TEXAS Health and Human Services | Texas Department of State Health Services

Emerging and Acute Infectious Disease Guidelines (EAIDG) 2025

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INTRODUCTION

The purpose of this handbook is to provide Texas' local and regional health departments a centralized resource for surveillance activities, and outbreak and reportable disease investigations. The hope is that this handbook will continue to grow over the years and highlight some of the best investigation practices in Texas.

This handbook will be reviewed annually by the **Texas Department of State Health Services (DSHS) Emerging and Acute Infectious Disease Unit (EAIDU)** and updated as needed. Disease investigation sections are individually maintained by these DSHS units (see table on the next page):

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EAIDU Teams & Diseases

Foodborne/ Waterborne	Healthcare Safety	High Consequence Infectious Disease	Invasive Respiratory Infectious Disease	Vaccine Preventable Disease	COVID-19
Botulism	Carbapenem-resistant *Enterobacterales* (CRE), CP-CRE	Ascariasis	Amebic Meningitis/ Encephalitis	Acute Flaccid Myelitis (AFM)	COVID-19
Campylobacteriosis	Vancomycin-intermediate *Staphylococcus aureus* (VISA)/ Vancomycin-resistant *Staphylococcus aureus* (VRSA)	Ebola	Legionellosis	Congenital Rubella Syndrome (CRS)	MIS-C
Cronobacter in infants					
Cryptosporidiosis	Candida auris (*C. auris*)	Hookworm	Novel Coronavirus (including MERS, SARS, etc.)	Diphtheria	
Cyclosporiasis		Mpox		*Haemophilus influenzae*, invasive disease	
Fascioliasis		Smallpox		Hepatitis A	
Hemolytic Uremic Syndrome (HUS)		Trichuriasis		Hepatitis B, acute and perinatal	
GI outbreaks		Viral Hemorrhagic Fever (non-Ebola)		Measles	
Hepatitis E				Meningococcal Disease	
Listeriosis				Mumps	
Norovirus outbreaks				Pertussis	
Paragonimiasis				Polio (paralytic and non-paralytic infection)	
Salmonellosis (non-typhoidal)				Rubella	

EAIDU Teams & Diseases

Salmonella Paratyphi				*Streptococcus pneumoniae,* invasive disease	
Salmonella Typhi				Tetanus	
Shiga toxin-producing *E. coli*				Varicella	
Shigellosis				Influenza A-Novel/Variant	
Vibriosis				Influenza-Associated Pediatric Mortality	
Yersiniosis					

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Acute Flaccid Myelitis

BASIC EPIDEMIOLOGY

Infectious Agent

There are multiple infectious agents that may be associated with acute flaccid myelitis (AFM). Conditions like AFM may be caused by a variety of factors, including several viruses:

- Enteroviruses
- West Nile Virus (WNV) and viruses in the same family as WNV, specifically Japanese encephalitis virus and South Louis encephalitis viruses, and
- Adenoviruses

Transmission

Mode of transmission is dependent on the infectious agent.

Incubation Period

Incubation period is dependent on the infectious agent.

Communicability

Although the underlying infection may be communicable, the condition of AFM is usually a rare complication.

Clinical Illness

Acute flaccid myelitis is a clinical syndrome characterized by sudden limb weakness (weakness or paralysis in one or more extremities, but not generalized to the entire body) and loss of muscle tone and reflexes. Some patients, in addition to the limb weakness, will experience:

- Facial droop/weakness
- Difficulty moving the eyes
- Drooping eyelids
- Difficulty with swallowing or slurred speech

Numbness or tingling is rare in patients with AFM, though some patients have pain in their arms or legs. Some patients with AFM may be unable to pass urine. The most severe symptoms of AFM are body temperature and blood pressure instability and respiratory failure that can happen when the muscles involved with breathing become weak. This can require urgent ventilator support (breathing machines).

DEFINITIONS

Clinical Case Definition

An illness with onset of acute flaccid limb weakness (low muscle tone, limp, hanging loosely, not spastic or contracted) of one or more limbs.

Laboratory Criteria for Diagnosis

- A magnetic resonance image (MRI) showing a spinal cord lesion with predominant gray matter* involvement and spanning one or more vertebral segments,
- Excluding persons with gray matter lesions in the spinal cord resulting from physician diagnosed malignancy, vascular disease, or anatomic abnormalities.

* Terms in the spinal cord MRI report such as "affecting mostly gray matter," "affecting the anterior horn or anterior horn cells," "affecting the central cord," "anterior myelitis," or "poliomyelitis" would all be consistent with this terminology. If still unsure if this criterion is met, consider consulting the neurologist or radiologist directly.

Case Classification

- **Confirmed:**
  - An illness with onset of acute focal limb weakness of one or more limbs **AND**
  - An MRI showing a spinal cord lesion with predominant gray matter*, † and spanning one or more vertebral segments.
- **Probable:**
  - An illness with onset of acute focal limb weakness of one or more limbs **AND**
  - An MRI showing spinal cord lesion where gray matter involvement is present, but predominance cannot be determined.
- **Suspect:**
  - An illness with onset of acute focal limb weakness of one or more limbs **AND**
  - An MRI showing spinal cord lesion in at least some gray matter and spanning one or more vertebral segments.

Other classification criteria: Autopsy findings that include histopathologic evidence of inflammation largely involving the anterior horn of the spinal cord spanning one or more vertebral segments.

Note: To provide consistency in case classification, review of case information and assignment of final case classification for all suspected AFM cases will be done by experts in national AFM surveillance. Final case determinations will be emailed to the respective Public Health Region.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of AFM. If an etiology is known and is a reportable condition (e.g., West Nile, varicella, or polio), the case should be investigated according to the etiology.

If the etiology is known and due to a non-reportable condition OR if the etiology is unknown, use this chapter for investigation purposes.

Case Investigation Checklist

- ☐ Confirm the clinical presentation of the patient.
- ☐ Ascertain what testing has been done, including lab testing, lumbar puncture, and MRI.
- ☐ Notify EAIDU of suspect case of AFM at **(800) 252-8239, (512) 776-7676, or AFMTexas@dshs.texas.gov.**
- ☐ Ask the treating physician, preferably the neurologist, to complete the Acute Flaccid Myelitis Patient Summary Form.

- EAIDU does NOT recommend that the LHD complete the form themselves.

- ☐ Submit the *Acute Flaccid Myelitis: Patient Summary Form* to EAIDU.
- ☐ CDC also requires (send to EAIDU):
  - History & Physical (H&P)
  - MRI report of the brain and spine
  - MRI images of the brain and spine uploaded to Ambra (contact EAIDU for link and CDC ID#)
  - Neurology consult notes for brain and spine
  - Vaccination record
  - Diagnostic laboratory reports
  - EMG report (if done)
  - Infectious disease consult notes (if available)
  - MRI images should, ideally, be sent via the CDC Ambra portal and are not required to be sent at the time of initial *Patient Summary Form* and medical record information.
  - In the event of a death, also send:
    - Hospital discharge summary
    - Death certificate
    - Autopsy report.
  - EAIDU will obtain approval from CDC for testing.
- ☐ Collect specimens, if possible, within 24 hours of onset of limb weakness, and to submit to DSHS Austin laboratory (Table 1). CDC has requested LHDs and providers **do not submit directly to the CDC.**
- ☐ DSHS Austin laboratory will forward appropriate specimens onto the CDC for testing.
- ☐ Complete 60 Day Follow Up section and 6-Month Follow Up Section of *Acute Flaccid Myelitis: Patient Summary Form* and submit to EAIDU, based on date of limb weakness onset date.

Control Measures

Control measures will depend on the causative agent; however, proper hand hygiene will help in controlling spread. Standard precautions in healthcare facilities should be implemented.

Exclusion

Anyone with a fever should be excluded from work or school until 24 hours have passed fever-free without the use of an anti-fever medication. Anyone with diarrhea should be excluded from work or school until 24 hours have passed diarrhea-free without the use of an anti-diarrheal medication. If the etiology is determined, there may be additional exclusion criteria that apply.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak of AFM is suspected, notify the regional DSHS office or EAIDU at (**512) 776-7676**.

- Because AFM is rare, epi-links between cases are not common. Outbreaks may be detected by CDC; however, if an outbreak is suspected, contact the appropriate DSHS office.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public

Reporting Requirements
Acute flaccid myelitis is not currently a reportable condition in and of itself. However, certain illnesses that cause AFM (e.g., polio, varicella, West Nile) may be reportable and should be reported according to Texas Administrative Code (TAC) requirements for these conditions.

EAIDU requests that patients with suspected AFM be reported within one week to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Email the *Acute Flaccid Myelitis: Patient Summary Form* as soon as possible to EAIDU. The form is needed to facilitate lab testing with CDC.
    - Forms should be emailed once enough information has been collected to establish that a patient meets the clinical presentation of acute flaccid limb weakness.
        - MRI images upload are not required to be sent at the time of Patient Summary Form and medical record information. However, the patient must have an MRI and lumbar puncture done to be submitted for CDC review. These should be submitted as promptly as possible. The CDC cannot review the patient without these.
        - In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.
    - Investigation forms may be faxed to **512-776-7616**, emailed securely to AFMTexas@dshs.texas.gov or mailed to:
      Emerging and Acute Infectious Disease Unit
      Texas Department of State Health Services
      Mail Code: 1960 PO Box 149347
      Austin, TX 78714-9347

- Fax, send secure email, or mail completed *Acute Flaccid Myelitis Patient Summary Form* 60 day follow up and 6 month follow up section once completed.
- Enter the investigation into NEDSS while waiting for case status confirmation from CDC.
    - Use "suspect" case status until determined
    - Enter the date of determination by CDC into the General Comments once available

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676.**

LABORATORY PROCEDURES

Prior to shipping, coordinate with EAIDU Central Office staff regarding specimens shipped.

Clinicians treating patients meeting the AFM case definition should pursue laboratory testing of CSF, blood, serum, respiratory, and stool specimens for enteroviruses, West Nile virus, and other known infectious etiologies at their usual clinical and reference laboratories. Clinicians may contact the local health department and/or DSHS for assistance with any testing that is not available locally. Specimens should not be shipped to DSHS without first consulting with the local health department.

Clinicians should collect specimens from patients suspected of having AFM as early as possible in the course of illness, preferably on the day of onset of limb weakness. Early specimen collection has the best chance to yield a diagnosis of AFM. The specimens which should be collected include the following:

- Cerebrospinal fluid (CSF) **AND**
- Blood (serum and whole blood), **AND**
- Stool (preferably two raw stool specimens collected as soon after onset of limb weakness and separated by 24 hours. Please do not send a rectal swab.) **AND**
- Nasopharyngeal swab (NP/OP) only if patient tested positive for enterovirus/rhinovirus

CDC advises overnight shipment of available clinical specimens, within 24-48 hours of specimen collection, if possible, from patients that meet the clinical case definition. Please ship specimens overnight so they arrive at DSHS Lab in Austin on Tuesday through Friday. Do not ship specimens on Friday or over the weekend.

For specimens that should be frozen, please freeze them at -20°C and make arrangements to ship the specimens overnight to DSHS Lab in Austin frozen on dry ice.

For specimens that should be sent refrigerated, please store them at 4°C and make arrangements to ship the specimens overnight to DSHS Lab in Austin on cold packs. Specimens should not have direct contact with the cold packs during shipping.

Specimens from each patient should be shipped with completed hard copies of the following:

- The Acute Flaccid Myelitis Patient Summary Form
- Submitters do not need to complete the CDC specimen submission form 50.34. The DSHS laboratory will complete this.
- A G-2V form must be submitted to the DSHS Austin laboratory for each individual specimen being submitted. For example, if you submit two stool specimens there should be 2 G-2V forms.

If ten or more patient specimens are submitted, please provide an electronic line listing by email. Use the following headers in this order: patient ID number; date of birth; sex; onset date; fatal y/n; specimen ID number; specimen collection date; specimen type; if culture isolate–cell line and passage number.

Prior to shipping, coordinate with Central Office staff regarding specimens shipped.

Additional instructions regarding specimen collection, storage, and shipping can be found at: https://www.cdc.gov/acute-flaccid-myelitis/hcp/diagnosis-testing/index.html

TABLES

Table 1: Specimens to collect and send to CDC for testing for Patients Under Investigation (PUIs) for AFM

Specimen Type	Minimum Amount	Collection	Storage	Shipping	Comments
Required Specimens					
Cerebro-spinal fluid (CSF)	1 mL	Spun and processed; standard cryovial tube; collect at same time or within 24 hours of serum if possible	Freeze at - 70°C	Ship on dry ice	CSF will be used for special studies; EV/RV testing will be batched and results returned as sample amount allows
Serum*	0.4 mL	Spun and processed; Tiger/ red top tube; collect at the same time or within 24 hours of CSF if possible	Freeze at - 70°C	Ship on dry ice	Serum will be used for special studies; no individual results will be returned
Stool (Whole stool (preferred)	≥1gram	Collect in sterile container, no special medium required, not a rectal swab†	Freeze at - 20°C**	Ship on dry ice	Results for EV/RV and poliovirus testing will be returned as testing completed (within 14 days)
Respiratory - NP/OP swab	1ml	Store in viral transport medium	Freeze at - 20°C**	Ship on dry ice	EV/RV testing and typing will be performed and results returned within 10 days of sample receipt
In the event of death, please send the following specimens, if possible					
Fresh-frozen tissue		Place directly on dry ice or liquid nitrogen	Freeze at - 70°C	Ship on dry ice	Representative sections from various organs are requested, but particularly from brain/spinal cord (including gray and white matter), heart, lung, liver, kidney, and other organs as available.

Specimen Type	Minimum Amount	Collection	Storage	Shipping	Comments
Formalin-fixed or formalin-fixed, paraffin-embedded tissue		Avoid prolonged fixation—tissues should have been fixed in formalin for 3 days, then transferred to 100% ethanol	Room temp-erature	Ship at room temperature with paraffin blocks in carriers to prevent breakage	See comment above regarding frozen tissue

***If any of the serum samples that you are sending to CDC were collected after the patient had received intravenous immune globulin (IVIG), steroid treatments, or plasmapheresis/plasma exchange, please indicate the date of that therapy on the Patient Summary Form.**

† The negative predictive value is very low for rectal swabs since the amount of fecal material collected is much less than for stool.

****All specimens may be stored at -70ºC for ease of shipping.**

NOTE: If specimens cannot be shipped within 24-48 hours of collection, consider recollection, if feasible.

REVISION HISTORY

November 2021
- Minor revisions

January 2021
- Updated case definition
- *Acute Flaccid Myelitis: Patient Summary Form* including updated medical record requirements and 60 day follow up section, 6 month, and 12 month follow up sections.
- Specimens should be sent through DSHS Austin laboratory and not directly to the CDC
- Updated information that CDC will review suspect AFM patients with limb weakness from prior years.
- Updated process for CDC review
- Specimen collection tables were updated to reflect changes to testing procedures at the CDC

December 2022
- Outbreak situations

September 2023
- Updated website links

Amebic Meningitis/Encephalitis

BASIC EPIDEMIOLOGY

Infectious Agent

Naegleria fowleri, Acanthamoeba spp*.* and *Balamuthia mandrillaris* are microscopic, free-living amebae (single-celled living organisms). *Naegleria fowleri* is the causal agent of primary amebic meningoencephalitis (PAM), while *Acanthamoeba* spp. and *Balamuthia mandrillaris* are the causal agents of granulomatous amebic encephalitis (GAE).

- *Naegleria fowleri* is a heat-loving (thermophilic), free-living ameba (single-celled microbe) commonly found around the world in warm fresh water (e.g., lakes, rivers, hot springs) and soil. *N. fowleri* is the only species of *Naegleria* known to infect people. Most of the time, the ameba lives in freshwater habitats by feeding on bacteria. However, in rare instances, the ameba can infect humans by entering the nose during water-related activities.
- *Acanthamoeba* species are found worldwide. Most commonly the amebae are found in soil, dust, fresh water, brackish water (e.g., a marsh) and sea water. *Acanthamoeba* spp. can also be found in swimming pools, hot tubs and drinking water systems (e.g., slime layers in pipes and taps), as well as in heating, ventilating and air conditioning (HVAC) systems and humidifiers. Several species of *Acanthamoeba*, including *A. culbertsoni, A. polyphaga, A. castellanii, A. astronyxis, A. hatchetti, A. rhysodes, A. divionensis, A. lugdunensis* and *A. lenticulata* are implicated in human disease.
- *Balamuthia mandrillaris* is found in soil and believed to enter the body through skin wounds and cuts, or when dust containing *Balamuthia mandrillaris* is breathed in or gets in the mouth. Exposure to *Balamuthia mandrillaris* is likely to be common because of how widespread the ameba is in the environment. However, very few cases of disease in humans have been found worldwide since *Balamuthia mandrillaris* was discovered.

Transmission

Naegleria fowleri

Transmission of *N. fowleri* to humans occurs when water containing the ameba enters the body through the nose. Trophozoites infect humans or animals by penetrating the nasal tissue and migrating to the brain via the olfactory nerves causing primary amebic meningoencephalitis. Exposure occurs when people go swimming or diving in warm freshwater places, like lakes and rivers. People do not become infected by drinking contaminated water. In very rare instances, *Naegleria* infections may also occur when contaminated water from other sources (e.g., inadequately chlorinated swimming pool water or contaminated tap water) enters the nose. Some examples are when people submerge their heads or cleanse during religious practices, and when people irrigate their sinuses (nose) using contaminated tap water. It is also possible that *Naegleria* infection could be acquired through transplantation of organs from an infected donor.

Acanthamoeba spp.

Acanthamoeba spp. can enter the body through the eye, the nasal passages,

cuts or skin wounds or by being inhaled into the lungs. The trophozoites are the infective forms, although both cysts and trophozoites enter the body through various means. When *Acanthamoeba* spp. enter the eye they can cause severe keratitis in otherwise healthy individuals, particularly contact lens users. When the ameba enters the respiratory system or through the skin, it can invade the central nervous system by hematogenous dissemination causing granulomatous amebic encephalitis (GAE) or disseminated disease, or skin lesions in individuals with compromised immune systems.

Balamuthia mandrillaris
Balamuthia mandrillaris GAE occurs when the amebae infect the body, possibly through skin wounds and cuts, or when dust containing *Balamuthia* is breathed in through the nose or mouth. The trophozoites are the infective forms, although both cysts and trophozoites gain entry into the body through various means. Entry can occur through the nasal passages to the lower respiratory tract, or through ulcerated or broken skin.
When *B. mandrillaris* enters the respiratory system or through the skin, it can invade the central nervous system by hematogenous dissemination causing granulomatous amebic encephalitis (GAE) or disseminated disease. The ameba can also cause skin lesions in individuals who are immune competent as well as those with compromised immune systems. *Balamuthia mandrillaris* infection also may be acquired through transplantation of infected donor organs.

Incubation Period and Illness Duration
Naegleria fowleri:

- Incubation period: Symptoms start 1-9 days (median 5 days) after exposure
- Duration of illness: Death occurs 1-18 days (median 5 days) after symptoms begin

Balamuthia mandrillaris and *Acanthamoeba* spp.:

- Incubation period: Weeks to months (or longer)
- Duration of illness: Weeks to months

Communicability
Amebic meningitis/encephalitis is not spread person-to-person (except in the case of transmission through transplantation of organs from an infected donor).

Clinical Illness
Primary amebic meningoencephalitis (PAM)
Infections with *Naegleria fowleri* cause the rare disease PAM, a brain infection that leads to the destruction of brain tissue. Infection can occur in young immune-competent individuals. In its early stages, the infection may be similar to bacterial meningitis. Initial symptoms of PAM start 1 to 9 days after infection. Initial symptoms may include headache, fever, nausea, or vomiting. Later symptoms may include stiff neck, confusion, lack of attention to people and surroundings, a loss of balance, seizures and hallucinations. These symptoms are followed by coma and death. After the start of symptoms, the disease progresses rapidly and death occurs within 18 days, usually on the fifth or sixth day.

Granulomatous amebic encephalitis (GAE)
GAE - caused by *Balamuthia mandrillaris* and *Acanthamoeba* species - often has a slow, insidious onset and then develops into a subacute or chronic disease lasting several weeks to months. However, *B. mandrillaris* infections associated with organ transplantation have an especially rapid clinical course.

GAE caused by *Acanthamoeba* spp. can cause a serious infection of the brain and spinal cord. Symptoms may include headaches, stiff neck, nausea and vomiting, tiredness, confusion, lack of attention to people and surroundings, loss of balance and bodily control, seizures and hallucinations. Symptoms progress over several weeks and death usually occurs. Skin infections do not necessarily lead to disseminated disease.

GAE and disseminated infection are very rare forms of *Acanthamoeba* spp. infection and primarily affect people with compromised immune systems. While unusual, disseminated infection can also affect healthy children and adults. Conditions that may increase a patient's risk for GAE and disseminated infection include AIDS, organ/tissue transplant, steroids or excessive use of antibiotics, diabetes mellitus, cancer, disorders in which white blood cells in the lymphatic tissue are over-produced or abnormal, disorders in which blood cells or blood clotting mechanisms do not function properly or are abnormal, liver cirrhosis and lupus.

Balamuthia mandrillaris infection can cause a wide range of symptoms. Disease can begin with a skin wound on the face, trunk or limbs and can then progress to the brain where it causes GAE. Diagnosis of *Balamuthia mandrillaris* GAE can be difficult, but some early symptoms may include headaches, stiff neck or head and neck pain with neck movement, sensitivity to light, nausea, vomiting, lethargy and low-grade fever. Other signs of *Balamuthia mandrillaris* GAE may include behavioral changes, seizures, weight loss, partial paralysis, speech difficulties and difficulty walking. *Balamuthia* can also cause a widespread infection involving multiple body parts. The disease might appear mild at first but can become more severe over weeks to several months. *Balamuthia mandrillaris* GAE is a very rare but usually fatal disease. Overall, the outlook for people with this disease is poor, although early diagnosis and treatment may increase the chances for survival.

Balamuthia mandrillaris is able to infect anyone, including healthy people. Those at increased risk for infection include people with HIV/AIDS, cancer, liver disease or diabetes mellitus; people taking immune system inhibiting drugs; alcoholics; young children or the elderly and pregnant women.

Severity
PAM and GAE cases are often fatal. The fatality rate for PAM is over 97%. Only 4 people out of 143 known infected individuals in the United States from 1962 to 2016 have survived. The death rate for *Balamuthia mandrillaris* GAE is more than 89% and the death rate for *Acanthamoeba* GAE is more than 90%.

DEFINITIONS

Amebic meningitis/encephalitis is classified as either primary amebic meningoencephalitis (if it is caused by *Naegleria fowleri*) or as Other Amebic

Meningitis/Encephalitis (if it is caused by another ameba). See the case definitions for both conditions below.

Clinical Case Definition of PAM

An infection presenting as meningoencephalitis or encephalitis. The clinical presentation of PAM is like that of acute meningitis caused by other pathogens and symptoms include headache, nausea, vomiting, anorexia, fever, lethargy, and stiff neck. Disorientation, mental status changes, seizure activity, loss of consciousness, and ataxia may occur within hours of initial presentation. After the onset of symptoms, the disease progresses rapidly and usually results in death within 3 to 7 days.

Laboratory Confirmation of PAM

Detection of *Naegleria fowleri* from a clinical specimen via:

- Detection of nucleic acid (e.g., PCR), **OR**
- Detection of antigen (e.g., immunohistochemistry)

Note: When available, molecular characterization (e.g., genotype) should be reported.

Comments: *Naegleria fowleri* might cause clinically similar illness to bacterial meningitis, particularly in its early stages. Definitive diagnosis by a reference laboratory is required. Unlike *Balamuthia mandrillaris* and *Acanthamoeba* spp., *N. fowleri* is commonly found in the CSF of patients with PAM.

Case Classifications for PAM

- **Confirmed**: A clinically compatible case that is laboratory confirmed
- **Probable**: A clinically compatible case that meets at least one of the supportive laboratory criteria (listed below) and does not meet confirmatory lab criteria
    - Supportive laboratory evidence:
        - Visualization of motile amebae in a wet mount of CSF
        - Isolation of *N. fowleri* in culture from a clinical specimen

Clinical Case Definition of Other Amebic Meningitis/Encephalitis

An infection presenting as meningoencephalitis or encephalitis. Granulomatous amebic encephalitis (GAE) can include general symptoms and signs of encephalitis such as early personality and behavioral changes, depressed mental status, fever, photophobia, seizures, nonspecific cranial nerve dysfunction, and visual loss. GAE neurologic infections are generally fatal within weeks or months; however, a few patients have survived.

Laboratory Confirmation of Other Amebic Meningitis/Encephalitis

Detection of *Acanthamoeba*, *Balamuthia*, or another non-*Naegleria* free-living ameba from a clinical specimen or culture via:

- Detection of nucleic acid (e.g., PCR), **OR**
- Detection of antigen (e.g., immunohistochemistry)

Comments: *Acanthamoeba* spp. and *B. mandrillaris* can cause clinically similar illnesses and might be difficult to differentiate using commonly available laboratory procedures. Definitive diagnosis by a reference laboratory might be required. A negative test on CSF does not rule out *Acanthamoeba* spp. or *B. mandrillaris* infection because these organisms are not commonly present in

the CSF.

Case Classifications for Other Amebic Meningitis/Encephalitis

- **Confirmed**: A clinically compatible case that is laboratory confirmed
- **Probable**: No probable case definition

Note: *Acanthamoeba* species and *Balamuthia mandrillaris* can also cause disseminated disease (affecting multiple organ systems) or cutaneous disease. For *B. mandrillaris* disease, painless skin lesions appearing as plaques a few millimeters thick and one to several centimeters wide have been observed in some patients, especially patients outside the U.S., preceding the onset of neurologic symptoms by 1 month to approximately 2 years. Skin lesions and sinus disease may be seen in *Acanthamoeba* disease. Amebic Keratitis, disseminated disease and cutaneous disease caused by free-living amebae are only voluntarily reportable in Texas unless they progress to meningitis or encephalitis**.**

Cluster and Outbreak Definitions for PAM and Other Amebic Meningitis/Encephalitis

- Cluster:
  - Two or more cases linked by place of residence or places visited within 1 year
- Outbreak:
  - Two or more cases associated with the same body of water or other common water exposure event/practice (e.g., Neti pot usage for nasal irrigation) within 1 year

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of suspected amebic meningitis or encephalitis. Primary amebic meningoencephalitis cases tend to receive substantial amounts of attention from the community and the media.

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition.
- ☐ Arrange for specimens to be sent to the Centers for Disease Control and Prevention (CDC) (if specimens have not already been sent).
- ☐ Review medical records or speak to an infection preventionist or physician to verify that the case meets case definition, and to obtain information on underlying health conditions and course of illness.
- ☐ Interview the case (or surrogate) to identify risk factors.
  - If multiple attempts were made to contact the case or surrogate and attempts were unsuccessful, please fill out the case investigation form with as much information as possible and indicate the reason for missing information (e.g., lost to follow-up - patient did not return call; multiple messages left).
- ☐ Ensure that appropriate control measures are implemented (see Control Measures section, below).
- ☐ Complete the Free Living Ameba Case Report form (available at http://www.dshs.texas.gov/eaidu/investigation) and fax or secure email

it to DSHS (IRID@dshs.texas.gov).

- ☐ Enter and submit for notification in the NEDSS Base System (NBS) all confirmed and probable case investigations.

Control Measures

Naegleria fowleri

- Provide education on primary amebic meningoencephalitis (PAM) as needed with emphasis on the rarity of disease.
  - Although infections are severe, the risk of *Naegleria fowleri* infection is very low. There have been 30 reported infections in the U.S. during the 10 years from 2000–2009, despite millions of recreational water exposures each year. By comparison, during the 10 years from 1996– 2005, there were over 36,000 drowning deaths in the U.S.
  - It is likely that a low risk of *Naegleria fowleri* infection will always exist with recreational use of warm freshwater lakes, rivers and hot springs. The low number of infections makes it difficult to know why some people have been infected compared to the millions of other people using the same or similar waters across the U.S.
  - The only way to prevent *Naegleria fowleri* infections is to refrain from water-related activities. For individuals who plan to take part in water-related activities, provide education on risk reduction (see below).
- Provide education on prevention of exposure. http://www.cdc.gov/parasites/naegleria/prevention.html
  - Avoid water-related activities in warm freshwater during periods of high water temperature.
  - Hold the nose shut, use nose clips, or keep your head above water when taking part in water-related activities in bodies of warm freshwater such as lakes, rivers or hot springs.
  - Avoid digging in, or stirring up, the sediment while taking part in water-related activities in shallow, warm freshwater areas.
  - *Naegleria fowleri* infections have been reported when people put their heads underwater, rinse their sinuses through the nose, and cleanse their noses during religious practices (e.g., ritual nasal rinsing and ablution) using contaminated tap or faucet water. If you perform nasal irrigation or sinus flushes (e.g., using a Neti pot) for any reason, be sure to use only sterile, distilled or lukewarm previously boiled water.
- Recommend that anyone experiencing symptoms be evaluated by a physician.
- Posting of signs mentioning the presence of *Naegleria fowleri* in bodies of water is not generally recommended since the *N. fowleri* ameba is ubiquitous in nature. There are no guidelines or supporting evidence for the posting or removal of such signs. Posting of safe swimming practices might be a preferred alternative.
- Several drugs are effective against *Naegleria fowleri* in the laboratory. However, their effectiveness in humans is unclear since almost all infections have been fatal even when people were treated. See the CDC's Primary Amebic Meningoencephalitis (PAM) treatment website for more

information on available treatments for patients with free-living ameba infections at Clinical Care of Naegleria fowleri Infection | Naegleria fowleri Infection | CDC.

Balamuthia mandrillaris and *Acanthamoeba* spp.

- There are no specific prevention and control measures for *B. Mandrillaris* and *Acanthamoeba* spp.
- Provide education on Granulomatous Amebic Encephalitis as needed with emphasis on the rarity of disease.
- Recommend that anyone experiencing symptoms be evaluated by a physician.
- Although infections are severe, the risk of *B. Mandrillaris* and *Acanthamoeba* spp. infection is very low. It mainly affects those who are immunocompromised.

School/Daycare Exclusion Criteria

No exclusion is required for disease control purposes.

MANAGING SPECIAL SITUATIONS

Multiple Cases Associated with a Single Water Source

If one or more cases occur that are associated with a single water source within a one-year period, notify the DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable, and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS within 30 days of receiving a report of a confirmed or probable case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completion of the investigation.
- Fax, securely email, or mail a completed investigation form when the NBS notification is submitted.
    - Investigation forms may be faxed to **512-776-7616,** securely emailed to the IRID Epidemiologist I or IRID team lead, or mailed to:

Infectious Disease Control Unit
Texas Department of State Health Services Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676**.
- For waterborne outbreaks, submit a completed **National Outbreak Reporting System (NORS)** outbreak form at the conclusion of the outbreak investigation.
    - Enter into NORS online reporting system at Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

It is recommended that CSF, serum and tissue specimens (including biopsy, surgical or necropsy specimens) be collected for the detection of free-living amebae (*Naegleria fowleri*, *Balamuthia mandrillaris* and *Acanthamoeba* spp.) and sent directly to the CDC along with the CDC Form for Free-living Amebae (FLA) Testing (request by emailing dpdx@cdc.gov) and the CDC 50.34 Submission Form (available at http://www.cdc.gov/laboratory/specimen-submission/index.html).

Clinicians who suspect amebic meningitis/encephalitis (including PAM) should contact their state health department and/or CDC (24/7 Emergency Operation Center - 770-488-1700). CDC can assist with diagnosis and provide treatment recommendations. Telediagnosis can be arranged at CDC by emailing photos through DPDx, CDC's Division of Parasitic Diseases and Malaria telediagnosis tool. Instructions for submitting photos through DPDx are available at the DPDx Contact Us page.

Important note: For CSF samples - Do NOT refrigerate or freeze; Do NOT centrifuge (Refrigeration or freezing will rapidly lyse and kill the amebae, preventing visual detection and identification.)

- The DSHS Parasitology Laboratory may be contacted for assistance and coordination in submitting specimen samples and electronic images to the CDC. The team lead, Cathy Snider, will work with the hospital to coordinate all CSF specimen shipments to the CDC.

Team Leader: Cathy Snider
Parasitology DSHS Parasitology Lab
1100 West 49th Street
Austin, TX 78756
Phone: 512-458-7560

Email: medical.parasitology@dshs.texas.gov

Specimen Collection
The following CDC guidelines are available at: About Naegleria fowleri Infection | Naegleria fowleri Infection | CDC. Tissue specimens - including biopsy, surgical or necropsy specimens - may be collected for the detection of free-living amebae (*Naegleria*, *Balamuthia* and *Acanthamoeba*).

Specimens Needed for Pre-Mortem Diagnosis Clinical Pre-Mortem Specimens for Diagnosis at CDC:

If possible, CDC requests that the following specimens be sent for diagnostic testing at CDC:

- Fresh CSF (Please DO NOT FREEZE and DO NOT REFRIGERATE as this kills the amebae)
- If the patient has had a biopsy, the following are also requested:
    - Fresh brain tissue (Please DO NOT FREEZE and DO NOT REFRIGERATE)
    - Formalin-fixed and paraffin embedded tissues
    - Three stained hematoxylin and eosin (H&E) slides

Specimens Needed for Post-Mortem and Autopsy Diagnosis
To better understand the pathogenesis of PAM and the potential for transmission via organ transplantation, CDC would like to encourage autopsies for PAM case patients whose families consent.

- CNS Tissue: *Naegleria fowleri* is most likely detected in biopsy or autopsy tissue collected from the area surrounding the nasal-olfactory bulbs in the brain. However, CDC requests that tissues be collected from other CNS sites in addition to the olfactory bulb to look for other possible locations of ameba entry into the brain, such as around the auditory nerve.
- Extra-CNS Tissue: All possible steps should be taken to minimize the possibility of cross-tissue contamination between CNS and extra-CNS tissues. These steps should, at a minimum, include:
    - Completing the gross examination and sample collection from all extra-CNS tissues prior to examination of the CNS tissues
    - Utilizing separate workspaces and dissecting tools for the extra-CNS and CNS tissues
    - Placing recovered samples of extra-CNS and CNS tissues in separate formalin containers
    - Processing all tissues, particularly extra-CNS and CNS, separately
    - Cutting extra-CNS and CNS tissues separately
        - If the same equipment is used to cut the tissue, cut extra-CNS tissues first and include a cleaning step in between different tissues.
        - Specimens can then be sent to CDC.

Clinical Specimens for Diagnosis at CDC

If possible, please send the following specimens:

- Fresh CSF (Please DO NOT FREEZE and DO NOT REFRIGERATE as this kills the amebae)
- Fresh, unfixed brain tissue
- Fresh, unfixed tissue (other than brain)
- Formalin-fixed, paraffin-embedded, tissue
    - Three H&E-stained slides
    - Six unstained slides (for indirect immunofluorescence, or IIF)
    - Paraffin-embedded tissue block
- Photos of gross brain morphology
    - Particularly around olfactory and auditory areas
- Serum

Submission Forms

- The FLA specimen submission form for free-living amebae (FLA) testing can be requested by emailing dpdx@cdc.gov. In addition, the CDC 50.34 Specimen Submission Form (available at http://www.cdc.gov/laboratory/specimen-submission/form.html) is also required for FLA testing.

Specimen Shipping

- Ship samples according to shipping guidelines and requirements available at http://www.cdc.gov/dpdx/diagnosticProcedures/other/FLA.html.
- Unfixed specimens for culture should be sent at ambient temperature by overnight priority mail. For PCR, sterile unfixed specimens or specimens in 70-90% ethanol should be sent by overnight priority mail on ice packs. Care should be taken to pack glass slides securely, as they can be damaged in shipment if not packed in a crush-proof container.
- **Please ship Monday through Thursday, overnight.** Packages cannot be accepted on weekends or federal holidays. Please send any fresh tissue, CSF, whole blood or serum specimens by overnight express:

CDC SMB/STAT Lab
Attn: Unit 53
1600 Clifton Road, NE
Atlanta, GA 30333
Ph: 404-718-4157; 404-718-4878

- For additional information about tissue specimens or shipping, please contact the CDC Division of Parasitic Diseases at dpdx@cdc.gov or 404-718-4110.

Digital Laboratory and Pathology Image Submission

- Please send your diagnostic request to dpdx@cdc.gov. When submitting your request, please include the following information along with your message:
    - Your name
    - Your affiliation
    - Your telephone contact number (optional)
- **PLEASE NOTE:** Effective immediately, the CDC's DPDx Team will require a **CDC 50.34 submission form** to be filled out and submitted with

images for diagnostic assistance in order to generate a formal, written laboratory report. This form must be submitted in a secure method to protect patient information. The CDC has a Sharefile system that should be used to submit the form and images. Please email the DPDx Team to request a one-time link to the Sharefile server to submit a case for diagnostic assistance. The Team will include a CDC CSID number for the case in the subject line when they email the link, and that number will be used for any subsequent correspondence (when necessary). The following steps describe the submission process:

- Send an email requesting diagnostic assistance to **dpdx@cdc.gov**. DO NOT include patient identifiers or images in the email requesting diagnostic assistance.
- The DPDx team will respond by email with a CDC Sharefile link, open this link in your browser.
- Upload your case images and **CDC 50.34 submission form**. Other supporting documents and communications such as questions, etc. can also be uploaded as word or text files.
- The DPDx team will receive notification once the files are uploaded and will respond via email with a preliminary diagnosis using the CDC CSID number assigned.
- An official, final diagnosis will be generated only if the CDC 50.34 is submitted.

REVISION HISTORY

October 2024

- Changed FLIA contact at DSHS
- Included Amebic Keratitis as voluntary reporting
- Minor grammar changes

December 2021

- Added IRID inbox email as a contact

January 2018

- Basic Epidemiology: updated the fatality rates for PAM and GAE
- Surveillance and Case Investigation: updated web addresses/links
- Reporting and Data Entry Requirements: added that completed case investigation forms may be sent to the IRID Epidemiologist I or IRID team lead by secure email
- Laboratory Procedures: updated "Specimens Needed for Pre-Mortem Diagnosis" information and updated the process for requesting diagnostic assistance from the CDC DPDx Team

Ascariasis

BASIC EPIDEMIOLOGY

Infectious Agent

Ascariasis is caused by what are generally called parasitic helminths or worms, commonly known as the small intestine roundworm and are given the scientific classification *Ascaris lumbricoides* and *Ascaris suum*. Both are parasitic worms in the phylum Nematoda. *Ascaris lumbricoides* is found in humans, and while *Ascaris suum* is most commonly found in pigs and can complete its lifecycle in the human. *Ascaris lumbricoides* is the most prevalent worldwide of all soil-transmitted helminths, normally addressed along with hookworm and Tricuriasis as a group.

Transmission

Transmission is primarily via ingestion of infectious eggs from soil contaminated with feces. Eggs are shed in an infected person's feces but do not become infectious until they have incubated in the soil for 2-3 weeks. Once they become infectious they can be transmitted via contaminated soil and water, agriculture products contaminated with human or pig feces, fingers (especially children), or fomites.

Incubation Period

For Ascariasis, the time from egg ingestion to the development of an egg-laying adult resulting in eggs being shed in the feces in 8-12 weeks. Within the human the lifecycle progresses as follows: upon being ingested and reaching the duodenum, larvae are released and enter the circulation via the enteric mucosa, and travel to the liver and the lungs within 1-2 weeks. In the lungs, they pass into the alveoli, travel through the respiratory tract to the mouth and are swallowed which takes another 3-4 weeks. Eventually they reach the small intestine. Once in the small intestine they develop into adult worms, a process that takes about 4-6 weeks.

Communicability

Human to human transmission of *Ascaris* spp. does NOT occur because part of the worm's life cycle must be completed in soil before becoming infectious. Soil contamination is perpetuated by fecal contamination from infected humans for *Ascaris lumbricoides* and humans (rarely) or pigs for *Ascaris suum*. An infected person may shed eggs for as long as they are infected with an egg-laying adult which may be several years.

Clinical Illness

Most infections with Ascaris spp. are asymptomatic. Live worms, passed in stools or occasionally from the mouth, anus, or nose, are often the first recognized sign of infection. Larval migration may result in pulmonary manifestations such as wheezing, cough, fever, eosinophilia, and pulmonary infiltration in some patients. Light infections may result in minor abdominal discomfort, dyspepsia, and loss of appetite. Heavy infections may result in severe abdominal pain, fatigue, vomiting, or weight loss. In children, infections, symptomatic or asymptomatic, resulting in nutrient deficiencies can cause delayed growth and/or cognitive impairment. Serious

complications are rare but can be fatal and include intestinal obstruction by a bolus of worms, or obstruction of bile duct, pancreatic duct or appendix by one or more adult worms. When symptoms do occur, they occur most often during the late phase adult worm intestinal stage, 6-8 weeks after egg ingestion, but may also occur during the early phase larval migration state, at 4-16 days following egg ingestion, as transient respiratory symptoms, and eosinophilic pneumonitis.

DEFINITIONS

Clinical Case Definition

For ascariasis, most cases are asymptomatic and are confirmed to have the disease through laboratory testing. For symptomatic cases early symptoms of ascariasis occur during larval migration and include cough, wheezing, pneumonitis and eosinophilia. Minor infections may manifest as abdominal discomfort or loss of appetite. Major infections may result in obstruction and inflammation of intestinal organs (appendicitis, pancreatitis etc.), vomiting (possibly accompanied by expulsion of adult worms), weight loss, and fatigue. In children, nutrient deficiency, growth retardation, and cognitive impairment may also be present.

Laboratory Confirmation

- Microscopic identification of *Ascaris* spp. (*A. lumbricoides* or *A. suum*) eggs in stool specimens **OR**
- Microscopic identification of ascarid larvae in sputum or gastric washings, **OR**
- Examination of adult worms identified as *A.lumbricoides* or *A. suum* passed from the anus, mouth or nose

Case Classifications

- **Confirmed:** A case that is laboratory confirmed
- **Probable**: A clinically compatible case where imaging shows evidence of infection such as, but not exclusive to:
    - An ultrasound showing worms in the pancreas or liver or
    - CT or MRI scans showing worms present in the ducts of the liver or pancreas.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of ascariasis. Investigations should include an interview of the case or a surrogate to get a detailed exposure and travel history. Please use the Ascariasis Investigation Form available on the DSHS website: http://www.dshs.texas.gov/eaidu/investigation/

Note:

- If an imported case (acquired outside of Texas) of Ascariasis is diagnosed/identified in a refugee with a current Texas address, it should be investigated and counted as a Texas case. If a case currently has an address outside of your jurisdiction or the refugee plans to move to another state or country, fax the available investigation information, with the new address, to DSHS EAIDU. This

information will be forwarded to the appropriate jurisdiction.
- Cases include Texans who acquired the disease while travelling out of the country.
- Disease may be acquired within Texas.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors, and describe course of illness.
- ☐ Interview the case to get detailed exposure history and risk factor information.
    - Use the **Ascariasis Investigation Form** to record information from the interview.
    - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
    - If the case did not travel internationally during the previous two years (or during their lifetime if less than two years old) and may have been exposed to a within-jurisdiction soil environment hospitable to helminths, carry out an in-person investigation at the exposure site. If applicable, interview others exposed at the site such as household members about their exposure and travel histories. Arrange for specimen collection from other exposed individuals. Contact DSHS Central Office at the Emerging and Acute Infectious Disease Unit to arrange environmental sampling if warranted.
    - Provide education to the case or his/her surrogate about effective handwashing, food safety practices, and the possibility of transmission if soil is contaminated. See Prevention and Control Measures.
- ☐ Please upload a copy of the investigation form to NBS or if another surveillance system is used, send the form via secure file transfer protocol, or email an encrypted copy of the investigation form to Central Office and the Regional Office.
    - Make three attempts to contact a case on different days and at different times of day before classifying the case as lost to follow-up (LTF). If the cases may have acquired the disease locally, call the case LFT after attempting to contact them in-person, when resources permit. For (LFT) cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and indicate the reason for any missing information.
- ☐ If the case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water.

- Proper disposal of human waste products, such as feces, is necessary to prevent contamination of soil.
- Avoid areas where human waste contamination of soil or water is likely.
- Proper removal and disposal of pet waste from outdoor areas.
- Thoroughly wash fruits and vegetables to remove soil/fertilizer residue.
- Thoroughly cook all fruits and vegetables that may have been in contact with soil produced from human and animal waste.
- Provide information about services for testing and treating exposed persons.

Exclusions

There is no human-to-human transmission of ascariasis therefore no exclusion from work, school or daycare is required for disease control purposes unless the individual has diarrhea. If the individual has diarrhea, the standard exclusion until diarrhea free for 24 hours without the use of diarrhea suppressing medications applies. Diarrhea is defined as 3 or more episodes of loose stools in a 24- hour period.

MANAGING SPECIAL SITUATIONS

Outbreaks/Clusters

If an outbreak or cluster is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, race/ethnicity, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and exposure to a soil environment hospitable to helminths and where the exposure occurred (e.g., farm, ranch, domicile lacking adequate plumbing, recreational area, or another occupational site), possible zoonotic transmission (e.g., exposure to pig manure), and the patient's travel history (e.g., travel location, duration, household members who traveled).

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Risks	Notes
1	NT	34	F	White/non-Hispanic	12/4/16	Diarrhea, Anemia	Travel to Vietnam, lives in same neighborhood	Brother ill

							as ID 2	
2	PR	4	M	Unknown	11/30/16	Anemia, bloody stool	Poor sanitation near home, lives in same neighborhood as ID 1	Lost to follow up (LTF)

- If the outbreak was reported in association with an apparent common risk factor (e.g., work or live near a possible site of soil contamination, members of the same household with similar travel), recommend that anyone displaying symptoms seek medical attention from a healthcare provider.
- If several cases in the same family or geographic area are identified and there is a possibility for similar exposures (e.g., travel to the same country, poor sanitation), testing of potentially exposed persons or mass treatment may be warranted.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Please upload a copy of the investigation form to NBS or if another surveillance system is used, send the form via secure file transfer protocol or email an encrypted copy of the investigation form to Central Office and the Regional Office.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676.**

LABORATORY PROCEDURES

Fecal Ova and Parasite testing for helminth eggs (fecal O&P examination) is widely available from most private laboratories, as well as the DSHS laboratory for specimen submission.
Adult worm specimen identification may not be available at private laboratories therefore submission
to the DSHS laboratory is available and highly recommended. Contact EAIDU to discuss further if needed.

Specimen Collection

- Submit a stool specimen in an O&P stool collection kit (5-10 % formalin & Zn-PVA fixatives).
    - Required volume: Stool 5 g solid or 5 mL liquid.
- Adult worms should be submitted in either 5-10% formalin or 70% ethanol.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name and date of birth or medical record number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, diagnosis/symptoms, and all required fields.

Specimen Shipping

- Transport temperature: May be shipped at ambient temperature.
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday, or state holiday, unless special arrangements have been pre- arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services 1100 West 49th St
Austin, TX 78756-3199
Attn. Walter Douglass (512) 776-7569

Possible Causes for Rejection:

- Specimen not in correct transport medium.
- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Unpreserved specimen received greater than 24 hours after collection. (Specimen may still be submitted as an attempt will be made to complete testing on compromised material.)
- Call Medical Parasitology Lab (512) 776-7560 with specific questions about specimen acceptance criteria.

REVISION HISTORY

March 2021

- Entire section updated

Botulism

***Initial calls or reports regarding suspect botulism should be referred to EAIDU for immediate evaluation and for approval of testing and/or release of antitoxin, if appropriate. If botulism is highly suspected (e.g., antitoxin is released or testing is approved), then the case will be forwarded to the appropriate regional or local health department for further investigation. ***

Please contact DSHS EAIDU at 512-776-7676 or 24/7 line 1-800-705-8868.

BASIC EPIDEMIOLOGY

Infectious Agent

Botulism is caused by neurotoxins produced by the bacterium *Clostridium botulinum*. *C. botulinum* bacteria form spores which can survive under a wide range of adverse environmental conditions, including high temperatures, such as boiling for less than ten minutes. Bacterial growth, however, (as opposed to spore survival) occurs only under anaerobic conditions and low acid (generally pH>4) and the toxin itself is produced as the bacteria are multiplying. There are seven types of botulinum toxin, designated A– G. In Texas, types A, B, and rarely E are the most common sources of human disease. The toxin is heat-labile, and can be inactivated by boiling for ten minutes.

Transmission

Foodborne botulism: caused by ingestion of pre-formed toxin. Most implicated foods are low acid, home-canned items inadequately processed during canning and not heated before consumption.
Rarely, commercial products are implicated, usually after a breakdown in standard canning procedures. Examples of implicated foods include:

- Home-canned asparagus, beans, and other vegetables (including low acid tomatoes and salsa), usually processed inadequately by the water-bath method;
- Fish that has been improperly canned, dried, smoked or stored;
- Sausages or other prepared meats, such as jerky, that are improperly processed (inadequate sodium nitrite) and improperly stored;
- Chopped or whole garlic, herbs, olives or vegetables bottled in oil;
- Among Alaskan Natives, traditionally preserved foods including fermented (putrefied) whale blubber, salmon heads, salmon eggs, and other marine products;
- Possibly home-pickled fish, eggs, vegetables and olives that have been inadequately prepared without the correct concentrations of salt and/or vinegar.
- Rare commercial canned products (e.g., commercially canned chili in 2007); products may be recalled even without cases if improper processing carries a risk of botulism.

Wound botulism: results from a local *C. botulinum* infection in devitalized tissue at a wound site, where semi-anaerobic conditions develop. Wound botulism has been rare, but increasingly reported, especially among persons who are injecting "black-tar" heroin.

Infant botulism: occurs when *C. botulinum* spores are ingested within food or soil and germinate in the preformed gut of infants under the age of 1 that have yet to develop mature intestinal flora. The germination of spores results in an intestinal infection in these infants, where the botulinum toxin is produced within the intestine and then enters the bloodstream causing symptoms. This is also known as intestinal botulism.

Inhalational botulism: does not occur naturally. Studies done with monkeys have shown that the toxin can be absorbed through the lung mucus membrane into the bloodstream. It is believed that if botulinum toxin were to be used as a bioweapon, it would be by this route.

Iatrogenic botulism: occurs from an accidental overdose or as an adverse event following the therapeutic or cosmetic injection of botulinum neurotoxin. Examples of therapeutic uses of botulinum toxin include treatment for hemifacial muscle spasms, focal dystonia, focal spasticity, autonomic disorders, Frey's syndrome and oculomotor disorders.

Incubation Period

Foodborne botulism: The incubation period for foodborne botulism usually 12-36 hours after toxin ingestion, but in rare cases can be as early as 6 hours or as late as 10 days after ingesting toxin. A short incubation is associated with more severe disease and larger toxin dose ingested.

Wound and latrogenic botulism: The incubation period can be up to two weeks or longer.

Infant botulism: The incubation period is unknown.

Inhalational botulism: Thought to be 12 –36 hours after inhalation but may take several days after exposure to low doses of toxin.

Communicability

No instance of secondary person-to-person transmission has been documented.

Clinical Illness

Early symptoms tend to be nonspecific and providers often do not suspect botulism until the symptoms become more severe. The hallmark symptoms of botulism are bilaterally symmetrical cranial nerve palsies, which result in slurred speech (dysarthria), difficulty swallowing (dysphagia), double vision (diplopia), and/or drooping eyelids (ptosis); the symptoms progress in a descending manner, causing weakness and possibly paralysis, including loss of respiratory function.

Botulism is frequently misdiagnosed in adults, most often as polyradiculoneuropathy (Guillain-Barré or Miller-Fisher syndrome), myasthenia gravis, or other diseases of the central nervous system.

The signs and symptoms of infant botulism are constipation, poor feeding

and/or weak sucking, drooping eyelids (ptosis), weak cry, dilated and/or sluggishly reactive pupils, poor head control, hypotonia ("floppy baby syndrome"), and respiratory difficulty.

DEFINITIONS

Note: There are 4 different categories of botulism used for reporting cases in NEDSS: Botulism, foodborne; Botulism, wound; Botulism, infant; and Botulism, other unspecified.

Botulism, Foodborne

Clinical Case Definition
Ingestion of botulinum toxin results in an illness of variable severity. Common symptoms are diplopia, blurred vision, and bulbar weakness. Symmetric paralysis can progress rapidly.

Laboratory Confirmation
- Detection of botulinum toxin in serum, stool/enema, gastric aspirate/vomitus or patient's food, **OR**
- Isolation of *Clostridium botulinum* from stool/enema, gastric aspirate/vomitus.

Case Classifications
- **Confirmed**: A clinically compatible case that is laboratory confirmed or that occurs among persons who ate the same food as persons who have laboratory confirmed botulism.
- **Probable**: A clinically compatible case with a history of ingestion of a food item known to carry a risk for the botulism toxin.

Botulism, Wound

Clinical Case Definition
An illness resulting from toxin produced by *Clostridium botulinum* that has infected a wound. Common symptoms are diplopia, blurred vision, and bulbar weakness. Symmetric paralysis can progress rapidly.

Laboratory Confirmation
- Detection of botulinum toxin in stool/enema or serum, **OR**
- Isolation of *Clostridium botulinum* from wound or stool/enema.

Case Classifications
- **Confirmed**: A clinically compatible case that is laboratory confirmed in a patient who has no suspected exposure to contaminated food and who has a history of a fresh, contaminated wound during the 2 weeks before onset of symptoms, or a history of injection drug use within the 2 weeks before onset of symptoms.
- **Probable:** A clinically compatible case in a patient who has no suspected exposure to contaminated food and who has either a history of a fresh, contaminated wound during the 2 weeks before onset of symptoms, or a history of injection drug use within the 2 weeks before onset of symptoms.

Botulism, Infant

Clinical Case Definition
An illness of infants (a child aged less than 1 year), characterized by constipation, poor feeding, altered cry, and "failure to thrive" that can be followed by progressive weakness, impaired respiration, and death.

Laboratory Confirmation
- Detection of botulinum toxin in stool/enema or serum, **OR**
- Isolation of *Clostridium botulinum* from stool/enema.

Case Classification
- **Confirmed**: A clinically compatible case that is laboratory confirmed, occurring in a child aged less than 1 year.

Botulism, Other Unspecified

Clinical Case Definition
Ingestion of botulinum toxin results in an illness of variable severity. Common symptoms are diplopia, blurred vision, slurred speech, difficulty swallowing and bulbar weakness. Symmetric descending paralysis can progress rapidly.

Laboratory Confirmation
- Detection of botulinum toxin in clinical specimen, **OR**
- Isolation of *Clostridium botulinum* from clinical specimen.

Case Classification
- **Confirmed**: A clinically compatible case that is laboratory confirmed in a patient aged greater than or equal to 1 year who has no history of ingestion of suspect food and has no wounds.

SURVEILLANCE AND CASE INVESTIGATION

Note: EAIDU should be directly involved in the evaluation and testing of suspect botulism cases because antitoxin (H-BAT or BabyBIG) can only be released by the CDC or California Infant Botulism Treatment and Prevention Program after consultation with the central office at the DSHS. This is done to ensure that the state health department is aware that there is a suspect case of botulism, as there is always the possibility of additional cases and a food source still in commerce if it is a suspect foodborne botulism case.

For suspect botulism consultations, please contact DSHS EAIDU at 512-776-7676 or 24/7 line 1-800-705-8868.

*** If botulism is highly suspected (e.g., antitoxin is released or testing is approved) then the case will be forwarded to the appropriate regional or local health department for further investigation.

Case Investigation
Local and regional health departments should investigate all reports of suspect botulism. Investigations should include an interview of the case or a

surrogate to get a detailed exposure history. Please use the Botulism Foodborne Alert Summary or the Infant Botulism Investigation Form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition (may have been done by EAIDU).
- ☐ Verify that the laboratory has sent a specimen to the DSHS laboratory (may have been done by EAIDU).
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to describe course of illness and outcome of case.
- ☐ Interview the case or surrogate to identify potential sources infections:

Foodborne Botulism

- ☐ Interview the case and others who may be able to provide pertinent information about foods eaten.
- ☐ A home visit is strongly recommended when home-canned foods are implicated, or if the source is not readily apparent.
- ☐ Ask about possible exposures 1–10 days before onset of symptoms, including:
    - Home-canned, vacuum-packed, or traditionally preserved foods. Foods to suspect as a source of illness are those eaten less than two days before onset, those that are low in acid (fish, meat, and vegetables), and those that were not eaten by other persons who remain well.
    - Commercially canned, vacuum packed foods or mishandled commercial products (e.g., refrigerated soup not kept cold after purchase); such products are implicated only rarely. For implicated foods, determine the brand, manufacturer, package size, lot number and location/date of purchase.
    - Preserved or traditionally prepared fish and marine products.
    - Items stored in oil (e.g., onions, garlic) or foil (e.g., baked potatoes.).
    - Sausages, preserved or traditionally preserved meats, and inadequately refrigerated meats; such products are implicated only rarely.
- ☐ Ask if any leftovers of any reported risky food items are still present in the home. Consult with EAIDU regarding possible testing of identified risky food items.
- ☐ Identify other potentially exposed persons. Obtain the name, address, and telephone number of every person who may have eaten the suspected food item, shared an environmental exposure or may have the suspect home-processed food in his or her possession.
- ☐ Obtain the organization name, contact telephone number, and attendance lists (particularly email or telephone lists) for every suspected gathering, public event, or other shared environmental exposure.
- ☐ Use the Botulism Foodborne Alert Summary to record information from the interview.

Wound Botulism

- ☐ Interview the case or surrogate to identify potential sources of infections:
  - Ask the patient about illicit injection drug use. Specifically, ask about the types of drugs used and how the drugs are used (e.g., injected into veins, injected into tissues, snorted, etc.) and whether they know other individuals with whom they used drugs.
  - In addition to illicit drug use, interview regarding potential foodborne exposures.

Infant Botulism

- ☐ Interview the case or surrogate to identify potential sources of infections:
  - The most common risk factors are exposure to dirt or dust (e.g., living near construction area, recent or current home remodeling), the ingestion of unpasteurized honey, consumption of herbal tea (e.g., chamomile tea), or using honey pacifiers. Although honey was associated with intestinal botulism in the past, it is rarely implicated in cases.
  - Use the Infant Botulism Investigation Form to record information from the interview.
- ☐ Fax completed forms to DSHS EAIDU at 512-776-7616 or email securely to an EAIDU epidemiologist at FOODBORNETEXAS@dshs.texas.gov.
- ☐ Hospitalized cases should be followed until discharge and patient's outcome recorded.
  - Initial reports can be sent to DSHS prior to discharge.
- ☐ In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Treatment

Treatment for botulism is based on the clinical picture and should never be delayed pending laboratory confirmation of the diagnosis. All patients require close monitoring of ventilatory status, and severe cases need aggressive supportive therapy. Additional therapies depend on the type of botulism and are outlined below:

- **Foodborne, Wound, Other (non-infant):** The Centers for Disease Control and Prevention (CDC) control the distribution of botulinum antitoxin (H-BAT), which is stocked at United States Public Health Service Quarantine Stations throughout the country. If antitoxin treatment is being considered, EAIDU will immediately consult with the CDC.

- **Infant Botulism:** A human-derived hyper immune globulin (BIG-IV or "Baby BIG") is approved by FDA for treatment of infants. Baby BIG can be obtained from the California Department of Health Services by calling their 24-hour number at 510- 231-7600. Consultations also available. EAIDU should also be contacted to

arrange for testing by the DSHS laboratory. Additional information about infant botulism is available at: http://www.infantbotulism.org/

Prevention and Control Measures

Foodborne botulism

- Strict hygienic procedures should be followed when home canning or pickling to properly sterilize products and prevent bacterial growth, thus reducing the contamination of foods.
- Oils infused with garlic, vegetables, fresh herbs or similar moist flavoring should be refrigerated.
- Potatoes which have been baked while wrapped in aluminum foil should be kept hot or thoroughly reheated before being served or refrigerated immediately.
- Because the botulism toxin is destroyed by high temperatures, persons who eat risky home- canned foods (i.e., low acidic, non-pickled foods) should consider boiling the food for a minimum of ten minutes before eating it to ensure safety. However, if a food is suspected or at risk of containing botulinum toxin, it should be discarded immediately, as uniform heating may not occur throughout the product or be of a sufficient temperature and/or length of time to destroy the toxin. Adequate pickling, the addition of sugar syrup, or sufficient brining should prevent the growth of *C. botulinum*.
- Instructions on safe home canning can be obtained from county extension services or from the United States Department of Agriculture.
    - Resources: USDA Complete Guide to Home Canning | National Center for Home Food Preservation

Wound botulism

- Wound botulism can be prevented by promptly seeking medical care for infected wounds and by not using injectable street drugs.
- Injection drug users and healthcare providers serving them should be educated regarding typical symptoms of botulism and the importance of rapid diagnosis and treatment. Potential routes for education include needle exchange programs, urban hospital emergency departments, or free clinics.

Infant botulism

- Honey can contain spores of *Clostridium botulinum* and may be a source of infection for infants, therefore children less than 12 months old should not be fed honey (raw or otherwise). Honey is safe for persons one year of age and older.

Iatrogenic botulism

- Iatrogenic botulism may be prevented by using commercially manufactured therapeutic botulinum toxin from medically approved sources and by avoiding injections above recommended doses.

Exclusions

No exclusion is required.

MANAGING SPECIAL SITUATIONS

Outbreaks

Botulism outbreaks are rare. Outbreaks of foodborne botulism have potential to be a public health emergency because the contaminated food may be eaten by other people. Rapid investigation of cases and outbreaks is critical for prompt treatment of likely cases, and for the identification of contaminated food vehicles and prevention of additional cases.

If an outbreak is suspected, **immediately** notify DSHS EAIDU **(512) 776-7676** or **24/7 line 1-800-705-8868**.

- Outbreak investigations should always be done in a collaborative manner involving local health department(s) with suspected or confirmed cases, the appropriate regional health department(s), an EAIDU botulism epidemiologist, DSHS Regulatory Services staff, and any appropriate federal agencies.
- If a food establishment or a commercial product is implicated, EAIDU will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the case(s).
- Outbreaks of infant botulism are rare. A food or formula product containing a high load of spores may be responsible for an outbreak. In 2018, four cases of infant botulism were reported across multiple jurisdictions in Texas and were linked to honey pacifiers purchased in Mexico.

The local/regional health department should:

- Review case information collected following the initial notification of any suspect individual case(s) already identified, including laboratory results, Foodborne Botulism Alert Summary forms, clinical histories, food histories, and any other information.
- Contact hospitals and healthcare providers in the appropriate areas of the state, or throughout the state if necessary, to alert them to the possibility of additional cases of foodborne botulism.
- Interview all cases suspected as being part of the outbreak or cluster if not done already.
- Prepare a line list of cases in your jurisdiction. At a minimum, information needed for the line list includes patient name, DSHS specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of botulism, and risky foods eaten, or other risky exposures reported by the case or surrogate.
- Encourage anyone with symptoms be evaluated by a healthcare provider.
- Communicate regularly with all parties involved in outbreak investigation
    - Provide Situation Reports through email.
    - Hold conference calls to discuss the outbreak investigation
- Report findings at conclusion of investigation:

- Create Outbreak Summary Report.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Botulinum Toxin as a Biological Weapon
B. *botulinum* toxin has been classified as a possible agent of bioterrorism due to its ability to be weaponized and because it is extremely potent and lethal. The toxin is also easy to produce and transport, and affected individuals often need extensive and prolonged intensive care. Dissemination through aerosol or food would be the most likely mode of spread. Aerosol dissemination could result in many cases of illness in a geographic area. Therefore, inhalational botulism produced by an act of bioterrorism should be considered for 2 or more botulism cases linked temporally and geographically but without a likely common foodborne or drug exposure. In such situations immediately call DSHS EAIDU at 512-776-7676 or 24/7 line 1-800-705-8868. The cases should be extensively interviewed to identify possible exposures such as gatherings, public events, specific geographic locations, large buildings, shopping areas, and public transportation.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **immediately** to the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Call DSHS EAIDU immediately when a botulism investigation is being conducted.
- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks **immediately** to the regional DSHS office or to EAIDU at **512-776-7676.**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric

illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Enter outbreaks into NORS online reporting system at Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

The DSHS laboratory in Austin is the only lab in Texas that can perform confirmatory testing for botulism. Specimens will be accepted by the DSHS lab only with prior approval by EAIDU. Please contact DSHS EAIDU at 512-776-7676 or 24/7 line 1-800-8868.

A preliminary laboratory result may be available in 3-5 days after the specimen arrivers and final result may take as long as 3 weeks. The decision to treat is based on the clinical picture and should not wait for laboratory confirmation. Generally, if the physician is not considering treatment with antitoxin, there is no need for laboratory testing.

The laboratory must be notified at 512-689-5537 prior to shipping any specimens.

Specimens should be collected prior to antitoxin administration.

Specimen Selection should be based on type of botulism suspected:

- Infant botulism
    - Stool or enema
    - Suspected sources will only be tested after confirmation of an infant case
- Foodborne or intestinal colonization
    - Stool or enema
    - Serum
    - Gastric/vomitus – not ideal but may be submitted
    - Suspected food sources will only be tested after confirmation of a human case
- Wound botulism
    - Wound swab or tissue – anaerobic
    - Serum
    - Stool or enema – only if foodborne botulism is also suspected

Specimen Collection

- Stool
    - 50 grams recommended for an adult
    - 10 grams recommended for an infant

    - Keep at 2º - 8º C. Do not freeze
    - A sterile water enema can be used to obtain a specimen from a non-stooling patient
- Vomitus or Gastric Aspirate
    - > 10 mL in sterile, leak-proof container
- Serum
    - 10ml minimum for an adult is recommended
    - Not recommended for infant testing
- Wound
    - 2 swabs from deep in the wound or tissue from a biopsy in anaerobic transport media
- Food
    - Must be collected by a registered sanitarian

Submission Form

- DSHS Laboratory G-27A form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-27A form.
- Fill in the date of collection and select the appropriate test.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Transport temperature:
    - Stool/enema, Vomitus/Gastric Aspirate, and Serum:
        - Keep at 2º - 8º C
        - Should be shipped cold (on cold packs, <u>not</u> dry ice) by overnight courier
    - Serum:
        - If sample delivery to lab will be < 48 hours from time of collection, keep at 2º - 8º C and ship cold
        - If sample delivery to lab will be > 48 hours from time of collection, freeze at -20º C and ship frozen
    - Wound material:
        - Ship tissue in anaerobic atmosphere
        - Ship swab in anaerobic transport for swabs
        - Ship without refrigeration
    - Food:
        - Should be shipped in original container under current storage conditions (e.g., cold storage submitted cold; frozen storage submitted frozen; etc.)
- All specimens must be triple contained in accordance with federal shipping regulations. All clinical specimens must be accompanied by a specimen submission form (G-27A).
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

  Laboratory Services Section, MC-1947
  Texas Department of State Health
  Services Attn. BioThreat Team (512)

689-5537
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Incorrect source of specimen.
- Insufficient amount of specimen.
- Missing or discrepant information on form/specimen

REVISION HISTORY

October 2024

- Replaced broken links.

Campylobacteriosis

BASIC EPIDEMIOLOGY

Infectious Agent

Campylobacter species, a Gram-negative bacilli. Most cases are caused by *C. jejuni* and fewer by *C. coli*.

Transmission

Transmission can occur through the ingestion of contaminated food or water, or through direct contact with animals. Person-to-person transmission is uncommon. Commonly recognized vehicles or mechanisms include:

- Handling or eating undercooked/raw poultry or meat.
- Unpasteurized (raw) milk or dairy products.
- Contaminated and inadequately treated drinking water.
- Contact with animals, especially farm animals such as cows and chickens, as well as cats and dogs.

Incubation Period

Usually 2 to 5 days (ranges 1-10 days).

Communicability

Infected persons not treated with antibiotics may excrete organism for 2 to 7 weeks, but this shedding is of little epidemiological importance, as person-to-person transmission is uncommon.

Clinical Illness

Illness is characterized by diarrhea, abdominal pain, malaise, and fever. The diarrhea may be bloody and can be accompanied by nausea and vomiting. Symptoms usually persist less than one week. More severe illness can occur, including dehydration, bloodstream infection, and symptoms mimicking acute appendicitis or ulcerative colitis. Post-infectious complications may include reactive arthritis, Guillain-Barre Syndrome, and irritable bowel syndrome.

DEFINITIONS

Clinical Case Definition

An illness of variable severity commonly manifested by diarrhea, abdominal pain, nausea and sometimes vomiting. The organism may also rarely cause extra-intestinal infections such as bacteremia, meningitis or other focal infections.

Laboratory Confirmation

- Isolation of *Campylobacter* spp. in a clinical specimen.

Case Classifications

- **Confirmed:** A case that is laboratory confirmed
- **Probable:**
    - A case with *Campylobacter* spp. detected in a clinical specimen using a culture independent diagnostic test (CIDT), **OR**

- A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Notes:

- The use of CIDTs as stand-alone tests for the direct detection of *Campylobacter* in stool is increasing. A positive culture result is considered a Confirmed case. A PCR, enteric panel, or other positive CIDT is considered a Probable case.

- A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

It is recommended that local and regional health departments investigate all reported cases of campylobacteriosis to identify potential sources of infection. Sporadic cases of campylobacteriosis do not require an investigation form be sent to DSHS EAIDU unless they are identified as part of a multi-jurisdictional cluster or outbreak. Any case associated with a cluster or outbreak should be interviewed.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ If time and resources allow or the case is part of an outbreak or cluster, interview the case to identify potential sources of infection. Ask about possible exposures 1–10 days before onset, including:
  - Contacts or household members with a similar illness. Obtain the name, phone number or address, and clinical information of the ill person.
  - Source(s) of drinking water and source of any water consumed either purposefully or accidentally during work or sports activity, such as lake or stream.
  - Consumption of unpasteurized (raw) milk or dairy products. Identify type of raw milk (cow, goat or "other"), brand and/or sources, and dates(s) of purchase and consumption.
  - Handling or consumption of raw or undercooked poultry or meat.
  - Meals from restaurants or other food services. Obtain name and location of the facility, and date of the meal.
  - Contact with animals or poultry. Ask whether animal has recently experienced diarrhea.
  - Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- ☐ Provide education to the case or his/her surrogate about food and pet

safety, and effective hand washing. See Prevention and Control Measures.

- ☐ Identify whether there is a public health concern: persons should not work as food handlers, child-care or health care workers, or attend child-care if they have diarrhea. See Exclusions.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water especially:
  - Before preparing, handling or eating any food
  - After going to the bathroom
  - After changing a diaper
  - After caring for someone with diarrhea
  - After handling raw food especially poultry
  - After any contact with animals or their living areas
- Avoid consumption of raw or undercooked poultry and meat. Cook all poultry products thoroughly. Make sure that the meat is cooked throughout (no longer pink) and any juices run clear. All poultry should be cooked to reach a minimum internal temperature of 165 °F.
- Prevent cross contamination in the kitchen by using separate cutting boards for foods of animal origin and other foods and carefully cleaning all cutting boards, countertops, and utensils with soap and hot water after preparing raw food of animal origin.
- Avoid consumption of unpasteurized (raw) milk or dairy products.
- Avoid drinking or swallowing untreated surface water. Untreated water should be boiled or otherwise disinfected before consumption.
- Exercise care when handling or cleaning up after pets with diarrhea. Wash hands afterwards.

Exclusions

School/child-care: No exclusions are specified for campylobacteriosis but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for campylobacteriosis but the standard exclusion for vomiting or diarrhea applies:

- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications, OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/24	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/24	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional campylobacteriosis cases.
- Isolates can be submitted to the DSHS laboratory for culture confirmation and identification. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
  - Policies on and adherence to hand hygiene
  - Storage and preparation of food
  - Procedures for changing diapers and toilet training
  - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, if they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Note:

- For cases with raw milk exposure, please email the information about dates of raw milk consumption and place of purchase to the DSHS Milk and Dairy Unit at milk.regulatory@dshs.texas.gov and cc foodbornetexas@dshs.texas.gov.
- If a food item or food establishment is implicated, an EAIDU foodborne epidemiologist will notify appropriate state and/or federal partner agencies regarding the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed and probable cases are required to be reported **within 1 week** to the local or regional health department or by faxing the disease reporting form to the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) **(512) 776-7616.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- If investigation forms are requested, they may be faxed to 512-776-7616 or emailed to FoodborneTexas@dshs.texas.gov.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of

transmission.

- Enter outbreaks into NORS online reporting system at NORS Reporting System Login
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
  - To request a NORS account, please email FoodborneTexas@dshs.texas.gov.
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name. After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Testing for campylobacteriosis is widely available from most private laboratories. Isolates or specimens from submitters are accepted with prior approval by the DSHS laboratory for culture confirmation and identification. Contact an EAIDU foodborne epidemiologist to discuss further. In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Campylobacter* species. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass
1100 West 49th Street
Austin, TX 78756-3199
(512) 776-7569

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Specimen not in correct transport medium.

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Campylobacter* spp. is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian**

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

March 2021

- Entire section.

October 2024 – Notes added to clarify case classification and additional information on raw milk.

Candida auris (C. auris)

BASIC EPIDEMIOLOGY

Infectious Agent

Candida auris (C.auris) is an emerging multidrug-resistant yeast associated with invasive infections and high mortality. Most strains of *C. auris* are resistant to at least one antifungal drug, one-third are resistant to two antifungal drug classes, and some strains are resistant to all three major classes of antifungal drugs, severely limiting treatment options. *C. auris* can spread in healthcare settings and cause outbreaks.

In the United States, *C. auris* has been predominantly identified among patients with extensive exposure to ventilator units at skilled nursing facilities and long-term acute care hospitals, and those who have received healthcare in countries with extensive *C. auris* transmission. Other risk factors for *C. auris* infection are similar to those for invasive infection with other *Candida* species and include central venous catheter use, and recent broad-spectrum antibiotic or antifungal use.

Transmission

C. auris can colonize patients' skin and other body sites, perhaps indefinitely, and colonization poses a risk both for invasive infection and transmission. *C. auris* can spread readily between patients in healthcare facilities. It has caused numerous healthcare-associated outbreaks that have been difficult to control. In some countries, *C. auris* has emerged as a leading cause of candidemia, accounting for up to 40% of *Candida* isolates in some hospitals; hospital units have been closed temporarily to stop transmission of *C. auris*. Control of *C. auris* requires timely detection and adherence to recommended infection control practices. Yeast identification methods used at many clinical laboratories often misidentify *C. auris* as other yeasts (e.g., *Candida haemulonii*), making detection and thereby control of *C. auris* challenging.

Transmission can occur via direct person-to-person contact or secondary contact with contaminated environmental surfaces, medical devices, or equipment. Additionally, the hands of healthcare workers who frequently touch potential contaminated objects in patient environments often become vectors of transmission when hand hygiene compliance or transmission-based precautions are not followed.

Incubation Period

There is no set incubation period for exposure-to-illness onset.

Communicability

The period of communicability is unknown and may be as long as the organism is present in the individual. *C. auris* persists in the healthcare environment for weeks, and certain routinely used disinfectants in healthcare settings are not effective against the organism.
Outbreaks of *C. auris* in many parts of the world have been very difficult to control, sometimes requiring closure of hospital units and intensive public

health interventions. In some countries with unchecked transmission of *C. auris*, it has become a leading cause of *Candida* infections, signaling a rapid change in the epidemiology of *Candida* infections.

Clinical Illness
Clinical manifestation of *C. auris* infection depends upon the site of infection. Patients with *C. auris* bloodstream infection typically have sepsis and severe illness. Other invasive infections, such as intraabdominal candidiasis can also occur. *C. auris* can also cause wound infections and otitis. *C. auris* has been found in urine and respiratory specimens, though its contribution to clinical disease in these sites is unclear. *C. auris* can also colonize the skin, nose, ears, and other body sites of asymptomatic people.

Severity
Candida auris can cause invasive infections associated with up to 40% in-hospital mortality.

DEFINITIONS

Clinical Case Definition
When found in a clinical culture, *C. auris* can represent an infection or colonization. There is no set clinical case definition for *C. auris* as it can cause many types of symptoms.

Laboratory Confirmation
Confirmatory Laboratory Evidence:

Candida auris, clinical
- Detection of *C. auris* in a clinical specimen obtained during the normal course of care for diagnostic or treatment purposes using either culture or a validated culture-independent test (e.g., nucleic acid amplification test [NAAT]).

Candida auris, screening
- Detection of *C. auris* in a specimen from a swab obtained for the purpose of colonization screening using either culture or validated culture-independent test (e.g., NAAT).

If multiple test types are conducted (e.g., both PCR and culture) on the same specimen and only one results as positive for *C. auris*, it would be enumerated as a laboratory-confirmed case. For example, if a specimen is PCR-positive and culture-negative, this would still be indicative of a confirmed *C. auris* case.

Case Classification
***Candida auris* case, clinical**
Public Health jurisdiction may consider stratifying clinical cases as invasive vs non-invasive.
- **Confirmed:** Person with confirmatory laboratory evidence from a clinical specimen collected for the purpose of diagnosing or treating disease in the normal course of care. This includes specimens from sites reflecting invasive infection (e.g., blood, cerebrospinal fluid) and specimens from non-invasive sites such as wounds, urine, and the respiratory tract, where presence of *C. auris* may simply represent colonization and not true infection. This does not include swabs

collected for screening purposes (see *Candida auris*, screening).

***Candida auris* case, screening**

- **Confirmed:** Person with confirmatory laboratory evidence from a swab collected for the purpose of screening for *C. auris* colonization regardless of site swabbed. Typical screening specimen sites are skin (e.g., axilla, groin), nares, rectum, or other external body sites. Swabs from wound or draining ear are considered clinical specimens.

Criteria to Distinguish a New Case from an Existing Case

A patient who is colonized or infected with *C. auris* is considered colonized indefinitely. The following provides guidance for health departments to distinguish a new case for patients who test positive for *C. auris* in either a screening swab (i.e., screening case) or in a clinical specimen (i.e., clinical case).

- For screening cases, count patient only once as a screening case; do not count if patient has been previously identified as a clinical or screening case. A person with a screening case can be later categorized as a clinical case (e.g., patient with positive screening swab who later develops bloodstream infection would be counted in both categories).
- For clinical cases, count patient only once as clinical case, even if the patient has already been counted separately as a screening case. A person with a clinical case should not be counted as a screening case thereafter because all clinical cases are considered to also be colonized with *C. auris* (e.g., patient with clinical *C. auris* specimen who late has positive screening swab is not counted as screening case).

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments will promptly address all reports of *C. auris*.

The jurisdiction where the healthcare facility is located conducts the investigation and ensures control measures are promptly taken. The investigation steps below describe the public health activities to be completed when a suspected or confirmed *C. auris* case is reported. Investigations and control measures are required for infection or colonization with any type of *C. auris*.

Case Investigation Checklist

- ☐ The jurisdiction that conducts the investigation is according to the location where the patient tested positive for *C. auris*. (e.g.; patient tested positive for *C. auris* and is in hospital in jurisdiction A but the patient resides in jurisdiction B, jurisdiction A would conduct the investigation).
- ☐ Confirm that the laboratory results meet the case definition. If it is unclear, call a DSHS Regional HAI Epidemiologist or MDRO/AR Epidemiologist for assistance.
- ☐ Immediately ensure contact precautions or enhanced barrier precautions have been implemented for anyone with suspected or confirmed *C. auris*. Enhanced barrier precautions are for nursing facility residents only.

- ☐ Ensure additional control measures are in place for cases and/or facilities. (see "specific control measures" section below)
- ☐ Review the medical records. If needed, speak to an Infection Preventionist (IP) at the healthcare facility to verify demographics, symptoms, and course of illness.
- ☐ Ensure facility is using a disinfectant from *EPA List P: Antimicrobial Products Registered with EPA for Claims Against Candida Auris* for the patient's environmental surfaces. The searchable list can be found here: https://www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris.
- ☐ If the patient has been discharged from the reporting healthcare facility and the receiving healthcare facility is known, the investigator ensures that the receiving healthcare facility is informed of the *C. auris* case and ensures control measures are in place.
- ☐ Refer to the *C. auris* Investigation form for additional questions to address.
    - The *C. auris* Investigation Form is available on the DSHS Website: http://www.dshs.state.tx.us/eaidu/investigation/
- ☐ All confirmed cases of *C. auris* require the investigation form to be completed.
- ☐ As required by the Texas Administrative Code (TAC), all isolates identified as *Candida auris* must be submitted to the DSHS Laboratory or other public health laboratory as designated by the Department of State Health Services.
    - Any yeast isolate identified as *C. haemulonii* or any yeast isolate that had identification attempted without successful identification can be sent to DSHS Laboratory.

Note: If a case is seen in healthcare facilities located in other public health jurisdictions, it is the responsibility of the investigator to notify the other public health jurisdictions of the case.

Prevention and Control Measures

Control Measures for Cases

Ideally, the facility implements the control measures, and the investigator communicates directly with the facility infection preventionist, or the designated individual with infection prevention oversight. The investigator may also speak with the patient directly if applicable. The investigator ensures the below control measures are addressed but not all control measures might be necessary for all case investigations.

Specific Control Measures

- Conduct an infection control assessment by reviewing the guidance in this document and in the Texas Antibiotic Resistance Lab Network Response Plan
- Facilities are responsible for ensuring that healthcare personnel are vigilant with hand hygiene practices and ensure that:
    - Hand hygiene sinks are accessible and free from clutter/supplies.
    - Alcohol-based hand sanitizers are accessible and well stocked.
- Ensure the patient is on contact precautions or enhanced barrier precautions. Contact precautions include but are not limited to:

  - Performing hand hygiene;
  - Donning (putting on) gown and gloves before entry into the patient's room.
  - Doffing (removing) gown, gloves and any other personal protective equipment (PPE) before exiting the patient's room.
  - Hand hygiene should be performed after removal of PPE and immediately upon exiting the patient's room.
  - Enhanced barrier precautions are implemented in nursing facilities for residents with a history of C. auris. Enhanced Barrier Precautions expand the use of PPE and refer to the use of gown and gloves during high-contact resident care activities that provide opportunities for transfer of MDROs to staff hands and clothing. See CDC guidance for implementation of enhanced barrier precautions: Implementation of Personal Protective Equipment (PPE) Use in Nursing Homes to Prevent Spread of Multidrug-resistant Organisms (MDROs) | LTCFs | CDC.
  - There are no recommendations to discontinue transmission-based precautions or enhanced barrier precautions once a patient is identified with *C. auris*.
- Ensure the facility is performing disinfection of reusable equipment before and after each use when caring for the patient positive for *C. auris*. Disinfectants used on environmental surfaces from *EPA List P: Antimicrobial Products Registered with EPA for Claims Against Candida Auris* for the patient's environmental surfaces. The searchable list can be found here: https://www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris.
- Recommend single patient rooms if available.
  - If single rooms are not feasible, recommend cohorting like patients (ex: a patient with *C. auris* and another patient with *C. auris*)
- Recommend staff cohorting if possible.
- Recommend reducing the use of invasive medical devices for patients on the unit where the case was cared for, as invasive devices increase patient's risk of infection.
- Increase the frequency of cleaning of high touch areas.
- Provide education on *C. auris* as needed, with specific emphasis on contact precaution and the above control measures.
  - Education could be provided to anyone at the facility, family members, and the patient. If assistance is needed regarding providing education, contact your DSHS HAI Epidemiologist.
- Colonization screening
  - Roommates of positive cases should be screened for *C. auris* colonization.
  - Implementation of broader colonization screening may be necessary, depending on the results of the infection control assessment. See DSHS *C. auris* screening recommendations and CDC Screening for *C. auris* Colonization webpage for guidance: Screening Recommendations for Healthcare Facilities | Candida auris (C. auris) | CDC. Contact a DSHS Regional HAI Epidemiologist for colonization screening resources.
  - Conduct retrospective laboratory surveillance. Identify clinical laboratories that performed cultures from healthcare settings where the index patient received care. Review three months of

lab results to identify any additional *C. auris* isolates or *Candida* isolates not speciated. If available, these retrospective isolates should be sent to DSHS Laboratory for testing. If the isolate is identified as Pan-Resistant *C. auris, CDC recommends expanding review to six months of lab results.*

- Conduct prospective surveillance to detect if there is ongoing transmission by monitoring laboratory cultures for *C. auris* isolates or *Candida* isolates not speciated at these facilities for three months after the collection date of the last positive specimen. Request submission of isolates to DSHS Laboratory.

Treatment
Each case will have a unique treatment option. It is recommended that the reporting facility collaborate with a clinical pharmacist, an infectious disease physician, and/or an antibiotic stewardship resource for an individualized treatment plan.

Exclusions
Students (K-12) and daycare age children with *C. auris* wound infection need to be excluded from attendance until drainage from wounds or skin and soft tissue infections is contained and maintained in a clean dry bandage; restrict from situations that could result in the infected area becoming exposed, wet, soiled, or otherwise compromised. No other exclusions apply.

MANAGING SPECIAL SITUATIONS

Outbreaks
If an outbreak is suspected, immediately notify a DSHS Regional HAI Epidemiologist.

Outbreak Definition
At this time there are no defined criteria for an outbreak. If your health department believes they have detected an outbreak, it is recommended to speak with the DSHS regional HAI Epidemiologist.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School and Child-care Facilities, and General Public Reporting Requirements Cases of *C. auris* should be reported ***within 1 working day*** to the local or regional health department. If the health department jurisdiction is unclear or you do not have the contact information, search the health department in the DSHS list of Texas local public health organizations: https://www.dshs.texas.gov/regional-local-health-operations/public-health-regions/texas-local-public-health.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Promptly investigate all reported cases.
- Ensure control measures are in place and provide education to prevent further spread of disease (see specific control measures section located in this document).
- Enter the case into NBS when the first occurrence is reported and create the NBS notification to DSHS on all cases of *C. auris* within 30

days of initial report.
    - Refer to the NBS Data Entry Guide for specific details on how to properly complete an NBS investigation and submit a NBS notification. Epidemiologist can attach a copy of the completed form to the NEDSS investigation as supportive documentation.
- The health department jurisdiction that conducted the investigation enters the case investigation into NBS. The jurisdiction in NBS should be the jurisdiction of the healthcare facility, not the jurisdiction of residency.
    - Submit a notification in NBS within 30 days of the initial report.
    - Epidemiologist can attach a copy of the completed form to the NEDSS investigation as supportive documentation.
    - Refer to the NBS Data Entry Guide for specific details on how to properly complete a NBS investigation and submit a NBS notification.
    - Once DSHS HSU staff reviews and approves the case in NBS, HSU staff will update the jurisdiction to the jurisdiction of residency for aggregate reporting purposes.

When a cluster or an outbreak is investigated, local and regional health departments should:

- Report suspected outbreaks within 24 hours of identification to a DSHS Regional HAI Epidemiologist.
- If a case is part of an outbreak, a NEDSS outbreak name must be requested through the NEDSS office by going to the NEDSS office by going to the NEDSS Help button on the NEDSS home screen and completing the form.

Purpose of Reporting and Surveillance

- To prevent transmission of infections with *C. auris* in healthcare facilities and the community, by decreasing the likelihood of transmission through the investigation process.
- To improve the detection, monitoring and epidemiological characterization of *C. auris* in Texas.
- To develop, implement and evaluate strategies to prevent the emergence, transmission and persistence of *C. auris*.
- To conduct and support epidemiological studies to identify outbreaks and potential sources of ongoing transmission in various populations.
- To identify further trends related to continued antibiotic resistance and the development of MDROs in Texas.

Requested Reporting

- Report *Candida auris* to your local health jurisdiction ***within 1 working day.***

Local Health Jurisdiction Investigation Responsibilities

- Local health departments may request assistance with the investigation of *C. auris* by contacting both the DSHS Lead Epidemiologist and the DSHS Regional HAI Epidemiologist for the health service region (HSR).
- Because of the potential for transmission of *C. auris* to vulnerable patients in healthcare settings, public health action is imperative in controlling further transmission by: instituting control measures, identifying and screening close contacts of cases that could transmit

in healthcare settings, if indicated, and ensuring that the facility IP has been notified and that appropriate infection control measures are in place.

LABORATORY PROCEDURES

As required by the Texas Administrative Code (TAC), all *C. auris* isolates must be submitted to the DSHS laboratory.

DSHS Laboratory also provide *C. auris* colonization screening services as part of a public health investigation. Screening specimens are only accepted when submission is coordinated with a DSHS HAI epidemiologist.

If you are suspecting a possible outbreak situation and need molecular testing, prior approval from a DSHS HAI Epidemiologist is required.

REVISION HISTORY

December 2021

- Section reviewed

October 2023

- Probable definition was removed based on the CSTE position statement and CDC guidance
- Minor grammatical corrections

Carbapenem-resistant Enterobacterales (CRE)

BASIC EPIDEMIOLOGY

Infectious Agent

Carbapenem-resistant Enterobacterales (CRE; previously known as Enterobacteriaceae) are gram-negative bacilli that are: (1) resistant to at least one carbapenem antibiotic (ertapenem, meropenem, doripenem, or imipenem) or (2) produce a carbapenemase (i.e., enzyme producing resistance to carbapenem antibiotics).

Carbapenemase-producing CRE can share the genetic code for carbapenemases with other bacteria, rapidly spreading resistance according to the CDC. Carbapenemase production by Enterobacterales can occur by many different mechanisms, such as *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi Metallo-beta-lactamase (NDM), Verona Integron-Encoded Metallo-beta-lactamase (VIM), Imipenemase (IMP) and Oxacillinase-48 (OXA-48).

Transmission

CRE can colonize or infect any body site, and may cause infections including pneumonia, bloodstream infections, urinary tract infections, wound infections, and meningitis. CRE infections happen in the community and in healthcare settings. A positive CRE culture may signify an infection or colonization. Colonization means the organism is present but not causing any symptoms or disease. Colonizing CRE strains can go on to cause infections or spread to other patients.

Transmission occurs via direct person-to-person contact, or secondary contact with contaminated environmental surfaces, medical devices, or equipment. Additionally, healthcare workers' hands may transmit CRE due to frequently touching objects in patient environments. Transmission can be prevented through standard precautions such as hand hygiene, environmental cleaning and disinfection, as well as adherence to transmission-based precautions.

Incubation Period

There is no set incubation period for CRE exposure-to-illness onset.

Communicability

The period of communicability is unknown and may last as long as the organism is present in the individual's system. According to the CDC, patients may remain colonized with CRE for months to years and can contribute to the spread of CRE even in the absence of any signs or symptoms of infection.

Clinical Illness

Patients in healthcare settings, such as hospitals or nursing homes, are at the highest risk for CRE infections. Patients with ventilators, urinary catheters, intravenous catheters, and/or long courses of certain antibiotics are particularly susceptible to CRE infections. CRE can cause infections in almost any part of the body. Infection types can include bloodstream infections, ventilator-associated pneumonia, and intra-abdominal abscesses. Symptoms associated with CRE infections vary based on the site that is infected (e.g., cough if in the lungs, urinary symptoms if in the bladder). Symptoms can also be generalized such as fever or chills.

DEFINITIONS

Clinical Case Definition

When found in a clinical culture, CRE can represent an infection or colonization. There is no set clinical case definition for CRE as it can cause many types of symptoms.

Laboratory Confirmation

Detection of *Klebsiella* species or *E. coli* from a body site that is laboratory confirmed:

- Resistant to any carbapenem, including meropenem, imipenem, doripenem, or ertapenem **OR**
- Positive for known carbapenemase resistance gene (i.e. KPC, NDM, VIM, IMP, OXA-48); Xpert Carba-R positive for KPC, PCR or Xpert Carba-R Assay positive **OR**
- Positive on phenotypic test for carbapenemase production by metallo- β-lactamase test, modified Hodge Test (MHT), Carbapenem Inactivation Method (CIM) positive, or modified CIM (mCIM).

Case Classification

Confirmed: Carbapenem-resistant Enterobacterales (CRE)
Klebsiella species, or *E. coli* from any body site that is laboratory confirmed.
Note: If a culture-independent diagnostic test (CIDT) report is received with multiple pathogens detected AND a carbapenemase gene is detected, it is not possible to determine which organism the carbapenemase gene belongs to. In this situation, the recommendation is to collect a culture from the same site.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments will promptly address all reports of CRE. The investigation steps below describe the public health activities to complete when a CRE case is reported. Case investigations and control measures are required for infection or colonization with any type of CRE.

Case Investigation Checklist

- The jurisdiction of the healthcare facility with a positive CRE confirmation will conduct the investigation (e.g., patient tested positive for CRE *E. coli* and is in hospital in jurisdiction A, but the patient resides in jurisdiction B, jurisdiction A would conduct the investigation).
- Confirm the laboratory results meet the case definition. If it is unclear, call DSHS Healthcare Safety Unit (HSU) HAI or AR Epidemiologist for assistance.
- Immediately ensure contact precautions are implemented for anyone with a reported CRE. Ensure the patient is on contact precautions or enhanced barrier precautions.
- Contact precautions include but are not limited to:
    - Performing hand hygiene, donning (putting on) gown and gloves before entry into the patient's room.
    - Doffing (removing) gown, gloves, and any other PPE before exiting the patient's room.
    - Hand hygiene should be performed after removal of PPE and immediately upon exiting the patient's room.
- Enhanced barrier precautions are intended to be implemented only in nursing facilities for residents with a history of MDROs. Enhanced Barrier Precautions expand the use of PPE and refer to the use of gown and gloves during high-contact resident care activities that provide opportunities for transfer of MDROs to

staff hands and clothing. See CDC guidance for implementation of enhanced barrier precautions: https://www.cdc.gov/long-term-care-facilities/hcp/prevent-mdro/ppe.html?CDC_AAref_Val=https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html

- Ensure additional control measures are in place for cases and/or facilities (see "specific control measures" section below).
- Review the medical records and speak to an Infection Preventionist (IP) at the affected healthcare facility to verify demographics, symptoms, and course of illness.
- If the patient was discharged from the reporting healthcare facility and the receiving healthcare facility is known, the investigator ensures that the receiving healthcare facility is informed of the CRE cases and that control measures are in place.
- Refer to the CRE Investigation form for additional questions to address. All cases of CRE require the investigation form to be completed. The CRE Investigation form is available on the DSHS website: http://www.dshs.texas.gov/eaidu/investigation/
- Epidemiologist can attach a copy of the completed form to the NEDSS investigation as supportive documentation.
- The health department jurisdiction that conducted the investigation enters the case investigation into NBS. Enter all confirmed case investigations and submit a notification in NBS within 30 days of the initial report.
- The jurisdiction in NBS should be the jurisdiction of the healthcare facility, not the jurisdiction of residency.
- Investigator should add a comment prior to submitting notification if jurisdiction needs to be changed to the patient's residential jurisdiction, upon case approval.
- Once the case is reviewed and approved, the approver will update the jurisdiction of residency for aggregate reporting purposes.
    - Note: If a case involves multiple jurisdictions, it is the responsibility of the investigator to notify other jurisdictions of the case.
- Labs collected and reported within one year of initial lab collection should be associated with the initial investigation.
- Labs collected and reported after one year of an initial confirmed lab result require a new investigation.

PREVENTION AND CONTROL MEASURES

Control measures for Cases

Ideally, the facility is performing control measures for the case. The investigator is communicating directly with the facility, most likely with the IP or the responsible representative overseeing infection prevention. The investigator ensures the below control measures are addressed with the reporting healthcare facility. Specific control measures might not be necessary for all case investigations.

Specific Control Measures

- Facilities are responsible for ensuring that healthcare personnel perform hand hygiene- use alcohol-based hand rub or wash hands with soap and water before and after contact with patients and their environment.
- Ensure the patient is on contact precautions. If the patient is a resident of a nursing home, then ensure that the patient is either in enhanced-barrier precautions or contact precautions.

    - Recommend single patient occupancy rooms, if available.
        - If single rooms are not feasible, recommend only cohorting patients with the same organism (ex: a patient with CRE-Escherichia coli [CRE-E. coli] and another patient with CRE-E. coli)
    - Don (put on) gown and gloves either before or upon immediate entry into the patient's room.
    - Doff (remove) gown, gloves and any other PPE immediately upon exiting the patient's room.
    - No recommendation currently exists for discontinuing contact precautions for CRE. A facility should consult with an infectious disease physician, the IP, or the provider that initiated the precautions. The facility may also call a DSHS HAI Epidemiologist for assistance.
- Reduce risk factors associated with MDRO transmission
    - Recommend evaluating the need for invasive devices on a daily basis and discontinuing when no longer necessary.
- Ensure the facility is using disposable noncritical patient-care equipment (e.g., blood pressure cuffs) or implement patient-dedicated use of such equipment.
- If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment with an Environmental Protection Agency (EPA) registered hospital grade disinfectant before use on another patient.
    - Verify the disinfectant label states a disinfection claim for targeted CRE organism.
    - Ensure manufacturer's recommendations are followed, including the initial clean step and contact time of the disinfectant. Contact time is the time it takes for the disinfectant to kill the organism (e.g., two minutes). The disinfectant must be wet on the surface for that amount of time to be effective.
- Encourage more frequent cleaning and disinfection of "high touch surfaces" throughout the unit and/or facility. High touch surfaces are those that people frequently touch with their hands, which could therefore become easily contaminated with microorganisms and picked up by others on their hands.
- Verify the facility's laboratory is immediately alerting clinical staff and the infection preventionist when CRE is identified.
- Educate the facility to ensure physicians, hospital staff, patients, and visitors are educated on CRE.

Treatment

Each case will have a unique treatment option. It is recommended that the reporting facility collaborate with a clinical pharmacist, an infectious disease physician, and/or an antibiotic stewardship resource for an individualized treatment plan.

Exclusions

Students (K-12) and daycare age children with CRE wound infection need to be excluded from attendance until drainage from wounds or skin and soft tissue infections is contained and maintained in a clean dry bandage; restrict from situations that could result in the infected area becoming exposed, wet, soiled, or otherwise compromised. No other exclusions apply.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify a DSHS HAI Epidemiologist. The DSHS HAI Epidemiologist will notify their leadership.

Outbreak Definition

Currently there are no defined criteria for an outbreak

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School and Child-care Facilities, and General Public Reporting Requirements

Cases of CRE should be reported within 1 working day to the local or regional health department. If the health department jurisdiction is unclear or you do not have the contact information, search the health department in the DSHS list of Texas local public health organizations: https://www.dshs.texas.gov/regional-local-health-operations/public-health-regions/texas-local-public-health.

Local and Regional Reporting and Follow-up Responsibilities

- Promptly investigate all reported CRE cases.
- Ensure control measures are in place, this should occur promptly prior to transfer to another unit, healthcare facility, or discharge home.
- Provide facility education to prevent further spread of disease (see specific control measures section located in this document).
- If an electronic laboratory report (ELR) notification is in TX NEDSS, follow-up promptly to obtain a lab report with antimicrobial susceptibility results.
- Enter the confirmed case into TX NEDSS when the first occurrence is reported and create the TX NEDSS notification to DSHS on all cases of CRE.
    - Complete entry within 30 days of initial report.
    - Refer to the NBS Data Entry Guide for specific details on how to properly complete a NEDSS investigation and submit a notification.
- Local health departments may request assistance with the investigation by contacting both the DSHS HAI Epidemiologists for the respective public health region (PHR).
- Because of the potential for transmission of CRE to vulnerable patients in healthcare settings, public health action is imperative in controlling further transmission by instituting control measures, identifying and screening close contacts of cases that could transmit in healthcare settings, if indicated, and ensuring that the facility IP has been notified and that appropriate infection control measures are in place.
- When a cluster or an outbreak is investigated, local and regional health departments should:
    - Report suspected outbreaks to a DSHS HAI Epidemiologist.
- If a case is part of an outbreak, a NEDSS outbreak name must be requested through the NEDSS office by going to the NEDSS Help button on the NEDSS home screen and completing the form. The direct link to the form is here: https://app.smartsheet.com/b/form/ed600cf7c07c40a78525ed24ba87e098 All investigation forms and other supporting documents will be shared with the DSHS HAI Epidemiologist per region specific process. Supporting documents can be uploaded into NBS under supplemental documentation.

LABORATORY PROCEDURES

Clinical laboratories are not required to submit isolates to the DSHS Laboratory at this time. To obtain confirmatory, gene sequencing or phenotypic testing, clinical laboratories can contact a reference laboratory for those services. The reference lab will give guidance on specimen collection, submission form and shipping. Any specimen sent to the DSHS Laboratory for possible outbreak situations or molecular testing requires prior approval from a DSHS HAI epidemiologist.

REVISION HISTORY

- February 2021
  - Updated verbiage from NBS to TX NEDSS.
- December 2021
  - Added CP-CRE with the case definition and laboratory identification criteria.
- January 2023
  - Exclude CP-CRE from CRE
  - Edited disease transmission section
  - Added note on CIDT under case classification
- October 2023
  - Labs collected and reported after one year of an initial confirmed lab result require a new investigation.
  - Minor grammatical corrections
- September 2024
  - Wording updated to provide clarification
  - Links updated for CDC webpages

Congenital Rubella Syndrome (CRS)

BASIC EPIDEMIOLOGY

Infectious Agent
Rubella virus (family Togaviridae; genus *Rubivirus)*

Transmission
Rubella transmission occurs from person to person through contact with infectious nasopharyngeal secretions and droplets and indirectly by objects contaminated with nasopharyngeal secretions of an infected patient, or through contact with the urine of an infant with CRS. In the case of CRS, rubella virus may also be transmitted from mother to fetus during pregnancy.

Incubation Period
CRS is contracted during pregnancy.

Communicability
Infants with CRS can shed the virus in the nasopharyngeal secretions and urine for up to a year or longer. Rubella virus has been recovered from the lens of children with CRS who have congenital cataracts for up to several years. Therefore, it is essential that infected infants be identified as early in life as possible in order to prevent further spread of the virus. Infected infants should be considered infectious until they are at least 1 year old or until two cultures of clinical specimens obtained 1 month apart after the infant is older than 3 months of age are negative for rubella virus.

Clinical Illness
CRS may consist of many problems including low birth weight, eye defects, cardiac defects, central nervous system defects, hepatitis, thrombocytopenic purpura, splenomegaly, and bone lesions.
Deafness is the most common manifestation of CRS and is sometimes the only manifestation. In mild forms of CRS, there may be no obvious clinical manifestations at birth, and the onset of CRS-related symptoms can be delayed until 2-4 years.

The severity of effects on the fetus depends on the period of gestation at which the infection occurs. A fetus infected early in the pregnancy (especially during the first trimester) has a high probability of developing CRS. In symptomatic women infected with rubella during the first 12 weeks (first trimester) of pregnancy, CRS-associated congenital defects occur in up to 85% of infants. The likelihood of congenital defects decreases if the woman's rubella infection occurs later in the gestational period, dropping to 25% when the woman has a rubella infection late in the second trimester.

DEFINITIONS

Clinical Case Definition
An illness of newborns resulting from rubella infection *in utero* and characterized by signs or symptoms from the following categories:

a) Cataracts/congenital glaucoma, congenital heart disease (most commonly patent ductus arteriosus, peripheral pulmonary artery stenosis), hearing loss, pigmentary retinopathy

b) Purpura, hepatosplenomegaly, jaundice, microcephaly, developmental delay, meningoencephalitis, or radiolucent bone disease.

Laboratory Criteria for Diagnosis

- Isolation of the rubella virus, **OR**
- Demonstration of rubella-specific immunoglobulin M (IgM) antibody, **OR**
- Infant rubella antibody level that persists at a higher level and for a longer period than expected from passive transfer of maternal antibody (i.e., rubella titer that does not drop at the expected rate of a two-fold dilution per month), **OR**
- Detection of rubella-virus-specific nucleic acid by PCR

Case Classification

- **Confirmed:** A case that meets clinical case definition and is laboratory confirmed.
- **Probable:** A case that meets one of the following:
  - Is not laboratory confirmed and has any two complications listed in **(a)** of the clinical case definition above, **OR**
  - Is not laboratory confirmed and has one complication from **(a)** and one from **(b);** and lacks evidence of any other etiology.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of congenital rubella immediately.

Case Investigation Checklist

- ☐ Ensure isolation of case and contact precautions are in place. Precautions can be considered if the infant has a respiratory illness or an aerosol-generating procedure is being performed.
- ☐ Confirm that the laboratory results meet the case definition.
- ☐ Request that the laboratory forward viral isolation specimens to the DSHS laboratory. See Laboratory Procedures.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, clinical picture, treatment history, and vaccination status of both mom and baby.
  - The Rash-Fever Illness Case Track Record can be used to record information collected during the investigation.
- ☐ Identify and follow-up with all exposed contacts.
  - Determine their susceptibility (fully vaccinated or lab evidence of rubella specific IgG).
  - If susceptible, give vaccination as appropriate for age and vaccination status.
  - See control measures below for infants and in the Rubella section for adults and older children.
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be emailed to DSHS EAIDU.
- ☐ Email the hospital records, labs and completed the Rash-Fever Illness Case Track Record to DSHS.

- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- Patients with congenital rubella syndrome should be considered contagious until they are1 year of age or until two cultures or PCR samples of clinical specimens obtained 1 month apart after the infant is older than 3 months of age are negative for rubella virus.
- Infection control precautions should be considered in children with CRS up to 3 years of age who are hospitalized for congenital cataract extraction.
- Health officials should consider excluding infants with CRS from child-care facilities until he or she is no longer considered infectious.
- Parents and caregivers should be made aware of the potential hazard of their infants to susceptible, pregnant contacts.
- Persons having contact with infants with CRS should have documented evidence of immunity to rubella.

Exclusion

Infants with CRS should be placed in contact isolation. These precautions should be enforced during any hospital admission before the child's first birthday, unless two cultures or PCR samples of clinical specimens obtained 1 month apart are negative for rubella virus after infant is older than 3 months of age.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak of rubella or CRS is suspected, notify EAIDU at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 work day** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS within 30 days of receiving a report of a confirmed or probable case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send secure email, or mail a completed investigation form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should**

also be sent to DSHS EAIDU.

- Investigation forms may be faxed to **512-776-7616,** emailed securely to VPDTexas@dshs.texas.gov or mailed to:

  Emerging and Acute Infectious Disease Unit
  Texas Department of State Health Services
  Mail Code: 1960
  PO Box 149347
  Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at 512-776-7676.

LABORATORY PROCEDURES

Please submit specimens for viral isolation (culture or PCR) to the DSHS laboratory in Austin. Specimens may be submitted for serology if serology is not available from a commercial lab.

Virus Isolation/PCR Specimen Collection and Submission (preferred)
Rubella virus can be isolated from throat, nasopharynx, blood, urine, and cerebrospinal fluid specimens from rubella and CRS cases. Efforts should be made to obtain clinical specimens (particularly pharyngeal swabs) for viral isolation from infants at the time of the initial investigation. Infants with CRS may, however, shed virus for a prolonged period (up to 1 year) so specimens obtained later may also yield rubella virus. Specimens for virus isolation (pharyngeal swabs) should be obtained monthly until cultures or PCRs are repeatedly negative.

Specimen Collection

- Use a viral culturette or synthetic swab (collection and transport system) to obtain a pharyngeal swab and place in 2-3 mL of viral transport media.
- Label the culturette or specimen tube with the patient's name and date of birth.

Submission Form

- Use Specimen Submission Form G-2V.
- Make sure the patient's name and date of birth match exactly what is written on the culturette or specimen tube.
- Mark the laboratory test requested (virus isolation-rubella), disease suspected, date of onset, and date of collection.

Specimen Shipping

- Keep the specimen at 2-8ºC and ship overnight on wet ice within 48 hours.
- If the specimen must be held longer, freeze at -70ºC and ship on dry ice.
- Send the specimen to the laboratory via overnight delivery on wet or

dry ice as noted above.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
  Ship specimens to:

  Laboratory Services Section, MC-1947
  Texas Department of State Health Services
  Attn. Walter Douglass
  1100 West 49th Street
  Austin, TX 78756-3199
  (512) 776-7569

Serology Specimen Collection and Submission (if needed)
IgM Serology: Single specimen collected soon after birth or soon after suspected diagnosis of CRS is made. Note: IgG is not useful in CRS as baby may have maternal antibodies. Do not use cord blood.

Specimen Collection
Option 1:
- Collect at least 5 mL blood in red top tube.
- Label blood tubes with patient's first and last name, and we recommend a second identifier such as date of birth or medical record number or social security number. If the first and last name is not provided, the specimen will be rejected.
  - Centrifuge the **red top blood** collection tube within 2 hours from the time of collection to separate the serum from the red blood cells (clot).
  - Transfer the serum from the red top tube into a serum transport tube properly labeled with the patient's name and date of birth or social security number and ship cold with cool packs and must be received within 48 hours.
  - If the serum samples will not be delivered to the laboratory within 48 hours of collection, then the samples must be frozen at –20°C (frozen) or lower and shipped frozen with dry ice.
  - Do not freeze whole blood in red top tube for shipping.

Option 2:
- Collect at least 5 mL blood in **gold top** or **tiger top** blood collection tube containing a gel serum separator (Gold top or tiger top tubes are types of serum separator tubes (SST) with the gel that keeps the serum separated from the clot after the centrifugation).
- Label blood tubes with patient's first and last name, and we recommend a second identifier such as date of birth or medical record number or social security number. If the first and last name is not provided, the specimen will be rejected.
  - Centrifuge the gold top blood collection tube within 2 hours from the time of collection to separate the serum from the red blood cells (clot) and ship cold with cool packs and must be received within 48 hours.
  - If more than 48 hours, transfer the serum into a serum

transport tube properly labeled with the patient's name and date of birth or social security number and ship frozen with dry ice.
    - Do not freeze serum in SST for shipping. Freezing will cause hemolysis and hemolyzed specimens will be unsatisfactory for testing.

Submission Form

- Use the DSHS Laboratory current version of G-2A form for specimen submission.
- Make sure the patient's first and last name and date of birth/social security number match exactly what is written on the tube.
- Mark the laboratory test requested, date of onset, and date of collection. Be certain that the names on acute and convalescent sera match exactly.
- Call DSHS Laboratory at 512-776-7138 if needing information for specimen submission.

Specimen Shipping

- To avoid specimen rejection, ship separated serum or centrifuged SST Monday through Thursday to the DSHS laboratory via overnight delivery following the above guidelines.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
    - If the serum samples will not be delivered to the DSHS laboratory within 48 hours of collection, transfer into a serum transport tube and freeze on Fridays. Ship frozen specimens with dry ice on Monday. Lone Star service will not deliver specimen to the DSHS lab on Saturday.

Causes for Rejection:

- Discrepancy between name on tube and name on form
- Insufficient quantity of serum for testing specimens received with extended transit time
- Received at incorrect temperature
- No date of collection

REVISION HISTORY

January 2021

- Updated Control Measures

September 2023

- Updated Control Measures

Coronavirus Disease 2019 (COVID-19)
Rev January 2023

BASIC EPIDEMIOLOGY

Infectious Agent

Coronavirus disease 2019 (COVID-19) is caused by the virus severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2), a new virus in humans causing respiratory illness which can be spread from person-to-person. SARS- CoV-2 is considered a novel coronavirus. The first case of the disease that would later be named COVID-19 was identified in Wuhan, China in December 2019. Reporting of individual SARS-CoV-2 infections to public health has become increasingly sporadic as testing patterns have changed (including widespread use of at-home testing) and as a higher proportion of infections with the now endemic virus result in asymptomatic infections and less severe illnesses not requiring medical care. The utility and representativeness of universal case-based surveillance data at the national level has diminished as some jurisdictions have removed SARS-CoV-2 infection from their lists of reportable conditions following the end of the federal Public Health Emergency in May 2023. SARS-CoV-2 infections remain reportable in many jurisdictions, though other surveillance systems have been leveraged or developed to achieve public health surveillance goals.

Transmission

People infected with COVID-19 can transmit the virus if they are vaccinated or unvaccinated, asymptomatic, pre-symptomatic, or symptomatic. Peak transmissibility occurs from prior to symptom onset to a few days after, but most people can shed virus up to 10 days following infection.
COVID-19 is primarily transmitted from person-to-person by exposure to infectious respiratory fluids through three primary mechanisms: 1) inhalation of very fine respiratory droplets and aerosol particles, 2) deposition of respiratory droplets and particles on exposed mucous membranes such as in the mouth, nose, or eye by direct splashes and sprays, and 3) by touching mucous membranes with hands that have been soiled either directly by virus containing respiratory fluids, or indirectly by touching surfaces with SARS-CoV-2 virus on them.

Virus containing droplets and particles is released when someone with COVID-19 sneezes, coughs, or talks. Infectious droplets can land in the mouths or noses of people who are nearby or possibly be inhaled into the lungs. Respiratory droplets can land on hands, objects or surfaces around the person when they cough or talk, and people can then become infected with COVID-19 from touching hands, objects or surfaces with droplets and then touching their eyes, nose, or mouth. Recent data suggest that there can be transmission of COVID-19 through droplets of those with mild symptoms or those who do not feel ill (transmission by individuals who are asymptomatic or pre-symptomatic). Current data do not support long range aerosol transmission of SARS-CoV-2, such as seen with measles or tuberculosis. Current evidence is supportive of COVID-19 transmission through short-range inhalation of aerosols, similar to many other respiratory pathogens. Short-range transmission is a possibility particularly in crowded medical wards and inadequately ventilated spaces. Certain procedures in health facilities can generate fine aerosols that increase the risk of transmission of SARS-CoV-2 and should be avoided whenever possible.

The risk of SARS-CoV-2 infection increases with the amount of virus to which a person is exposed. Factors that may increase the risk of SARS-CoV-2 transmission can include:

- **Enclosed spaces with inadequate ventilation or air handling** within which

the concentration of exhaled respiratory fluids, especially very fine droplets and aerosol particles, can build-up in the air space.
- **Increased exhalation** of respiratory fluids if the infectious person is engaged in physical exertion or raises their voice (e.g., exercising, shouting, singing).
- **Prolonged exposure** to these conditions, typically more than 15 minutes.

A range of body fluids have been shown to contain SARS-CoV-2 RNA and viable SARS-CoV-2 virus, indicating that they may also be infectious. SARS-CoV-2 viral RNA has been detected in upper and lower respiratory tract specimens and has been isolated from upper respiratory tract specimens and bronchoalveolar lavage fluid. SARS-CoV-2 RNA has been detected in blood and stool specimens, and SARS-CoV-2 virus has been isolated in cell culture from the stool of some patients. The duration of SARS-CoV-2 RNA detection in upper and lower respiratory tract specimens and in extrapulmonary specimens may range from several days to several weeks or longer. Duration of RNA detection several weeks to several months or longer has been observed in cases of acute SARS-CoV-2 infection. See CDC about Coronavirus Disease 2019 (COVID-19) for more information see: About COVID-19 | COVID-19 | CDC

Prevention of Transmission
The infectious dose of SARS-CoV-2 needed to transmit infection has not been established. Current evidence strongly suggests transmission from contaminated surfaces does not contribute substantially to new infections. The relative contributions of inhalation of virus and deposition of virus on mucous membranes remain unquantified and will be difficult to establish. Despite these knowledge gaps, the available evidence continues to demonstrate that existing recommendations to prevent SARS-CoV-2 transmission remain effective. These include COVID-19 vaccine, physical distancing, community use of well-fitting masks (e.g., barrier face coverings, procedure/surgical masks), adequate ventilation, and avoidance of crowded indoor spaces. These methods will reduce transmission both from inhalation of virus and deposition of virus on exposed mucous membranes. Transmission through soiled hands and surfaces can be prevented by practicing good hand hygiene and by environmental cleaning.

See CDC about Coronavirus Disease 2019 (COVID-19) for more information: https://www.cdc.gov/covid/index.html and https://www.cdc.gov/covid/hcp/clinical-care/covid19-presentation.html#:~:text=Incubation%20period.%20Incubation%20periods

Incubation Period
The incubation period for SARS-CoV-2 is estimated to range from 2 to 14 days with a median of 3 to 5 days. One study reported that 97.5% of people with COVID-19 who have symptoms will do so within 11.5 days of SARS-CoV-2 infection.

Presentation

Asymptomatic and Pre-symptomatic Presentation
Communicability
SARS-CoV-2 infection may not elicit symptoms in some people (asymptomatic) and may elicit symptoms after a positive test (pre-symptomatic presentation). It is unclear what percentage of people who initially appear asymptomatic progress to clinical disease. Children are more likely to remain asymptomatic than adults. People may have abnormalities on chest imaging consistent with COVID-19 before symptom onset or a positive COVID-19 test Asymptomatic and pre-symptomatic transmission of SARS-CoV-2 has been documented and there are studies reporting that a significant proportion of COVID-19 transmission occurs while infectious individuals are in their incubation period.

Some studies have suggested transmission as early as five days before symptom onset. There is evidence of the presence of COVID-19 RNA in patient samples for as long as several weeks after symptom onset. However, RNA detection by itself does not necessarily indicate the presence of live virus. Generally, the greatest risk of transmission occurs between 2 days prior to symptom onset to between 3-5 days after symptom onset.

Symptomatic Presentation
Symptoms can be difficult to differentiate from, and can overlap with, other viral respiratory illnesses such as influenza (flu) and respiratory syncytial virus (RSV). COVID-19 can vary from asymptomatic infection to critical illness; symptoms and severity can change during the illness. Because symptoms may progress quickly, close follow-up is needed, especially for:

- Older adults
- People with disabilities
- People with immunocompromising conditions
- People with certain underlying medical conditions

Clinical Illness

The Infectious Diseases Society of America (IDSA) COVID-19 Treatment guidelines define the following groups to facilitate appropriate treatment:

- **Mild Illness**
  COVID-19 is considered mild when there are clinical features suggestive of upper respiratory tract involvement without features of lung or other end organ involvement.
- **Moderate Illness**

Moderate COVID-19 is pulmonary involvement with no hypoxia. Most patients improve with supportive care at this stage, but patients with risk factors can progress to more severe or critical disease or death; such individuals may benefit from pharmacotherapies.

- **Severe Illness:** Individuals who have SpO2 <94% on room air at sea level or needing supplemental oxygen.
- **Critical Illness:** Individuals who have respiratory failure who are subcategorized as:
  - Needing high-flow oxygen or non-invasive ventilation
  - Needing mechanical ventilation and extracorporeal membrane oxygenation (ECMO)

To learn more about COVID-19 treatment, please refer to the ISDA Guidelines on the Treatment and Management of Patients with COVID-19 and the ACP Clinical Guidelines and Recommendations on COVID-19.

Typical symptoms of SARS-CoV-2 include fever or chills, cough, shortness of breath or difficulty breathing, fatigue, headache, nasal congestion or runny nose, muscle or body aches, sore throat, new loss of smell or taste, nausea or vomiting, and diarrhea. The most commonly reported symptoms may differ with severity of disease, presence of underlying conditions or immunosuppression, and may vary by SARS-CoV-2 lineage. For example, shortness of breath is more commonly reported among hospitalized COVID-19 cases than among those who have a milder illness. Older adults, immunosuppressed, have certain disabilities, and people with underlying comorbidities may experience fever or respiratory symptoms later during the course of infection than those who are younger or do not have comorbidities.

The severity of illness can range from mild or moderate (mild symptoms up to mild pneumonia), severe (dyspnea, hypoxia or more than 50% lung involvement on imaging), to critical (respiratory failure, shock or multiorgan system dysfunction) and depends on a variety of factors, including but not limited to age, underlying medical comorbidities, vaccination status, treatment,

and SARS-CoV-2 lineage. Age is a strong risk factor for severe illness, complications, and death due to COVID-19.

Hospitalization may be required for management of severe COVID-19 and the most common complications, which can include pneumonia, hypoxemic respiratory failure/ARDS, sepsis and septic shock, cardiomyopathy, arrhythmia, acute kidney injury, and complications from prolonged hospitalization such as secondary bacterial and fungal infections, thromboembolism, gastrointestinal bleeding, myopathy, and polyneuropathy. Strokes, clotting of intra-vascular catheters, and myocardial injury with ST-segment elevation have also been reported due to COVID-19-associated coagulopathy.

A large cohort study that included more than 44,000 people from China conducted in 2020 (Wu & McGoonan, 2020) reported that 81% of cases identified resulted in mild to moderate illness, 14% of cases identified resulted in severe illness, and 5% resulted in critical illness. Other studies reported lower illness severity in children than adults with 94% of children having asymptomatic, mild or moderate disease, 5% having severe disease and less than 1% having critical disease (Dong, ~~Mo, Hu~~ et. al., 2020). However, children of all ages with certain underlying medical conditions and infants <12 months of age may be at increased risk of severe illness from COVID-19. Texas DSHS and CDC are also investigating multisystem inflammatory syndrome in children (MIS-C) and multisystem inflammatory syndrome in adults (MIS-A) associated with COVID-19 which is distinct from severe COVID-19 illness in infants and children. See CDC clinical guidance for more details and updated information:-https://www.cdc.gov/covid/about/index.html and https://www.cdc.gov/covid/index.html#:~:text=COVID-19%20(coronavirus%20disease%202019)%20is%20a

DEFINITIONS

Because of the continual advancement in the science of COVID-19 disease and severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2) infection and changes to surveillance approaches during the pandemic there has been an update to reporting and case classification criteria to better meet long-term surveillance goals for tracking this disease. Therefore, **c**ase definitions for novel coronaviruses evolve as clinical and epidemiologic information on these viruses is updated. Please refer to the COVID-19 coronavirus information on DSHS's website for the most recent definitions. The DSHS COVID-19 case definitions may be found here: https://dshs.texas.gov/coronavirus/public-health.aspx

Laboratory Criteria for Reporting

☐ Detection of SARS-CoV-2 RNA in a clinical or post-mortem specimen using a diagnostic molecular amplification test performed by a CLIA-certified provider*,

OR

☐ Detection of SARS-CoV-2 RNA in a clinical or post-mortem specimen by genomic sequences,

Detection of SARS-CoV-2 specific antigen in a clinical or post-mortem specimen using a diagnostic test performed by a CLIA-certified provider*

*Includes those tests performed under a CLIA certificate of waiver

NOTE: Testing performed by individuals at home using over-the-counter test kits is considered supportive laboratory evidence and should not be included in case counts due to lack of CLIA oversight.

Vital Records Criteria for Reporting
A person whose death certificate lists COVID-19 disease or SARS-CoV-2 or an equivalent term as an underlying cause of death or a significant condition contributing to death.

Clinical Criteria for Reporting
N/A

Epidemiologic Linkage Criteria for Reporting
N/A

Other Criteria for Reporting
N/A

Laboratory Evidence
Laboratory evidence using a method approved or authorized by the U.S. Food and Drug Administration (FDA[1]) or designated authority[2]:

Confirmatory** laboratory evidence:

- ☐ Detection of SARS-CoV-2 RNA in a clinical or post-mortem specimen using a diagnostic molecular amplification test performed by a Clinical Laboratory Improvement (CLIA)-certified provider***,

  OR

- ☐ Detection of SARS-CoV-2 in a clinical or post-mortem specimen by genomic sequencing****.

Presumptive** laboratory evidence:

- ☐ Detection of SARS-CoV-2 specific antigen in a clinical or post-mortem specimen using a diagnostic test performed by a CLIA-certified provider.

Supportive** Laboratory evidence:

- ☐ Detection of SARS-CoV-2 specific antigen by immunocytochemistry

  OR

- ☐ Detection of SARS-CoV-2 RNA or specific antigen using a test performed without CLIA oversight.

Footnotes:

1. FDA Emergency Use Authorizations https://www.fda.gov/medical-devices/emergency-situations-medicaldevices/emergency-use-authorizations and https://www.fda.gov/medical-devices/emergency-situationsmedical-devices/faqs-testing-sars-cov-2#nolonger
2. On March 13, 2020, the President issued a Memorandum on Expanding State-Approved Diagnostic Tests: "Should additional States request flexibility to authorize laboratories within the State to develop and perform tests used to detect COVID-19, the Secretary shall take appropriate action, consistent with law, to facilitate the request."

**. The terms confirmatory, presumptive, and supportive are categorical labels used here to standardize case classifications for public health surveillance. The terms should not be used to interpret the utility or validity of any laboratory test methodology.

*** Includes those tests performed under a CLIA certificate of waiver.

**** Some genomic sequencing tests that have been authorized for emergency use by the FDA do not require an initial PCR result to be generated. Genomic sequencing results may be all the public health agency receives.

Case Classifications

Confirmed: A case that meets confirmatory laboratory evidence*

Probable: A case that meets presumptive laboratory evidence*

Suspect: A case that:

☐ Meets supportive laboratory evidence,* †

OR

☐ Meets vital records criteria with no confirmatory or presumptive laboratory evidence for SARS-CoV-2.

*Includes those tests performed under a CLIA certificate of waiver.
† *For suspect cases, jurisdictions may opt to place them in a registry for other epidemiological analyses or investigate to determine probable or confirmed status. Suspect cases should not be included in case counts.*

NOTE: Testing performed by individuals at home using over-the-counter test kits is considered supportive laboratory evidence and should not be included in case counts due to lack of CLIA oversight.

Criteria to distinguish a new case of this disease or condition from reports or notifications which should not be enumerated as a new case for surveillance:

The following should be enumerated as a new case:

☐ Person was most recently enumerated as a confirmed or probable case with onset date (if available) or first positive specimen collection date for that classification >90 days prior‡,
OR

☐ SARS-CoV-2 sequencing results from the new positive specimen and a positive specimen from the most recent previous case demonstrate a different lineage,

OR

☐ Person was previously reported but not enumerated as a confirmed or probable case (i.e., suspect)‡‡, but now meets the criteria for a confirmed or probable case.

‡Some individuals, e.g., severely immunocompromised persons, can shed SARS-CoV-2 detected

by molecular amplification tests >90 days after infection. For severely immunocompromised individuals, clinical judgment should be used to determine if a repeat positive test is likely to result from long term shedding and therefore not be enumerated as a new case. CDC defines severe immunocompromise as certain conditions, such as being on chemotherapy for cancer, untreated HIV infection with CD4 T lymphocyte count < 200, combined primary immunodeficiency disorder, receipt of prednisone > 20mg/day for more than 14 days.

‡‡Repeat suspect cases should not be enumerated.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate laboratory, clinical reports and self-reports of SARS-CoV-2 based on the prioritization of case investigations outlined in DSHS Surveillance Case Definitions for Coronavirus Disease 2019 (COVID-19) Coronavirus Disease 2019 (COVID-19) 2023 Case Definition | CDC at https://ndc.services.cdc.gov/case-definitions/coronavirus-disease-2019-2023. The current investigation form for 2019 Novel Coronavirus available at www.dshs.texas.gov/sites/default/files/coronavirus/docs/DSHS-COVID19CaseReportForm.pdf. Completion of a more detailed investigation form may be required for probable or confirmed cases or in the event of an outbreak or other special situation. This more detailed investigation form will be provided by DSHS or may be available at www.dshs.texas.gov/covid-19-coronavirus-disease-2019/information-public-health if needed.

Case Investigation Checklist

- ☐ Any reported novel coronavirus case should be investigated within 7 days of notifications to the health department if possible. Otherwise, case investigations should be prioritized based on the order outlined in Coronavirus Disease 2019 (COVID-19) 2023 Case Definition | CDC at https://ndc.services.cdc.gov/case-definitions/coronavirus-disease-2019-2023.
- ☐ Ensure that appropriate control measures have been implemented (see Prevention and Control Measures, below).
- ☐ Determine whether the patient meets the case definition.
    - If needed obtain medical records, interview the suspected case-patient or surrogate and interview the patient's healthcare provider.
- ☐ Notify DSHS within 7 days of cases of novel coronavirus. See https://www.dshs.texas.gov/covid-19-coronavirus-disease-2019/information-laboratories/complying-governors-order-to for more details.
- ☐ For any patient who meets case criteria as a probable or confirmed COVID-19 case, complete a case investigation in NBS. Please refer to the *Data Entry Guidelines (DEG)* for specific data entry requirements.

Confirmed/Probable Case Investigation Checklist

- ☐ Any confirmed or probable COVID-19 cases should be investigated and entered into NEDSS following case investigation prioritization guidelines, (Coronavirus Disease 2019 (COVID-19) 2023 Case Definition | CDC at https://ndc.services.cdc.gov/case-definitions/coronavirus-disease-2019-2023). (www.dshs.texas.gov/sites/default/files/coronavirus/docs/DSHS-COVID19CaseDefinitionandInvestigationPrioritizationGuidance.pdf).
- ☐ Ensure that appropriate control measures have been implemented (see Prevention and Control Measures, below).
- ☐ Confirm that laboratory results (if available) meet the case definition.

- ☐ Notify DSHS within 7 days of probable or confirmed cases of coronavirus disease 2019.
- ☐ Confirmed and probable case investigations must be entered into the COVID-19 program area module (PAM) in the NEDSS Base System (NBS) or complete and return the Coronavirus Disease 2019 (COVID-19) Case Report form. Data sources may include medical records and by interviewing the case-patient or surrogate to identify close contacts, risk factors, and other pertinent information.
    - Completion of a more detailed investigation may be required and will be provided by DSHS, if needed for cases involving reinfection, vaccine breakthrough, outbreak, or a SARS-CoV-2 variant of concern or variant of high consequence.
- ☐ Be prepared to enhance surveillance in the local area for respiratory illnesses and respiratory viruses, if requested by DSHS.
    - Refer to the *Public Health Preparedness, Surveillance, and Response Plan for Texas: Respiratory Viruses Having Pandemic Potential* for a list of responsibilities by department and program area, and for action triggers.
- ☐ If applicable, complete the steps in the Managing Special Situations section.

Prevention and Control Measures

Staying up to date with COVID-19 vaccines and receiving COVID-19 antiviral medications if infected significantly lowers the risk of getting very sick, being hospitalized, or dying from COVID-19. DSHS recommends COVID-19 vaccination for everyone included in the current Food and Drug Administration (FDA) emergency use authorizations and approvals (Emergency Use Authorization | FDA). People who are moderately or severely immunocompromised have specific recommendations for COVID-19 vaccines, including boosters.

Please see Vaccines for Moderately to Severely Immunocompromised People | COVID-19 | CDC and https://www.cdc.gov/covid/vaccines/?CDC_AAref_Val=https://www.cdc.gov/coronavirus/2019-ncov/vaccines/index.html for updates to COVID-19 vaccine related guidance.

Prevention and control guidelines for SARS-Cov-2 are subject to change as disease knowledge evolves. Please refer to the CDC websites provided below for the most recent updates and recommendations.
https://www.cdc.gov/covid/prevention/?CDC_AAref_Val=https://www.cdc.gov/coronavirus/2019-ncov/prevent-getting-sick/prevention.html

Additional setting specific guidance may be found at: https://www.dshs.texas.gov/covid-19-coronavirus-disease-2019/information-communities-other-specific-groups

General Population

CDC advises that people follow prevention steps to help reduce their risk of getting infected and reducing the severity of illness with respiratory viruses, like SARS-CoV-2:

- Staying Up to Date with COVID-19 Vaccines | COVID-19 | CDC
- Improving Ventilation in Your Home (cdc.gov)
- Testing for COVID-19 | COVID-19 | CDC
- Following Recommendations for What to Do If You Have Been Exposed
- Preventing Spread of Respiratory Viruses When You're Sick | Respiratory Illnesses | CDC
- How to Protect Yourself and Others | COVID-19 | CDC
- Preventing Spread of Respiratory Viruses When You're Sick | Respiratory Illnesses | CDC
- For more information on COVID-19 vaccination please see: https://www.cdc.gov/covid/vaccines/?CDC_AAref_Val=https://www.cdc.gov/coron

avirus/2019-ncov/vaccines/index.html.
    - For more information on COVID-19 antiviral medications please see: https://www.cdc.gov/ncird/whats-new/antiviral-treatments.html

COVID-19 Prevention
The following prevention steps are recommended for people confirmed to have SARS-CoV-2 infection who can receive care at home and do not need to be hospitalized for medical reasons; people being evaluated by a healthcare provider for SARS-CoV-2 infection; caregivers and household members of a person confirmed to have, or being evaluated for, SARS-CoV-2 infection; and other people who have had close contact with a person confirmed to have, or being evaluated for, SARS- CoV-2 infection:

Note: If you are confirmed to have, or being evaluated for, SARS-CoV-2 infection you should follow the prevention steps below in accordance with How to Protect Yourself and Others at https://www.cdc.gov/covid/prevention/index.html. Although vaccinated people sometimes get infected with the virus that causes COVID-19, staying up to date on COVID-19 vaccines significantly lowers the risk of getting very sick, being hospitalized, or dying from COVID-19.

CDC recommends that all people use core prevention strategies to protect themselves and others from COVID-19.

- Stay home:
    - You should restrict activities outside your home, except for getting medical care. Do not go to work, school, or public areas, and do not use public transportation or taxis.
- Separate yourself from other people in your home:
    - As much as possible, you should stay in a different room from other people in your home. Also, you should use a separate bathroom, if available.
- Improve ventilation (air flow) at home to help prevent COVID-19 from spreading to other people
- Wear a high quality facemask or respirator around others:
    - You should wear a facemask covering your mouth and nose when you are in the same room with other people and when you visit a healthcare provider. If you cannot wear a facemask, the people who live with you should wear one while they are in the same room with you.
- Practice every day hygiene and cleaning and avoid sharing personal household items:
    - Wash hands often
    - Cover coughs and sneezes
- Monitor your symptoms and follow healthcare provider instructions:
    - Seek prompt medical attention if your illness is worsening (e.g., difficulty breathing). Before going to your medical appointment, call the healthcare provider and tell him or her that you have, or are being evaluated for, COVID-19 infection. This will help the healthcare provider's office take steps to keep other people from getting infected.

Because updates to isolation guidance is rapidly evolving, please see the Coronavirus Disease 2019 homepage on the Texas DSHS website and How to Protect Yourself and Others | CDC for updates for the general public. This does not apply to public school or congregate settings. Please see Preventing Spread of Infections in K-12 Schools | CDC and DSHS School Health Recommendations for the Prevention and Control of Communicable Diseases in a Group- Care Setting for the most up to date guidance for public school and congregate settings.

Caregivers and Household Members
See How to Protect Yourself and Others | COVID-19 | CDC from CDC for the most updated recommendations.

Healthcare Facilities including Nursin Homes, and Home health:
See Infection Control Guidance: SARS-CoV-2 | COVID-19 | CDC from the CDC for the most updated recommendations.

Travelers and Airline Crew
- Recommendations for travel due to the COVID-19 pandemic are updated frequently, for the latest information refer to the Travelers' Health | CDC.

Treatment
Available therapeutics reduce the risk of hospitalization and severe outcomes due to COVID-19 for certain high-risk groups. DSHS recommends the available, oral medication Paxlovid, Remdesivir, and Lagevrio as the first-line treatment for high-risk Texans with symptomatic COVID-19. To find medication, patients should reach out to their healthcare provider or use the Test-to-Treat Locator: HHS COVID-19 Test-to-Treat Locator

Texans seeking infusion treatments should consider the preferred Remdesivir treatment and talk to a doctor with questions. Please see https://www.dshs.texas.gov/covid-19-coronavirus-disease-2019/covid-19-therapeutics-information for updates and additional information.

Exclusion
Coronavirus disease 2019 commonly referred to as COVID-19 is a disease requiring exclusion from school under 25 Tex. Admin. Code § 97.7.

A school administrator shall exclude from attendance any child having or suspected of having COVID-19. Exclusion shall continue until the readmission criteria for the conditions are met. The readmission criteria for COVID-19 is as follows:

- If symptomatic, exclude until at least 5 days have passed since symptom onset, and fever free*, and other symptoms have improved.
- Children who test positive for COVID-19 but do not have any symptoms must stay home until at least 5 days after the day they were tested.

*Fever free for 24 hours without the use of fever suppressing medications. Fever is a temperature of 100° Fahrenheit (37.8° Celsius) or higher. Please see Preventing Spread of Infections in K-12 Schools | CDC, COVID-19 School Readmission Criteria and DSHS School Health Recommendations for the Prevention and Control of Communicable Diseases in a Group- Care Setting for the most up to date guidance for public school and congregate settings.

MANAGING SPECIAL SITUATIONS

MIS-C
Multisystem Inflammatory Syndrome in Children (MIS-C) is "Multisystem inflammatory syndrome in children" is an unusual expression of COVID-19 of
public health concern and should be reported to Texas Department of State Health Services. MIS-C is a condition where different body parts can become inflamed. See the DSHS MIS-C webpage for more information: www.dshs.texas.gov/covid-19-coronavirus-disease-2019/texas-covid-19-data/cases-multisystem-inflammatory-syndrome/multisystem-inflammatory-syndrome-children and CDC webpage at https://www.cdc.gov/mis/about/index.html.

- If a healthcare practitioner reports a suspected MIS-C case to the local health department, the local health department should assess the case and determine if the reported case meets the CDC MIS-C case definition. LHDs should request demographics, history and physical, labs, echo or radiology results if performed, and discharge summary (if available) from the provider to make their assessment.
- Case definition for MIS-C is available at: https://www.cdc.gov/mis/hcp/case-definition-reporting/?CDC_AAref_Val=https://www.cdc.gov/mis/mis-c/hcp_cstecdc/index.htm
- If case meets criteria, the local department should:
    - Complete their investigation and enter case into the MIS-C data mart in NEDSS. The LHD should then submit the medical records and case report form (available on the DSHS website) to EAIDU via secure email to EAIDU-coronavirus@dshs.texas.gov to be entered into NEDSS. Alternatively, the LHD may submit the medical records and case report form via secure email to EAIDU without entering the case into NEDSS; EAIDU will enter the case into NEDSS after their review if not already entered.
- For more information on evaluating and reporting cases of MIS-C, please see the Multisystem Inflammatory Syndrome in Children (MIS-C) Reporting Process available on the DSHS website.

SARS-CoV-2 Variants

Viruses like SARS-CoV-2 continuously evolve as changes in the genetic code (genetic mutations) occur during replication of the genome. A lineage is a genetically closely related group of virus variants derived from a common ancestor. A variant has one or more mutations that differentiate it from other variants of the SARS-CoV-2 viruses. Genetic variants of SARS-CoV-2 are circulating locally and globally and are being studied to inform local outbreak investigations and understand differences in transmission and severity of COVID-19 among those infected. DSHS is collecting information about COVID-19 variants of high consequence (VOHC) and variants of concern (VOC) as designated by the CDC. This list may be updated as additional VOHC/VOC are identified. Please see the DSHS Coronavirus Disease 2019 (COVID-19) SARS-CoV-2 Variant Case Guidance on the DSHS website for the most up to date information.

- Samples from suspected variant of concern cases and close contacts may be submitted to the DSHS Austin Public Health Laboratory for whole genome sequencing. Please see DSHS COVID-19 Next Generation Sequencing (NGS) Specimen Collection and Submission Instructions for more information.
- For more information on investigating or reporting variants, please see the DSHS Coronavirus Disease 2019 (COVID-19) Variant Case Guidance available on the DSHS website and for more information on the CDC's Role in Tracking Variants | COVID-19 | CDC.

Reinfection

COVID reinfections should be enumerated as a new case for surveillance purposes.

Guidance is evolving rapidly, for more information or the most up to date guidance about reporting COVID-19 reinfection cases, and the case definition please see the DSHS Coronavirus Disease 2019 (COVID-19) Reinfection Guidance available on the DSHS website at www.dshs.texas.gov/sites/default/files/coronavirus/docs/DSHS-COVID19ReinfectionGuidance.pdf.

Vaccine Breakthrough Cases

Because updates to vaccination guidance is rapidly evolving, please see the Vaccine

Breakthrough Guidance available on the DSHS website: COVID-19 (Coronavirus Disease 2019) | Texas DSHS for the most up to date information.

Clusters of Patients with Severe Acute Respiratory Illness/Outbreaks of COVID-19
If an outbreak is suspected or there is a cluster of COVID-19 in a jurisdiction, local area or facility, notify EAIDU by submitting a Respiratory Disease Outbreak Summary Form to EAIDU-coronavirus@dshs.texas.gov or by fax to (512) 776-7676.

The local/regional health department should:
- Investigate common exposures among the cases and work with any identified facilities or entities.
    - Recommend appropriate control measures for the specific entity or setting.
- Monitor individuals exposed to confirmed/probable cases.
    - Collect specimens from individuals exposed to confirmed or probable cases, if requested.
- Encourage persons with compatible symptoms to be evaluated by a healthcare provider.

If appropriate, alert healthcare providers in the area to be cognizant of possible cases and encourage immediate reporting of suspected cases.

REPORTING AND DATA ENTRY REQUIREMENTS
Provider, School, Child-Care Facility, and General Public Reporting Requirements
Confirmed and probable cases of SARS-CoV-2 infection are required to be reported to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at EAIDU-coronavirus@dshs.texas.gov or by fax to (512) 776-7676.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:
- Enter the case into NEDSS and submit an NBS notification on all **confirmed** and **probable** cases to DSHS within 7 days of receiving a report of such a case. NBS notifications will be automatically submitted for cases created through the workflow decision support system (WDS) but should be manually submitted for cases that are manually entered.
    - Suspect cases should not be entered into NBS. Please refer to the DSHS NBS Data Entry Guide on the website at www.dshs.texas.gov/sites/default/files/coronavirus/docs/DSHS-COVID19DataEntryGuide.pdf.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- When an outbreak is investigated, local and regional health departments should:
    - Review the DSHS Coronavirus Disease 2019 (COVID-19) SARS-CoV-2 Outbreak Reporting Guidance at DSHS Coronavirus Disease 2019 Outbreak Definition 08.23.2024.pdf.
    - Report outbreaks immediately to the regional DSHS office and or to DSHS EAIDU by secure email to EAIDU-coronavirus@dshs.texas.gov or fax to: 512-776-7676.
    - Enter outbreak associated cases into NEDSS and submit an NBS notification on all **confirmed** and **probable** cases to DSHS within 7 days. Ensure Outbreak fields outlined in COVID-19 section of DEG are completed and outbreak name entered matches outbreak name included on Respiratory Disease Outbreak Summary Form. Addition of outbreak names to NEDSS may be requested using the NEDSS

Helpdesk webform
- Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.
  - Fax or send by secure email a copy to the DSHS regional office and to EAIDU as a secure email to EAIDU-Coronavirus@dshs.texas.gov or fax to: 512-776-7676).
- The Respiratory Disease Outbreak Summary Form is available at http://www.dshs.texas.gov/eaidu/investigation/.

LABORATORY PROCEDURES

Identification of a novel coronavirus such as SARS-CoV-2 is available in Texas through the DSHS Austin Laboratory, Texas Laboratory Response Network (LRN) laboratories, and commercial laboratories throughout the state can test for SARS-CoV-2. For a list of laboratories in Texas currently qualified to perform novel coronavirus testing, please contact DSHS EAIDU by email at EAIDU-coronavirus@dshs.texas.gov or by fax at 512-776- 7676. Whole genome sequencing is also available at the DSHS Austin Laboratory for certain SARS CoV-2 specimens with epidemiologist approval or that meet priority sequencing criteria and for surveillance samples approved for whole genome sequencing by EAIDU (see https://www.dshs.texas.gov/sites/default/files/lab/forms/COVID-19-NGS-specimen-collection-and-submission-instructions.pdf for updated information).

Specimen Collection

Please see https://www.dshs.texas.gov/laboratory-services/laboratory-testing-services-manual-guidelines-specimen-collection-submission and Interim Guidelines for Collecting and Handling of Clinical Specimens for COVID-19 Testing | COVID-19 | CDC for the most up-to-date guidelines.

Specimen Type and Priority

Points to consider when determining which specimen types to collect from a patient under investigation for SARS-CoV-2 include:
- The number of days between specimen collection and symptom onset
- Symptoms at the time of specimen collection.

Additional points to consider:
- Maintain proper infection control when collecting specimens.
- Use approved collection methods and equipment when collecting specimens.
- Handle, store, and ship specimens following appropriate protocols.

General Guidelines

Proper specimen collection is the most important step in the laboratory diagnosis of infectious diseases. A specimen that is not collected correctly may be rejected for testing or lead to false or inconclusive (https://www.cdc.gov/covid/hcp/clinical-care/clinical-specimen-guidelines.html) test results. The following specimen collection guidelines follow standard recommended procedures.

For diagnostic testing for current SARS-CoV-2 infections, CDC recommends collecting and testing an upper respiratory specimen. Contact the testing laboratory to confirm accepted specimen types and follow the manufacturer instructions for specimen collection. Sterile swabs should be used for the collection of upper respiratory specimens. This is important both to ensure patient safety and preserve specimen integrity. Note that nasopharyngeal and oropharyngeal specimens are not appropriate for self-collection.

Testing lower respiratory tract specimens is also an option. For patients who develop a productive cough, sputum can be collected and tested for SARS-CoV-2 when available. However, the induction of sputum is not recommended due to the possibility of aerosol production during the procedure. Under certain clinical circumstances (e.g., for those receiving invasive mechanical ventilation), a lower respiratory tract aspirate or bronchoalveolar lavage specimen can be collected and tested as a lower respiratory tract specimen.

For short periods (≤ 72 hours), most specimens should be held at 2-8°C rather than frozen. For delays exceeding 72 hours, freeze specimens at -70°C as soon as possible after collection (with exceptions noted below). Label each specimen container with the patient's ID number, specimen type and the date the sample was collected.

Respiratory Specimens

A. Lower respiratory tract

- ☐ Bronchoalveolar lavage, tracheal aspirate, or pleural fluid
  - Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.
  - Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.
- ☐ Sputum
  - Have the patient rinse his/her mouth with water and then expectorate (deep cough) sputum directly into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.
  - Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

  Note: This is an aerosol-generating procedure and likely to generate higher concentrations of infectious respiratory aerosols. Aerosol-generating procedures potentially put healthcare providers and others at an increased risk for pathogen exposure and infection. Healthcare providers should maintain proper infection control (Infection Control Guidance: SARS-CoV-2 | COVID-19 | CDC), including standard precautions, and wear an N95 or equivalent or higher-level respirator, eye protection, gloves, and a gown, when collecting specimens.

B. Upper respiratory tract

- ☐ Nasopharyngeal AND oropharyngeal swabs (NP/OP swabs)
  - Collection of both nasopharyngeal and oropharyngeal swabs, or a combined NP/OP specimen, is recommended.
  - Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing.
  - Collection technique
    - Tilt patient's head back 70 degrees.
    - Nasopharyngeal swabs: Insert a swab into the nostril parallel to the palate. Gently rub and roll the swab. Leave the swab in place for a few seconds to absorb secretions. Slowly remove swab while rotating it. Specimens can be collected from both sides using the same swab, but it is not necessary to collect specimens from both sides if the mini-tip is saturated with fluid from the first collection.

- If a deviated septum or blockage create difficulty in obtaining the specimen from one nostril, use the same swab to obtain the specimen from the other nostril.
  - Oropharyngeal swabs: Swab the posterior pharynx, avoiding the tongue.
- Place swabs, tip first, immediately into sterile tubes containing 2-3 ml of viral transport media. NP/OP specimens can be combined, placing both swabs in the same vial.
- Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

☐ Nasopharyngeal wash/aspirate or nasal aspirates
- Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.
- Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Serum

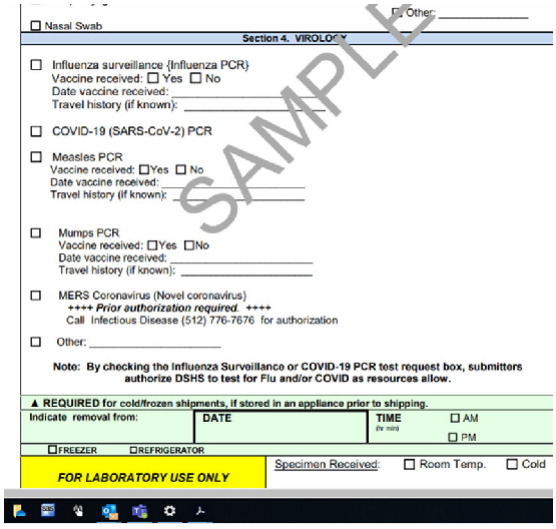
☐ Serum (for serologic testing at CDC) [Note: Use this serum guidance if the only serum specimen available would be collected 14 or more days after illness onset]

☐ Serum (for rRT-PCR testing at authorized state or local public health lab) [Note: Use this serum guidance for specimens collected during the first two weeks of the patient's illness onset]
- For rRT-PCR testing (i.e., detection of the virus and not antibodies), a single serum specimen collected optimally during the first 10-12 days after symptom onset is recommended.
- The minimum amount of serum required for SARS-CoV-2 testing (either serologic or rRT-PCR) is 200 µL. If both SARS-CoV-2 serology and rRT-PCR tests are planned, the minimum amount of serum required is 400 µL (200 µL for each test). Serum separator tubes should be stored upright for at least 30 minutes, and then centrifuged at 1000–1300 relative centrifugal force (RCF) for 10 minutes before removing the serum and placing it in a separate sterile tube for shipping (such as a cryovial). Refrigerate the serum specimen at 2-8°C and ship on ice-pack; freezing and shipment of serum on dry ice is permissible.
- Children and adults
  - Collect 1 tube (5-10 mL) of whole blood in a serum separator tube.
- Infants
  - A minimum of 1 mL of whole blood is needed for testing pediatric patients.
  - If possible, collect 1 mL in a serum separator tube.

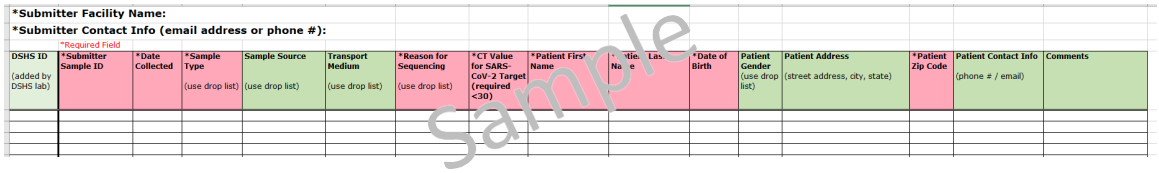
Submission Forms

For PCR testing:

- ☐ Use DSHS Laboratory G-2V Specimen Submission Form for specimen submission. On the form, under the Virology section, check the box "COVID-19 (SARS-CoV-2)".



- ☐ Make sure the patient's name and approved secondary identifier on the form exactly match what is written on the specimen tube.
  - An approved secondary identifier should be one of the following: date of birth, medical record number, social security number, Medicaid number, or CDC number.
- ☐ Fill in the patient's first name, last name, address, city, state, zip code, sex, date of birth, date and time of collection, date of onset and diagnosis/symptoms.
- ☐ The submitter will not incur a cost for novel coronavirus testing when patients meet testing criteria as long as the appropriate payor source is selected on the submission form. Contact DSHS EAIDU at 512-776-7676 for instructions on filling out the Payor



Source section of the G-2V Specimen Submission Form.

For Whole Genome Sequencing (WGS)

- ☐ Use DSHS Laboratory whole genome sequencing line list form, which is distributed to submitters upon sequencing approval.

- ☐ Fill in the patient's first name, last name, date of birth, address, city, state, zip code, gender, date and time of collection, patient contact information, sample ID, date collected, sample source, transport medium, Ct value and reason for sequencing.
- ☐ Enclose a printed copy with sample shipment and email an electronic copy of the completed line list to wgs.dshs@dshs.texas.gov and EAIDU-Coronavirus@dshs.texas.gov with expected date of delivery and tracking number for package.

Specimen Shipping

- ☐ **Notify the testing laboratory that you will be shipping the specimen and provide the shipment date, tracking number, and all relevant forms.**
- ☐ Transport temperature: Store the specimen at 2-8°C if the specimen will be received at the laboratory within 72 hours of collection; ship the specimen on cold or freezer packs. Otherwise, the specimen must be frozen at -70°C and shipped on dry ice.
- ☐ Ship specimens via overnight delivery.
- ☐ DO NOT mail on a Friday or the day before a holiday unless special arrangements have been made in advance with the DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Incorrect source of specimen
- ☐ The specimen is received at an incorrect temperature, such as ambient temperature
- ☐ The specimen is received more than 72 hours after collection (if refrigerated)
- ☐ Missing or discrepant information on form/specimen
- ☐ Patient does not meet testing criteria or has not been approved for testing by EAIDU Coronavirus Epidemiology Team (EAIDU-Coronavirus@dshs.texas.gov).

REVISION HISTORY

January 2022

- ☐ Section established in EAIDG and all sections written to reflect current guidelines for COVID-19 reporting, prevention, and testing information. Guidance for COVID-19 is rapidly evolving, please see the www.dshs.texas.gov/covid-19-coronavirus-disease-2019/information-public-health webpage for the most up to date information.

September 2024

- ☐ Updates made to entire section

Cronobacter in infants

BASIC EPIDEMIOLOGY

Infectious Agent

Cronobacter spp. belong to the order Enterobacterales, which are Gram-negative bacteria. It is an opportunistic pathogen linked to illnesses and outbreaks of life-threatening necrotizing enterocolitis, meningitis, and sepsis in infants and other susceptible populations. In 2007-2008, the bacteria were reclassified under the genus *Cronobacter* which replaced the former single species *Enterobacter sakazakii*. To date, the most clinically relevant species are *C. sakazakii* and *C. malonaticus,* which are recognized as causing invasive disease in infants.

Transmission

Cronobacter are ubiquitous in the environment and can live in dry food, such as powdered infant formula (PIF), powdered milk, herbal teas, starches, and also in contaminated feeding items like breast pump equipment.

Powdered infant formula, which is not a sterile product, has been recognized as a primary vehicle for *Cronobacter* transmission and was identified as a source in recent outbreaks.

Microbiological contamination of PIF can potentially occur at multiple points during production or distribution. Additionally, some *Cronobacter* infections have been traced to PIF preparation and storage by consumers in hospital and home settings.

Cronobacter infections continue to occur in the hospital setting suggesting the need to address infection control issues and hand hygiene, handling and storage practices, and implementation of safer alternatives to PIF.

Risk group

Cronobacter infection is rare. CDC typically receives reports of about 2-4 infections in infants per year. Neonates and infants are at greatest risk for high morbidity and mortality due to their immature immune system. Other factors for high morbidity and mortality include premature delivery and pregnancy-related disease in the gestational parents.

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Incubation Period

From as little as 6 hours to as long as two weeks, with an average incubation period of 10 days.

Clinical Illness

Cronobacter infection can cause serious systemic infections in infants with a reported fatality rate of approximately 40%. Clinical syndrome includes sepsis (bacteremia), necrotizing enterocolitis, meningitis, skin or soft tissue infection, urinary tract infection, diarrhea, and others. It can also have serious complications such as seizures, brain abscess and brain infarction, or hydrocephalus.

DEFINITIONS

Clinical Case Definition
In the absence of a more likely alternative diagnosis, it is an acute illness in an infant (<12 months of age) characterized by an invasive infection, including but not limited to meningitis, cerebral abscess sepsis, necrotizing enterocolitis, or urinary tract infection.

Laboratory Confirmation

- Isolation by culture of Cronobacter spp. in a clinical specimen from a normally sterile site (e.g., blood or cerebral fluid)

Case Classifications

- **Confirmed:** Meets clinical criteria AND confirmatory laboratory evidence
- **Probable:** Meets clinical criteria AND epidemiological linkage criteria AND supportive laboratory evidence
- **Suspect**:
  - Meets clinical criteria AND supportive laboratory evidence, OR
  - Meets clinical criteria AND epidemiological linkage criteria.

Notes:

Supportive Laboratory Evidence:

- Isolation of *Cronobacter* spp. in a clinical specimen from a non-sterile site (e.g., stool or rectum, urine, skin, respiratory secretions, or broncho-alveolar lavage, etc.)

Epidemiologic Linkage Criteria:

Epidemiologic risk factors within 7 days prior to illness onset in an infant:

- Consumption of powdered infant formula (PIF) implicated as the source of infection, OR
- Exposure to a non-PIF product, such as breast milk, implicated as the source of infection, OR
- Residing in a congregate setting (e.g., a neonatal intensive care unit [NICU]) with an active *Cronobacter* spp. outbreak.

SURVEILLANCE AND CASE INVESTIGATION

Note: by TAC, the *Cronobacter* in infants is reportable within 1 week, but it's important to notify the EAIDU Foodborne team as soon as possible to ensure that regulatory actions and testing of suspected powdered infant formula were initiated on time.

Case Investigation
Local and regional health departments should investigate all reports of suspected *Cronobacter* in infants.
Please use the Infant Case Report Form for Invasive Cronobacter Infection to record the information from the interview:
http://www.dshs.state.tx.us/idcu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition (may have been done by EAIDU).
- ☐ Verify that the laboratory has sent a specimen to the DSHS laboratory.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to describe course of illness and outcome of case.
- ☐ Interview the case's parents or guardian to identify the potential source of infection, such as powdered infant formula:
    - Collect detailed information on PIF (formula name, brand and serial number, date and place of purchase)
    - Did the child consume formula at home or it was provided at the hospital
- ☐ Ask if any leftovers of suspected powdered infant formula or unopened containers of formula are still present in the home. Additional samples can be considered for testing, such as expressed breast milk, and infant cereal. The EAIDU Foodborne team will assist in coordinating product testing at the DSHS or FDA/CDC laboratory.
- ☐ Based on investigation findings, it could be recommended to do environmental sampling (e.g. swabbing kitchen in hospital, breast pump parts, etc)
- ☐ Fax completed forms to DSHS EAIDU at 512-776-7616 or email securely to the EAIDU epidemiologist at FOODBORNETEXAS@dshs.texas.gov.
- ☐ Hospitalized cases should be followed until discharge and patient's outcome recorded.
    - Initial reports can be sent to DSHS prior to discharge.
- ☐ In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

The CDC *Cronobacter* Infection website has many resources on how to prevent Cronobacter infections in infants if breastfeeding or using powdered infant formula:

- Preventing Cronobacter in Infants | Cronobacter Infection | CDC

Prevention tips:

- Breastfeed if you can:
    - Breastfeeding | Nutrition | CDC
    - About Breast Pump Hygiene
- Clean, sanitize, and store feeding items safely to prevent germs grow and spread:
    - How to Clean, Sanitize, and Store Infant Feeding Items
    - FDA: handling infant formula safely
- Wash your hands with soap and water and also clean surfaces before preparing bottles or food and while feeding your baby
- Prepare and store your formula safely:
    - Infant Formula Preparation and Storage | Nutrition | CDC

Exclusions
No exclusion is required.

MANAGING SPECIAL SITUATIONS

Outbreaks
Past outbreaks of Cronobacter in infants related to powdered infant formula (PIF) have been investigated in the US and Texas.

- Cronobacter Outbreak Linked to Powdered Infant Formula | Cronobacter Infection | CDC

Although Cronobacter outbreaks are rare, they have a potential to be a public health emergency because other infants may eat the contaminated infant formula. Rapid investigation of cases and outbreaks is critical for prompt treatment of likely cases, for the identification of contaminated food vehicles and prevention of additional cases.

If an outbreak is suspected, **immediately** notify DSHS EAIDU **(512) 776-7676** or **24/7 line 1-800-705-8868**.

- Outbreak investigations should always be done in a collaborative manner involving local health department(s) with suspected or confirmed cases, the appropriate regional health department(s), an EAIDU Foodborne epidemiologist, DSHS Regulatory Services staff, and any appropriate federal agencies.
- If PIF is implicated, EAIDU Foodborne team will notify the FDA and DSHS Division of Regulatory Services about the suspect case associated with PIF and the possibility of a suspect product testing and further investigation of PIF by the FDA.

The local/regional health department should:

- Review case information from the initial notification of any suspect individual case(s) already identified, including laboratory results, clinical histories, food histories, and any other information.
- Interview the infant's parents or guardians, using the Infant Case Report Form for Invasive Cronobacter Infection (Investigation Forms | Texas DSHS (state.tx.us), and collect detailed information on PIF, such as did the child consume the formula at home or it was provided at the hospital. Is a leftover or unopened container with the same serial number of the PIF still available for testing? Collect information on PIF name, brand, serial number, date and place of purchase, and email it to the EAIDU Foodborne team at FoodborneTexas@dshs.texas.gov
- Based on investigation findings, it could be recommended to do environmental sampling (e.g. swabbing kitchen in hospital, breast pump parts, etc) or the testing of expressed breast milk and infant cereal. The EAIDU Foodborne team will assist in coordinating product testing at the DSHS or FDA/CDC laboratory.
- Prepare a line list of cases in your jurisdiction. At a minimum, information needed for the line list includes patient name, DSHS specimen identification number, specimen source, date of specimen

collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of botulism, and risky foods eaten, or other risky exposures reported by the case or surrogate.

- Communicate regularly with all parties involved in outbreak investigation
    - Provide Situation Reports through email.
    - If needed, hold conference calls to discuss the outbreak investigation
- Complete the Infant Case Report Form for Invasive Cronobacter Infection and email to the EAIDU Foodborne team at FoodborneTexas@dshs.texas.gov

☐ Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Call DSHS EAIDU when investigation of a suspect case of Cronobacter in infant is being conducted.
- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks **immediately** to the regional DSHS office or to EAIDU at **512-776-7676.**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Enter outbreaks into NORS online reporting system at Sign In - NORS (cdc.gov)

    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

Clinical specimens are encouraged to be submitted to the DSHS laboratory in Austin for confirmation and Whole Genome Sequencing (WGS).

The DSHS laboratory can test Powdered Infant Formula (PIF) if it is associated with the investigation of a suspect case of Cronobacter in infant. PIF sample will be accepted by the DSHS laboratory only with prior approval by EAIDU Foodborne team. If you have a request to test PIF, please email FoodborneTexas@dshs.texas.gov

Specimen Collection

- Blood or CFS
    - 1-2 ml minimum for an infant is recommended
    - Keep blood at 2º - 8º C
    - Keep CSF at room temperature at 15º - 25º C

- Food (PIF)
    - Minimum of 100 grams, but 200 grams or more is preferred
    - Must be collected by a registered sanitarian
    - Food samples that arrive on Fridays or the day before a holiday will be stored and testing will begin on the next business day. Arrival before 10AM is highly preferred.

Submission Form

- DSHS Laboratory G-27A form for a clinical specimen submission.
- DSHS Laboratory G-23 for food (PIF) specimen submission
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the submission form

- Fill in the date of collection and select the appropriate test.
- Payor source:
  - Check "IDEAS" to avoid billing for submitter

Specimen Shipping

- Transport temperature:
  - Blood:
    - Keep at 2º - 8º C
    - Should be shipped cold (on cold packs, not dry ice) by overnight courier
  - CSF:
    - Should be shipped at ambient temperature
  - Food:
    - Should be shipped in original container under current storage conditions (e.g., cold storage submitted cold; frozen storage submitted frozen; etc.)
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

  Laboratory Services Section, MC-1947
  Texas Department of State Health Services
  Attn. Walter Douglass (512) 776-7569
  1100 West 49th Street
  Austin, TX 78756-3199

Causes for Rejection:

- Incorrect source of specimen.
- Insufficient amount of specimen.
- Missing or discrepant information on form/specimen

REVISION HISTORY

Cryptosporidiosis

BASIC EPIDEMIOLOGY

Infectious Agent

Cryptosporidium species, a coccidian, protozoan parasite. *Cryptosporidium hominus* and *Cryptosporidium parvum* are the 2 species most often associated with human illness.

Transmission

Transmission occurs through the fecal-oral route. This is predominantly through the ingestion of sporulated oocysts, which are the infectious stage of the parasite, in contaminated or untreated water sources. Oocysts are shed periodically in high quantities in the stool of infected individuals and are highly resistant to environmental conditions and chemical disinfectants. Transmission can also occur through person-to-person transmission, through contact with an infected animal or contaminated surface, and via the ingestion of contaminated food. A wide array of animals can act as reservoirs and sources of infection without displaying symptoms of illness, including fish, reptiles, birds, and small (rodents, cats, dogs) and large mammals (cattle and sheep).

Incubation Period

Variable; usually 1 to 12 days, with an average of 7 days

Communicability

Oocysts may be shed immediately upon symptom onset and for up to 2 weeks after symptoms resolve. Immunocompromised individuals may shed oocysts for months. *Cryptosporidium* oocysts are infectious immediately upon excretion. Outside of the body the oocysts can remain infectious for 2-6 months and even longer when in a moist environment.

Clinical Illness

Frequent, non-bloody, watery diarrhea lasting 6 to 14 days (less than 30 days) is the predominant symptom. Fever, abdominal cramps, fatigue, vomiting, anorexia, and weight loss may also be seen. Asymptomatic infections are common.

Severity

Usually self-limited in healthy individuals. Pregnant women and people with weakened immune systems are at higher risk of severe complications. Rare instances of disseminated infection may occur in immunocompromised individuals. Malnutrition and significant weight loss in immunocompromised individuals with chronic diarrhea can contribute to death.

DEFINITIONS

Clinical Case Definition

A gastrointestinal illness characterized by diarrhea and one or more of the following: diarrhea duration of 72 hours or more, abdominal cramping, vomiting, or anorexia.

Laboratory Confirmation

- ☐ Detection of *Cryptosporidium* organisms or DNA in stool, intestinal fluid, tissue samples, biopsy specimens, or other biological sample by certain

laboratory methods with a high positive predictive value (PPV), e.g., DFA, PCR, EIA, or light microscopy of stained specimen.

Case Classifications

- ☐ **Confirmed:** A case that is laboratory confirmed
- ☐ **Probable:** A person must meet one of the following:
  - A case with *Cryptosporidium* antigen detected by a screening test method such as, the immunochromatographic card/rapid card test or a laboratory test of unknown method, **OR**
  - A clinically compatible case that is epidemiologically linked to a confirmed case by one of the following means:
    - Household or other close contact to a lab-confirmed case with onset of symptoms within 1 month (before or after), **OR**
    - Exposure to an outbreak at a body of water or water facility involving at least 2 lab-confirmed cases and onset of symptoms within one month (before or after) of one or more of these cases.

Note: a case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

It is recommended that local and regional health departments investigate all reported cases of cryptosporidiosis to identify potential sources of infection. Sporadic cases of cryptosporidiosis do not require an investigation form be sent to DSHS EAIDU unless they are identified as part of a multi-jurisdictional cluster or outbreak. Any case associated with a cluster or outbreak should be interviewed.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist/healthcare provider to verify case definition, identify possible risk factors, and describe course of illness.
- ☐ If time and resources allow or the case is part of an outbreak or cluster, interview the case to identify potential sources of infection. Ask about possible exposures in the 2 to 12 days before onset, including:
  - Contact with any acquaintances or household member with a similar illness.
  - Attendance or work at a child-care facility by the case or a household member.
  - Source(s) of drinking water, including water at home and work, as well as streams, lakes or other untreated sources.
  - Recreational water exposures: lakes, rivers, swimming pools, water slides, etc. Obtain the date and location of exposure.
  - Travel outside the area. Obtain travel dates and locations visited.
  - Contact with livestock and other animals.
  - Consumption of high-risk foods (e.g., raw milk or other unpasteurized products).
  - Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- ☐ Provide education to the case or his/her surrogate regarding modes of transmission and ways to prevent transmission to others. See Prevention

and Control Measures.

- ☐ Identify whether there is a public health concern: persons should not work as food handlers, child- care or healthcare workers, or attend child-care as long as they have diarrhea. See Exclusions.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.

Prevention and Control Measures

- ☐ Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After any contact with animals or their living areas.
- ☐ Swimming at recreational water venues (pools, interactive fountains, lakes, ocean):
  - Prevent transmission to others by not swimming when experiencing diarrhea (this is essential for children in diapers).
  - If diagnosed with cryptosporidiosis, swimming should be avoided for at least 2 weeks after diarrhea stops.
  - Symptomatic individuals should shower prior to entering the water.
  - Children should be washed thoroughly (especially their bottoms) with soap and water after they use the toilet or their diapers are changed and before they enter the water.
  - Children should be taken on frequent bathroom breaks and have their diapers checked often.
  - Change diapers in the bathroom, not near the poolside or water source.
- ☐ Contact with animals:
  - Avoid or minimize any contact with the feces of all animals, especially young animals.
  - Wear disposable gloves when cleaning up animal feces and always wash hands when finished.
  - Wash hands after any contact with any animals or their living areas.
- ☐ Outside:
  - Wash hands after gardening, even if wearing gloves.
- ☐ Immunocompromised persons/at risk populations - cryptosporidiosis can become a life-threatening disease for immunocompromised persons:
  - Avoid close contact with any person or animal that has cryptosporidiosis.
  - Do not handle animal feces.
- ☐ Avoid sexual practices that can cause oral exposure to stool (e.g., oral-anal contact).

Exclusions

School/child-care: No exclusions are specified for cryptosporidiosis but the standard exclusion for diarrhea or fever applies:

- ☐ Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- ☐ Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for cryptosporidiosis but the standard exclusion for vomiting or diarrhea applies:

- ☐ Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications, OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

The local/regional health department should:

- ☐ Interview all cases suspected as being part of the outbreak or cluster.
- ☐ Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- ☐ Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- ☐ If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional cases.
- ☐ Work with any implicated facilities to ensure staff and students/residents/volunteers get hand hygiene education and review hygiene and sanitary practices currently in place including:
  - Policies on, and adherence to, hand hygiene
  - Storage and preparation of food
  - Procedures for changing diapers and toilet training
  - Procedures for environmental cleaning
- ☐ Recommend that anyone displaying symptoms seeks medical attention from a

healthcare provider.

- ☐ Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child- care, if they are symptomatic. See Exclusions in Case Investigation section.
- ☐ When a public recreational or public water source (such as public pools, water parks or lake) is implicated as a source of transmission, educate staff on appropriate measures of environmental cleaning and disinfection.
  - Recommend the disinfection and remediation guidelines at the CDC website: Healthy Swimming | Healthy Swimming | CDC and Operating and Managing Public Pools, Hot Tubs and Splash Pads | Healthy Swimming | CDC
  - When a recreational water source has been implicated in an outbreak, recommend hyperchlorination be used for disinfection and remediation: What to Do When There is Poop in the Pool | Healthy Swimming | CDC
- ☐ Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Note:

- ☐ If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- ☐ If investigation forms are requested, they may be faxed to 512-776-7616 or emailed securely to an EAIDU foodborne epidemiologist at FOODBORNETEXAS@dshs.texas.gov.

When an outbreak is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676**
- ☐ Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more

cases of similar illness associated with a common exposure.
- The following should be reported to NORS:
  - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Outbreaks as indicated above with patients in the same household.
- Enter outbreaks into NORS online reporting system at Sign In - NORS (cdc.gov)
- Forms, training materials, and other resources are available at http://www.cdc.gov/nors/

☐ To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
- Please put in Subject Line: NORS User Account Request
- Information needed from requestor: name, email address, and agency name
- After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Testing for cryptosporidiosis is widely available from most private laboratories. Specimens should not be submitted to the DSHS laboratory unless approved by EAIDU. Submission of specimens to the DSHS laboratory will be considered during outbreak investigations. Contact an EAIDU foodborne epidemiologist to discuss further.

Specimen Collection

☐ Submit a stool specimen in a sterile, leak-proof container.
- Required volume: Stool 15g solid or 15mL liquid.

☐ Fresh stool that cannot be received by the lab in less than 5 hours should be placed in formalin immediately.

Submission Form

☐ Use DSHS Laboratory G-2B form for specimen submission.
☐ Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
☐ Fill in the date of collection and select the appropriate test.
☐ If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
☐ Payor source:
- Check "IDEAS" to avoid bill for submitter

Specimen Shipping

☐ Transport temperature: May be shipped at ambient temperature or 2-8ºC.
☐ Ship specimens via overnight delivery.
☐ DO NOT mail on a Friday, or state holiday, unless special arrangements have been pre-arranged with DSHS Laboratory.
☐ Ship specimens to:

Laboratory Services Section,
MC-1947 Texas Department of
State Health Services Attn.
Walter Douglass (512) 776-7569
1100 West 49th Street

Austin, TX 78756-3199

Causes for Rejection:

- ☐ Specimen not in correct transport medium.
- ☐ Missing or discrepant information on form/specimen.
- ☐ Unpreserved specimen received greater than 5 hours after collection.

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Cryptosporidium* is NOT available at the DSHS laboratory.

REVISION HISTORY

October 2024

- ☐ Replaced broken links

Cyclosporiasis

BASIC EPIDEMIOLOGY

Infectious Agent

Cyclospora cayetanensis, a sporulating, protozoan parasite. *Cyclospora* is an oocyst, i.e., it is protected by an outer wall making it resistant to disinfectants. It also has surface adhesions that allow it to adhere to various surfaces, e.g., leafy greens, berries, etc.

Transmission

Transmission occurs through ingestion of oocysts in contaminated food or water.

Incubation Period

Usually 7 days (range 2-14 days)

Communicability

Cyclospora oocysts are not infectious in freshly excreted stool, making person-to-person transmission unlikely. However, indirect transmission can occur if excreted oocysts contaminate the environment and sufficient time/conditions allow them to become infectious (i.e., sporulate).

Clinical Illness

Watery diarrhea is the predominant symptom. Other symptoms include loss of appetite, weight loss, cramping, bloating, increased gas, nausea and fatigue. Less common symptoms include vomiting, body aches and a low-grade fever. Asymptomatic infections can occur, particularly where cyclosporiasis is endemic.

DEFINITIONS

Clinical Case Definition

An illness of variable severity caused by the protozoan parasite *Cyclospora cayetanensis*. The most common symptom is watery diarrhea. Other common symptoms include loss of appetite, weight loss, abdominal cramps, bloating, nausea, increased flatulence, and fatigue. Vomiting, body aches, and low-grade fever also may be noted. Relapses and asymptomatic infections can occur.

Laboratory Confirmation

- Detection of *Cyclospora*:
  - Organisms by microscopic examination in stool, intestinal fluid/aspirate, or intestinal biopsy specimens **OR**
  - DNA (by PCR) in stool, intestinal fluid/aspirate or intestinal biopsy specimens

Case Classifications

- **Confirmed:** A laboratory-confirmed case with clinical compatibility
- **Probable:** A clinically compatible case that is epidemiologically linked to a confirmed case

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of cyclosporiasis. Investigations should include an interview of the case or a surrogate to get a detailed exposure history.

Please use the ***Cyclospora*** **National Hypothesis Generating Questionnaire (CNHGQ)** investigation form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/

Case Investigation Checklist

- Confirm laboratory results meet the case definition.
- Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- Interview the case to get detailed food history and risk factor information.
    - Use the ***Cyclospora*** **National Hypothesis Generating Questionnaire (CNHGQ)** investigation form to record information from the interview.
    - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
    - Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and ways to prevent transmission to others. See Prevention and Control Measures.
- Fax completed forms to DSHS EAIDU at 512-776-7616 or email securely to FoodborneTexas@dshs.texas.gov.
    - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- Identify whether there is a public health concern: persons should not work as food handlers, child- care or health care workers, or attend child-care if they have diarrhea. See Exclusions.
- If case is part of an outbreak or cluster, see Managing Special Situations section.
- All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water, especially:
    - Before preparing, handling or eating any food.
    - After going to the bathroom.
    - After changing a diaper.
    - After caring for someone with diarrhea.
- Thoroughly wash fruits and vegetables; however, this practice does not eliminate the risk of *Cyclospora*.
- When traveling internationally to areas with poor sanitary conditions:
    - Drink bottled water or water that has been boiled for at least 1 minute.
    - Don't drink fountain drinks or drinks with ice.
    - Don't eat fruits or vegetables that you don't peel yourself.
    - Avoid uncooked foods.
- Avoid swallowing recreational water, especially when traveling.

Exclusions

School/child-care: No exclusions are specified for cyclosporiasis but the standard

exclusion for diarrhea or fever applies:

Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.

- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for cyclosporiasis but the standard exclusion for vomiting or diarrhea applies:

- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications

  OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676,** or email an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, is lost to follow-up, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/24	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/24	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your

jurisdiction to alert them to the possibility of additional cases.
- Work with any implicated facilities to ensure staff and students/residents/volunteers get hand hygiene education and review hygiene and sanitary practices currently in place, including:
  - Policies on, and adherence to, hand hygiene.
  - Storage and preparation of food.
  - Procedures for changing diapers and toilet training.
  - Procedures for environmental cleaning.
- If the outbreak was reported in association with a local event (e.g., party, conference, rodeo), a restaurant/caterer, or other possible local exposure where food was served, try to obtain as much information about the case's food history at the event, the menu of the event, and the source of the food served.
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child- care, if they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Note:
- If a food item or food establishment is implicated, an EAIDU foodborne epidemiologist will notify appropriate state/and/or federal partner agencies regarding the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed and probable cases are required to be reported **within 1 week** to the local or regional health department or by faxing the disease reporting form to the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:
- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed CNHGQ to DSHS EAIDU at **512-776-7676** or email securely to FoodborneTexas@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676.**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Enter outbreaks into NORS online reporting system at Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov.
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Testing for cylcosporiasis is widely available from most private laboratories. Specimens are encouraged to be submitted to the DSHS laboratory for confirmation.

Specimen Collection

- Submit a stool specimen in a sterile, leak-proof container.
    - Required volume: Stool 15 g solid or 15mL liquid.
- Fresh stool that cannot be received by the lab in less than 5 hours should be placed in formalin and PVA immediately.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check “Outbreak association” and write in name of outbreak.
- Payor source:
    - Check “IDEAS” to avoid bill for submitter.

Specimen Shipping

Transport temperature: May be shipped at ambient temperature or 2-8ºC.

- Ship specimens via overnight delivery and email the tracking number to an EAIDU foodborne epidemiologist
- DO NOT mail on a Friday, or a state or federal holiday unless approved by an EAIDU foodborne epidemiologist and confirmed by DSHS Laboratory.
- Must be received on cold packs or wet ice.
- Ship specimens to:

Laboratory Services Section,
MC-1947 Texas Department of
State Health Services Attn.
Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Specimen not in correct transport medium.
- Missing or discrepant information on form/specimen.
- Unpreserved specimen received greater than 5 hours after collection.
- Transport media was expired.
- Specimen too old.

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food samples for *Cyclospora cayetanensis* is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist.

General policy

- The DSHS lab will only test food samples from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples unless a pathogen has been identified in a clinical specimen.
- Food samples must be **collected by a registered sanitarian**.

At this time, environmental testing is not available for *Cyclospora.* For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

December 2021

- Updated Definitions, Managing Special Situations, and Laboratory Procedures sections

March 2021

- Entire section

Diphtheria

BASIC EPIDEMIOLOGY

Infectious Agent
Toxin-producing strains of *Corynebacterium diphtheriae*

Transmission
Direct person-to-person transmission by intimate respiratory and physical contact. Cutaneous skin lesions are also important in transmission.

Incubation Period
Usually 2-5 days (range 1-10 days)

Communicability
Untreated individuals generally shed bacteria from the respiratory tract or from skin lesions for 2-4 weeks after infection. Infected individuals are infectious for up to 4 days after antibiotic treatment has been initiated. A chronic carrier state is extremely rare, but known to exist, and such a carrier may shed organisms for up to 6 months or longer.

Clinical Illness
Classic diphtheria is an upper respiratory tract illness characterized by sore throat, low-grade fever, and an adherent membrane of the tonsils, pharynx, and/or nose. The disease can involve almost any mucous membrane. Growth of the adherent membrane can cause a potentially fatal airway obstruction. Patients with severe disease can develop a "bullneck" appearance caused by edema of the anterior neck.

Cutaneous diphtheria is either caused by toxigenic or non-toxigenic strains of *C. diptheriae*. The disease is usually mild, typically consisting of non-distinctive sores or shallow ulcers, and rarely causes toxic complications. Cutaneous infections represent 1-2% of infections with toxigenic strains. Cutaneous diphtheria is not reportable but should be promptly investigated to determine whether the strain is toxigenic.

DEFINITIONS

Clinical Case Definition
An upper respiratory tract illness typically characterized by sore throat, low-grade fever, and an adherent membrane of the tonsil(s), pharynx, larynx, and/or nose with an adherent membrane of the nose, pharynx, tonsils, or larynx **OR** an infection of non-respiratory anatomical site (e.g., skin, wound, conjunctiva, ear, genital mucosa)

Laboratory Criteria for Diagnosis
- ☐ Isolation of toxin-producing *Corynebacterium diphtheriae* from any site, **AND**
- ☐ Confirmation of toxin-production by Elek test or by another validated test capable of confirming toxin-production

Case Classification
- ☐ **Confirmed:**
  - A clinically compatible case that is:
    - Laboratory confirmed **OR**

        - Epidemiologically linked to a laboratory-confirmed case
    - An infection of a non-respiratory anatomical site (e.g., skin, wound, conjunctiva, ear, genital mucosa) with:
        - Isolation of toxin-producing *Corynebacterium diphtheriae* from any site

☐ **Probable:** No probable case definition

Note: PCR (polymerase chain reaction) and MALDI-TOF (matrix-associated laser desorption/ionization- time of flight mass spectrometry) diagnostics for *C. diphtheriae*, when used alone, do not confirm toxin production. These tests, when used, should always be combined with a test that confirms toxin production, such as the Elek test, which can be performed at the CDC through submission to the DSHS Lab in Austin.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should immediately investigate any reported suspect cases of diphtheria.

****If a provider suspects respiratory diphtheria, the provider should be instructed to call the Texas Department of State Health Services EAIDU to discuss the case and determine whether diphtheria antitoxin is needed. During business hours, the provider should call 512-776-7676, after hours the number is 512-221-6852****

EAIDU will evaluate and determine the need for antitoxin prior to contacting the Centers for Disease Control and Prevention (CDC) for diphtheria antitoxin, if still required. The current CDC Emergency Operations Center (EOC) protocol has been revised to redirect medical care providers requesting DAT (for treatment of suspected diphtheria) to contact their respective state health departments and discuss their case if they have not previously done so.

If the CDC releases antitoxin, the following control measures should be implemented immediately. If the CDC does not feel antitoxin is warranted, the control measures can be implemented after laboratory/pathological confirmation.

Case Investigation Checklist

- ☐ If not done already, notify DSHS EAIDU immediately and discuss possible release of antitoxin for respiratory diphtheria. Antitoxin is not recommended for cutaneous diphtheria unless there are signs of systemic toxicity.
- ☐ If deemed to be a candidate for antitoxin by EAIDU, refer provider to CDC for antitoxin.
- ☐ Isolate patient (for respiratory infections, standard + droplet precautions; if cutaneous, contact).
- ☐ Confirm that laboratory results meet the case definition.
- ☐ Verify that the laboratory has forwarded the specimen to the DSHS laboratory. See Laboratory Procedures.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, underlying health conditions, course of illness, vaccination status and travel history.
    - Request copies of admission and discharge summaries and laboratory results.

- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
  - Case (or parent), ImmTrac, school nurse records, primary care provider, etc.
- ☐ Identify and follow-up with all close contacts. See Managing Close Contacts below.
  - Collect specimens and send to the DSHS laboratory.
  - Provide prophylaxis (see Prophylaxis Guidelines).
  - Monitor for 7 days.
  - Give vaccination or booster as appropriate for age and vaccination status.
- ☐ Submit specimens from case and close contacts to the DSHS laboratory.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- ☐ Reports of suspected diphtheria should be investigated **immediately**.
- ☐ Universal vaccination with a diphtheria toxoid containing vaccine is the best prevention and control measure.
  - Infants and children
    - CDC recommends routine DTaP vaccination for all infants and children younger than 7 years old, with administration of a 5-dose DTaP series, with 1 dose each at 2 months, 4 months, 6 months, 15-18 months, and 4-6 years.
  - Adolescents
    - CDC recommends routine Tdap vaccination for all adolescents, ideally with a single dose of Tdap at 11 to 12 years of age.
  - Adults
    - CDC recommends vaccination every 10 years for all adults to maintain protection against diphtheria.
- ☐ Identify and follow-up with close contacts of confirmed cases.
  - Only close contacts of a patient with culture-confirmed or suspected diphtheria should be considered at increased risk for acquiring secondary disease. Such contacts include all household members and other persons with a history of habitual close contact with the patient, as well as those directly exposed to oral secretions of the respiratory patient or wound of the cutaneous patient.
  - Treat any contact with antitoxin at the first sign of respiratory illness. **CONTACT EAIDU**.
- ☐ Patient should be kept in strict isolation until two cultures from both throat and nose, taken at least 24 hours apart and at least 24 hours after cessation of antimicrobial therapy, are negative for diphtheria bacilli. If cultures are not possible, patient should be kept in isolation for 14 days following appropriate antibiotic treatment.
- ☐ Treat any confirmed carrier with an adequate course of antibiotic and repeat cultures at a minimum of 2 weeks to ensure eradication of the organism. Persons who continue to harbor the organism after treatment with either penicillin or erythromycin should receive an additional 10-day course of erythromycin and should submit samples for follow-up cultures. Cases should be monitored until hospital discharge, even if all investigation and control measures have been completed.

Managing Close Contacts

- ☐ Close contacts include household members and other persons directly exposed to oral secretions of a respiratory diphtheria case or the wound of a cutaneous diphtheria case.
- ☐ Close contacts should be cultured regardless of their immunization status, receive prompt antimicrobial chemoprophylaxis, and be examined daily for seven days for evidence of disease.
    - Submit specimens from close contacts to the DSHS laboratory.
    - Do not wait for culture results before treating contacts.
- ☐ After culture, all contacts should receive antibiotic prophylaxis (see below).

Prophylaxis Guidance

- ☐ **Inadequately immunized contacts should receive DTap/DT/Td*/Tdap boosters.**
- ☐ All close contacts who have received fewer than 3 doses of diphtheria toxoid or whose vaccination status is unknown should receive an immediate dose of a diphtheria toxoid-containing preparation appropriate for their age and should complete the primary series according to the recommended schedule.
- ☐ If more than 5 years have elapsed since administration of diphtheria toxoid-containing vaccine, a booster dose should be given.
- ☐ If the most recent dose was within 5 years, no booster is required.
- ☐ Unimmunized contacts should start a course of DTap/DT/Td* vaccine and be monitored closely for symptoms for 7 days.
- ☐ Recommended prophylaxis is a 7-10-day course of oral erythromycin (children 40 mg/kg/day and adults 1 g/day).
- ☐ Identified carriers of *C. diphtheriae* should be cultured after they complete antimicrobial therapy. Those who continue to carry the organism should receive an additional 10-day course of oral erythromycin and follow-up cultures.
- ☐ *Note: One Td vaccine (TdVax) has been discontinued, with remaining supplies constrained and priority given to those with a contraindication to receiving pertussis-containing vaccines. Tdap vaccine is an acceptable alternative to Td vaccine.

Treatment

The mainstay of treatment of a case of suspected respiratory diphtheria is prompt administration of diphtheria antitoxin. This should be given without waiting for laboratory confirmation of a diagnosis. Antitoxin is only available from the CDC, usually through the Quarantine Station in Houston. To determine whether or not the case-patient is approved for antitoxin release, call EAIDU at 512-776-7616 or 512-221- 6892 (after hours).

Cutaneous diphtheria should have the wound thoroughly cleaned with soap and water and the patient given appropriate antibiotics for 10 days.

Exclusion

Patient should be excluded until released from isolation by provider.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak of diphtheria is suspected, notify the regional DSHS office or EAIDU at

(800) 252-8239 or (512) 776-7676.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements

Clinically suspected diphtheria cases are required to be reported **immediately** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed** cases to DSHS within 30 days of receiving a report of a confirmed case.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- ☐ Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation.
  - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
  - Investigation forms may be faxed to **512-776-7616**, securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Infectious Disease Control Unit
Texas Department of State Health Services Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.

LABORATORY PROCEDURES

Isolation and identification of *Corynebacterium diphtheriae* is available through the DSHS Laboratory. Specimens should be sent to DSHS from cases and all close contacts. Before shipping specimens, be sure to notify DSHS EAIDU VPD staff at **(512) 776-7676.**

Please refer to the Texas Administrative Code (TAC) Title 25, Ch 97, Subchapter A, Rule §97.3 "What Condition to Report and What Isolates to Report or Submit".

Specimen Collection

- ☐ Use a cotton-tipped or polyester-tipped swab.
- ☐ Swabs should be taken below the membrane, if possible. (A portion of the membrane may be submitted for culture, but does not always yield *C. diphtheriae* well.)
- ☐ Ship swabs in Amie's or Stuarts Transport or transfer to a Loeffler's Slant for transport to DSHS Labs.

Submission Form

- ☐ Use DSHS Laboratory G-2B form for specimen submission.
- ☐ Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- ☐ Fill in the date of collection, date of onset, and diagnosis/symptoms.

Specimen Shipping

- ☐ Transport temperature: Keep at 2° - 25°C.
- ☐ Ship specimens via overnight delivery on cold packs or wet ice (double bagged) within 48 hours of collection.
- ☐ DO NOT mail on a Friday or a day before a state holiday unless special arrangements have been pre- arranged with DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section,
MC-1947 Texas Department of
State Health Services Attn.
Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Incorrect source of specimen
- ☐ Specimen > 24 hours not in transport medium
- ☐ Missing or discrepant information on form/specimen

REVISION HISTORY

January 2021

- ☐ Updated case classification
- ☐ Updated Managing Close Contacts
- ☐ Added Prophylaxis Guidelines section
- ☐ Updated throughout to add cutaneous diphtheria

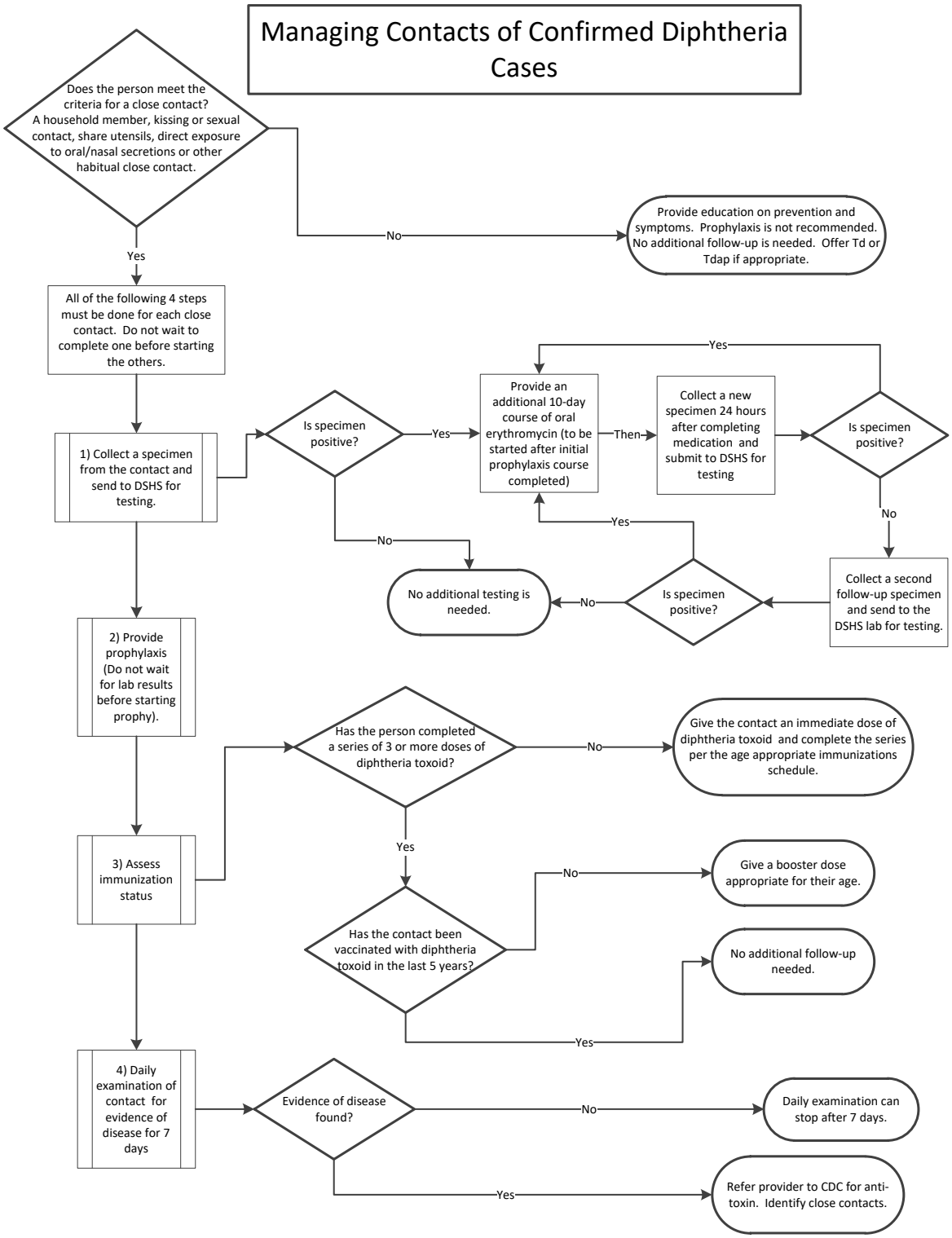
December 2022

- ☐ Updated Case Investigation Checklist
- ☐ Updated Case Classification section

October 2024

- ☐ Updated Control Measures section – added vaccine schedule
- ☐ Updated Prophylaxis Guidelines – added note about Td vaccine

FLOW CHART


Managing Contacts of Confirmed Diphtheria Cases
Does the person meet the criteria for a close contact? A household member, kissing or sexual contact, share utensils, direct exposure to oral/nasal secretions or other habitual close contact.
No
Provide education on prevention and symptoms. Prophylaxis is not recommended. No additional follow-up is needed. Offer Td or Tdap if appropriate.
Yes
All of the following 4 steps must be done for each close contact. Do not wait to complete one before starting the others.
1) Collect a specimen from the contact and send to DSHS for testing.
Is specimen positive?
Yes
Provide an additional 10-day course of oral erythromycin (to be started after initial prophylaxis course completed)
Then
Collect a new specimen 24 hours after completing medication and submit to DSHS for testing
Is specimen positive?
Yes
No
Collect a second follow-up specimen and send to the DSHS lab for testing.
Is specimen positive?
Yes
No
No additional testing is needed.
2) Provide prophylaxis (Do not wait for lab results before starting prophy).
3) Assess immunization status
Has the person completed a series of 3 or more doses of diphtheria toxoid?
No
Give the contact an immediate dose of diphtheria toxoid and complete the series per the age appropriate immunizations schedule.
Yes
Has the contact been vaccinated with diphtheria toxoid in the last 5 years?
No
Give a booster dose appropriate for their age.
Yes
No additional follow-up needed.
4) Daily examination of contact for evidence of disease for 7 days
Evidence of disease found?
No
Daily examination can stop after 7 days.
Yes
Refer provider to CDC for anti-toxin. Identify close contacts.

Ebola Virus Disease

BASIC EPIDEMIOLOGY

Infectious Agent

The infectious agent is Ebolavirus, in the family filoviridae. There are six identified Ebola virus species, four of which cause disease in humans: Zaire, Sudan, Taï Forest, and Bundibugyo. Reston can cause disease in non-human primates and pigs, and it is unknown if Bombali can cause disease in humans.

Transmission

It is thought that fruit bats of the Pteropodidae family are natural Ebola virus hosts. Ebola is introduced into the human population through close contact with the blood, secretions, organs or other bodily fluids of infected animals such as chimpanzees, gorillas, fruit bats, monkeys, forest antelope and porcupines found ill or dead or in the rainforest.

Once infection occurs in humans, there are several ways Ebola can spread to others, including through direct contact (through broken skin, mucous membranes - eyes, nose, mouth, etc.) with:

- ☐ blood or body fluids (including but not limited to urine, saliva, sweat, feces, vomit, breastmilk, semen) of a person who is sick with Ebola
- ☐ objects contaminated with the virus (e.g., needles, syringes)

Risk is highest during the late stages of the illness when the patient is vomiting, having diarrhea, or hemorrhaging, and at death if unprotected contact with the corpse occurs. Post-mortem infection has been linked to the preparation of the body for burial and during burial rituals or funeral services.

Ebola is not spread through the air. It is also not typically spread by water or food except through handling or consumption of contaminated bush meat (wild animals hunted for food).

Incubation Period

Usually 8-10 days after exposure (range 2-21 days)

Communicability

People with Ebola are not infectious until symptoms begin. They are infectious for the duration of the illness. The postmortem remains of people that have passed away while sick with Ebola are considered infectious and are a common source of infection in outbreaks. Ebola virus has been detected in some body fluids of Ebola virus disease (EVD) survivors. Ebola virus genetic material has been detected in semen up to several years after illness, and abstinence or condom use is recommended unless semen is PCR negative on two consecutive tests. Ebola virus has been detected in breast milk, and it is best for a mother who has recently survived EVD not to breastfeed if she has other safe ways to feed her baby. Where available, testing of breastmilk for the presence of Ebola virus genetic material can help to guide decisions about when breastfeeding can be safely resumed.

Clinical Illness

EVD is a severe acute illness, usually with sudden onset of fever, malaise, muscle pain, severe headache, vomiting, diarrhea, abdominal pain, bruising and bleeding. Complications include liver damage, kidney damage, shock, and central nervous system complications. Recovery from Ebola depends on the quality and timing of

supportive clinical care. Case fatality rates as high as 90 percent have been reported. Laboratory findings usually show lymphopenia, severe thrombocytopenia, and transaminase elevation (AST>ALT).

DEFINITIONS

Laboratory Confirmation

- ☐ RT-PCR for Ebola virus from blood or tissues, **OR**
- ☐ Ebola virus isolation in culture from blood or tissues, **OR**
- ☐ Ebola virus antigen-capture ELISA, **OR**
- ☐ Detection of Ebola virus antigen in tissues by Immunohistochemistry

Clinical Criteria

An illness with acute onset with **ALL** of the following clinical findings:

- ☐ A fever ≥100°F
- ☐ One or more of the following clinical features:
  - Severe headache
  - Muscle pain
  - Fatigue
  - Erythematous maculopapular rash on the trunk with fine desquamation 3–4 days after rash onset
  - Vomiting
  - Diarrhea
  - Abdominal pain
  - Bleeding not related to injury
  - Thrombocytopenia

Case Classifications

- ☐ **Confirmed**: A person that meets laboratory criteria
- ☐ Suspect (clinical case definition or Person Under Investigation (PUI)): A person that meets clinical criteria **AND** one or more of the following epidemiologic risk factors within 21 days before onset of symptoms:
  - Direct contact with blood or other body fluids of a person who is sick with or has died from EVD, **OR**
  - Direct contact with objects (such as needles and syringes) contaminated with body fluids from a person sick with EVD or the body of a person who died from EVD, **OR**
  - Work in a laboratory that handles, or direct contact with primates or bats from an Ebola virus endemic area or area with active transmission, **OR**
  - Sexual exposure to semen of a confirmed acute or clinically recovered case of EVD, or exposure to breast-milk of an individual who had EVD, **OR**
  - Work in a laboratory that handles EVD specimens, **OR**
  - Residence in - or travel to - an EVD endemic area or area of active transmission .

Exposure Risk Levels

Exposure risk levels can be found in the Texas Department of State Health Services Ebola Monitoring Guidance.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should IMMEDIATELY investigate all reports of Ebola. Investigations should include an interview of the case or a surrogate to get a

detailed exposure history. Guidelines, forms, and other sources of information are available through http:/www.cdc.gov/Ebola to assist with Ebola investigations. The current case investigation form is available at http://www.dshs.texas.gov/eaidu/investigation/

The likelihood of an Ebola diagnosis depends on the current global situation. A case in the United States is highly unlikely if there are no current Ebola outbreak occurring, although laboratory exposures may occur at any time. Monitoring of all travelers returning from an Ebola outbreak area should occur for 21 days following the date of departure, and the level of monitoring will depend on risk exposures identified during their risk assessment. Contact EAIDU for traveler monitoring guidance, and review CDC guidance at: https://www.cdc.gov/quarantine/interim-guidance-risk-assessment-ebola.html

Testing for Ebola virus by RT-PCR should only be performed for patients with symptoms consistent with EVD and who have an epidemiologic risk factor or exposure that puts them at risk. Additionally, they should be evaluated for other possible febrile illnesses, including those that are common in areas where the patient traveled or resided (e.g., malaria, typhoid, influenza, dengue, etc.).

Case Investigation Checklist

- ☐ Isolate patient in a single patient room containing a private bathroom with the door closed.
- ☐ Implement standard, contact, and droplet precautions.
- ☐ Utilize appropriate PPE (http://www.cdc.gov/vhf/ebola/healthcare-us/ppe/guidance.html)
- ☐ Work with the hospital to assure adequate PPE training and supervision is in place. To protect healthcare workers during care of a patient with EVD, healthcare facilities must provide onsite management and oversight on the safe use of PPE and implement administrative and environmental controls with continuous safety checks through direct observation of healthcare workers during the PPE donning and doffing processes.
- ☐ Assess Person Under Investigation's (PUI's) epidemiological risk factors.
- ☐ Contact EAIDU for consultation on symptoms, epidemiological risk factors, and preliminary lab findings to consider lab testing for Ebola virus. EAIDU will coordinate the required consultation with CDC for test approval.
- ☐ Consider observation for progression of symptoms while testing and treating for alternative diagnoses, such as malaria, prior to testing.
- ☐ Arrange for testing of PUI as needed.
- ☐ Identify all close contacts of PUI during infectious period. Contact tracing should begin as soon as a person with epidemiological risk factors and EVD symptoms presents for medical evaluation.
- ☐ A list should be kept of all persons who are in proximity of the patient at the health care facility including time, location, and type of contact.
- ☐ If positive for Ebola
    - Identify and prioritize Ebola contacts based on the exposure risk levels, which can be found in the Texas Department of State Health Services Monitoring Guidance.
    - Arrange for symptom monitoring for 21 days for all contacts and possible quarantine of high-risk contacts.
    - If patient traveled while possibly infectious, collect information about

travel. This information may need to be relayed to CDC.
    - Consider a press release and/or a health alert.
    - Facilitate transfer to a specialized Ebola treatment center.
- ☐ If negative for Ebola and symptoms persist, consider testing travelers to endemic areas for Lassa fever, Marburg virus, other viral hemorrhagic fevers, or other infectious diseases consistent with the patient's symptoms.

Control Measures

- ☐ Evaluate level of exposure of household members to exposure risk level and whether they should be quarantined during the 21-day monitoring period.
- ☐ Arrange for environmental cleaning of the residence. (https://www.cdc.gov/vhf/ebola/prevention/cleaning-us-homes.html)
- ☐ Monitor Contacts - Asymptomatic individuals who have had a possible exposure to Ebola should be monitored so that they can be isolated if signs or symptoms occur; additional restrictions such as quarantine, do not board orders, or restriction letters may also be required, depending upon the type of exposure. Local EMS should be notified of anyone that is being monitored. For all high, some, and low risk contacts:
    - Follow up with all contacts and determine exposure risk level. Provide contact information for LHD to individual, establish an emergency plan for medical evaluation including transportation and medical facility, provide training as needed in use of thermometer and reporting procedures, and establish a reporting method.
    - Monitor for symptoms for 21 days after exposure.
    - For high exposure risk level contacts, symptom monitoring should be performed in-person (direct active monitoring) twice daily by health department staff. Persons at high exposure risk may need to be placed under quarantine. For some and low exposure risk level contacts, monitoring guidance will be provided at the time of the incident.
- ☐ In-person monitoring visits
  This section provides guidance for in-person monitoring. Guidance for other types of monitoring and frequency of monitoring will be provided at the time of the incident.
    - Visit and monitor the contact at a pre-arranged location. Call the contact shortly prior to the in-person visit to ensure they will be at pre-determined location and inquire of their health (feverish, overall general health).
    - If the contact indicates they are experiencing signs or symptoms suggestive of EVD[1], obtain a temperature reading over the phone.
    - If the contact does not report a fever (≥ 100°F[2]), continue with the in-person check.
    - If the contact reports a fever (≥ 100°F), **do not** conduct an in-person visit. Arrange for enhanced frequency of monitoring or for a medical evaluation if needed.
    - During in-person visits, avoid making physical contact with the person under surveillance. Attempt to maintain a distance of at least 3 feet.
    - Inquire about any presence or absence of specific symptoms that are associated with EVD and observe whether they appear ill. Visually confirm the thermometer temperature reading, but do not handle or touch the thermometer.

- Although an in-person visit by a healthcare provider or public health personnel is preferred and recommended, the contact may also be observed via a HIPAA-approved video conferencing platform. If video conferencing will be utilized, thermometer reading must be visually confirmed.

☐ Arrange for medical evaluation as needed
- When monitoring is initiated, identify an assessment hospital to utilize if needed and communicate with them to assure they are prepared. For hospital guidance, please see CDC's website.

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1 Symptoms of EVD include fever, severe headache, muscle pain, weakness, diarrhea, vomiting, abdominal (stomach) pain, unexplained hemorrhage or bruising
2 Texas Administrative Code (TAC) definition of fever (Title 25, §97.1-15)

- Create a transport plan to utilize if the contact is unable to transport themselves to the medical facility.
- Ensure that EMS has been informed of the contact that is being monitored for Ebola.
- Communicate with the medical facility prior to arrival to arrange entry, isolation, and ensure appropriate PPE and standard, contact, and droplet precautions are utilized.

☐ If a contact reports one or more symptoms (not including fever), inquire about possible explanations for the symptom. In addition, it is recommended that a physician or other medical provider conduct a follow-up call to confirm the underlying explanation for the symptom.

☐ If no alternative cause or diagnosis is provided for the reported symptom, arrange for a medical consultation/evaluation.

☐ If the contact exhibits symptoms indicative of EVD, the contact is now classified as a "Person Under Investigation" Do not enter the contact's home. Call your local health authority. Appropriate PPE is now needed. Limit contact. If contact is necessary, consider the following:
- For PUIs who are clinically stable and do not have bleeding, vomiting, and diarrhea, AND will not require invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation), use (at a minimum):
  - ☐ Single-use (disposable) fluid-resistant gown that extends to at least mid-calf or single-use (disposable) fluid-resistant coveralls without integrated hood
  - ☐ Single-use (disposable) full face shield
  - ☐ Single-use (disposable) facemask
  - ☐ Single-use (disposable) gloves with extended cuffs. Two pairs of gloves should be worn. At a minimum, outer gloves should have extended cuffs.
- For patients who are exhibiting obvious bleeding, vomiting, and diarrhea, OR are not clinically stable, OR will require invasive or aerosol-generating procedures (e.g., intubation, suctioning, active resuscitation), OR are a confirmed Ebola patient, use:
  - ☐ Impermeable gown or coverall
  - ☐ Respiratory and eye protection (either a PAPR or a disposable,

NIOSH-certified N- 95 respirator in combination with a single-use surgical hood extending to shoulders and single-use full face shield)
- ☐ Single-use examination gloves with extended cuffs
- ☐ Single-use boot covers
- ☐ Single-use apron

- References:
  PPE: Confirmed Patients and Clinically Unstable Patients Suspected to have VHF | Viral Hemorrhagic Fevers (VHFs) | CDC and
  PPE: Confirmed Patients and Clinically Unstable Patients Suspected to have VHF | Viral Hemorrhagic Fevers (VHFs) | CDC

Outreach Activities

- ☐ Coordinate with DSHS and your PIO (Public Information Office) to issue a health alert to all area providers, hospitals, and urgent care clinics.
  - Describe situation.
  - Provide instructions on the use of PPE.
  - List symptoms and risk factors to look for.
  - Instruct on what to do if a PUI is identified.
- ☐ Contact all entities likely to have or that have had an exposure (e.g., if patient took bus while sick, or if contacts all attend church).
  - Describe situation.
  - Allay concerns.
  - List symptoms to look for and what to do if anyone with symptoms are identified.
  - Elicit additional contacts, if appropriate.
- ☐ Prepare media statements and FAQs.
- ☐ Have a 24/7 phone for providers to call
- ☐ Inform the police department, EMS, 911, and anyone else who might be called upon to interact or care for PUIs
  - Describe situation.
  - Provide instructions on PPE.
  - List symptoms and risk factors to look for.
  - Instruct on what to do if a PUI is identified.

Exclusion

Patients with Ebola will not be released from isolation until they are no longer considered infectious (3 days without symptoms, ability to perform activities of daily living, and one negative PCR result 72 hours or more after symptom onset).

If Ebola testing is performed, a PUI may be released from isolation if a specimen collected 72 hours or more after symptom onset is PCR negative. If Ebola testing is not performed, a PUI may be released from isolation, in certain circumstances, after consultation with public health.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Any confirmed or clinically suspected cases of Ebola are required to be reported **immediately** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Unit (EAIDU) **at (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ Call DSHS EAIDU immediately when an Ebola investigation is being conducted or considered.
- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed** and **suspect** cases.
  - o Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - o A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
  - o For positives, enter an investigation in NBS and create a notification the same day or, iflab test is completed after-hours, the next day.
  - o In comments describe symptoms, risk factors, and test reason
  - o A notification can be sent as soon as the lab testing is completed. Additional information from the investigation may be entered upon completing the investigation.

LABORATORY PROCEDURES

Testing for Ebola is only available at select laboratories in the US. The CDC, Texas DSHS Austin LRN-B, and 5 regional LRN-B laboratories (Lubbock, San Antonio, Dallas, Tyler, Houston) offer Ebola PCR testing. Approval from an EAIDU epidemiologist and the CDC are required BEFORE submitting specimens for testing.
https://www.dshs.texas.gov/lab/eprLRNcontact.shtm

Specimen Collection

- ☐ Collect two purple top EDTA **plastic** tubes of blood with a minimum volume of 4 ml each.
- ☐ Do not submit specimens in glass containers or in heparinized tubes.
- ☐ It is not necessary to separate and remove serum or plasma from the primary collection container.
- ☐ Write the patient's name and another identifier such as date of birth or social security number on the collection tube.
- ☐ Specimens should be immediately stored at 2-8°C or transported immediately.
- ☐ Specimens other than blood may be submitted upon consult with EAIDU.

Submission Form

The submission form information and instructions included here are specific for the DSHS laboratory in Austin. Each LRN laboratory may have their own submission form and instructions, so request this information from the laboratory to which you are sending specimens.

- ☐ Use DSHS Laboratory G-27A form for specimen submission.
- ☐ Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- ☐ Fill in the date of collection, date of onset, and diagnosis/symptoms.
- ☐ Check the box for Other: and write Ebola.
- ☐ For DSHS lab, prior to shipment, fax a copy to (512) 776-7431 Attn: BioThreat Team or send via secure email to dshsLRN@dshs.texas.gov
- ☐ Include a copy with the specimen.

Specimen Shipping

- ☐ The DSHS lab will NOT accept specimens for Ebola testing that are not pre-approved. You must contact EAIDU prior to submission. It will be determined at that time whether a specimen needs to be sent directly to CDC simultaneously or whether the LRN laboratory will send one.
- ☐ The testing lab must be contacted prior to shipment to arrange receipt and testing of specimen. For the DSHS lab, call the BioThreat Team's 24/7 number, (512) 689-5537.
- ☐ Regions should provide coordination for testing at other LRN laboratories as needed.
- ☐ Transport temperature: Keep at 2º - 8º C
- ☐ Do not ship any other specimens with Ebola specimens.
- ☐ Ship specimens via overnight delivery on cold packs. Couriers are strongly recommended for submission to the DSHS lab. EAIDU can help arrange courier transportation if necessary.
- ☐ For the DSHS Laboratory, ship specimens to:

Laboratory Services Section,
MC-1947 Texas Department of
State Health Services Attn:
BioThreat Team (512) 689-5537
1100 West 49th Street
Austin, TX 78756-3199

- ☐ The following must be provided to the laboratory by phone or email (DSHS BioThreat Team at (512) 689-5537 or dshsLRN@dshs.texas.gov):
  - Method of delivery
  - Estimated time of arrival
  - Tracking number for the package or courier phone number

Causes for Rejection:

- ☐ **Testing not approved by EAIDU and CDC**
- ☐ Missing or discrepant information on form/specimen.

REVISION HISTORY

December 2021

- ☐ Edited Basic Epidemiology and Definitions

March 2021

- ☐ Edited All Sections

Fascioliasis

BASIC EPIDEMIOLOGY

Infectious Agent

Fasciola species, a parasitic liver fluke (flat worm). Two *Fasciola* species infect people: *F. hepatica*, known as "the common liver fluke" and "the sheep liver fluke", is most common; *F. gigantica* is less common but can also infect people.

Transmission

Transmission occurs through consumption of raw aquatic plants (such as watercress) that are contaminated with infectious larvae (metacercariae), usually in locations around domestic and wild ruminants (commonly sheep, cattle and goats). Transmission can also occur by ingesting contaminated water, e.g., by drinking it or by eating vegetables that were washed or irrigated with contaminated water. Infection is not transmitted directly from person to person.

Incubation Period

Acute phase of infection: symptoms, if any, can start 4-7 days after the exposure and can last several weeks or months. Symptoms associated with the chronic phase of infection, if present, can occur months to years after the exposure.

Communicability

Infection is not transmitted directly from person to person. The life span of adult flukes in humans is estimated to range from 5 to 10 years, or longer.

Clinical Illness

- ☐ **Early (acute) phase:** symptoms may include fever, nausea, vomiting, diarrhea, a swollen liver (hepatomegaly), liver function abnormalities, skin rashes, shortness of breath and abdominal pain or tenderness.
- ☐ **Chronic phase** (after the parasite settles in the bile ducts) is marked by inflammation and hyperplasia and thickening of the bile ducts and gall bladder, leading to biliary lithiasis or obstruction. The symptoms of this phase, such as biliary colic, nausea, intolerance to fatty food, right upper quadrant pain, epigastric pain, obstructive jaundice, and pruritus, are the result of a blockade in the biliary tract and inflammation in the gall bladder. Inflammation of the liver, gallbladder, and pancreas can also occur.

DEFINITIONS

Clinical Case Definition

Fascioliasis (liver fluke trematode) is transmitted by eating raw watercress or other water plants contaminated with immature larvae, usually from locations around sheep, cattle, or related animals. The immature larval flukes migrate through the intestinal wall, the abdominal cavity, and the liver tissue, into the bile ducts, where they develop into mature adult flukes. In the early (acute) phase, symptoms may include fever; gastrointestinal problems such as nausea, vomiting and diarrhea; a swollen liver (hepatomegaly); liver function abnormalities, skin rashes; shortness of

breath; and abdominal pain or tenderness. The chronic phase (after the parasite settles in the bile ducts), is marked by inflammation and hyperplasia and thickening of the bile ducts and gall bladder, leading to biliary lithiasis or obstruction. The symptoms of this phase, such as biliary colic, nausea, intolerance to fatty food, right upper quadrant pain, epigastric pain, obstructive jaundice, and pruritus, are the result of a blockade in the biliary tract and inflammation in the gall bladder. Inflammation of the liver, gallbladder, and pancreas can also occur.

Laboratory Confirmation

- ☐ Microscopic identification of *Fasciola* eggs in feces, duodenal contents, or bile
- ☐ Detection of *Fasciola* coproantigens (antigens found in feces) by ELISA

Case Classifications

- ☐ **Confirmed**: A case that is laboratory confirmed
- ☐ **Probable**: A clinically compatible case with
  - Detection of *Fasciola* antibodies, **OR**
  - History of ingestion of watercress or freshwater plants and eosinophilia

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of fascioliasis. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the Fascioliasis Investigation Form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to get detailed exposure history and risk factor information.
  - Use the **Fascioliasis Investigation Form** to record information from the interview.
  - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
  - Provide education to the case or his/her surrogate about effective hand washing and food safety practices. See Prevention and Control Measures.
- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616**
  - For lost to follow-up (LTF) cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU and indicate the reason for any missing information.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.

- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- ☐ Routine hand washing with soap and warm water.
- ☐ Avoid eating uncooked watercress and other aquatic plants of wild or unknown origin, especially from grazing areas or places where the disease is known to be endemic.
- ☐ Vegetables grown in fields that might have been irrigated with contaminated water should be thoroughly cooked.
- ☐ Travelers to areas with poor sanitation should avoid food and water that might be contaminated.

Exclusions

School/child-care: No exclusions are specified for fascioliasis but the standard exclusion for diarrhea or fever applies:

- ☐ Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- ☐ Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for fascioliasis but the standard exclusion for vomiting or diarrhea applies:

- ☐ Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks/Clusters

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- ☐ Interview all cases suspected as being part of the outbreak or cluster.
- ☐ Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- ☐ Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky exposures, such as consumption of watercress or other aquatic plants, recreational water contact or

travel to an endemic country reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Risks	Notes
1	NT	34	F	White/non - Hispanic	12/4/16	Fever, epigastric tenderness	Ate watercress on trip to China	Reported travel with 5 other friends
2	PR	4	M	Unknown	11/30/16	Fever, Upper abdomen discomfort, hepatomegaly	Travel companion of Case ID# 1	Lost to follow up (LTF)

- ☐ If the outbreak was reported in association with an apparent common risk factor (e.g., food establishment serving watercress or other aquatic plants, recreational body of water, travel), contact hospitals in your jurisdiction to alert them to the possibility of additional fascioliasis cases.
- ☐ Determine the source of infection to prevent additional cases.
- ☐ Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist at FOODBORNETEXAS@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676.**
- ☐ Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.

- For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
- The following should be reported to NORS:
  - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Outbreaks as indicated above with patients in the same household.

- Enter outbreaks into NORS online reporting system at Sign In - NORS (cdc.gov)
- Forms, training materials, and other resources are available at http://www.cdc.gov/nors/

- To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

Testing for fascioliasis is widely available from most private laboratories. Specimens are encouraged to be submitted to the DSHS laboratory for confirmation. Contact an EAIDU foodborne epidemiologist to discuss further.

Specimen Collection

- ☐ Submit a stool specimen in a sterile, leak-proof container.
- Required volume: Stool 15 g solid or 15mL liquid.
- ☐ Fresh stool that cannot be received by the lab in less than 5 hours should be placed in formalin and PVA immediately.

Submission Form

- ☐ Use DSHS Laboratory G-2B form for specimen submission.
- ☐ Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- ☐ Fill in the date of collection and select the appropriate test.
- ☐ If submitting as part of an outbreak investigation, check "Outbreak association" and write-in name of outbreak.
- ☐ Payor source:
  - Check "IDEAS" to avoid bill for submitter.

Specimen Shipping

Transport temperature: May be shipped at ambient temperature or 2-8ºC.

- ☐ Ship specimens via overnight delivery.
- ☐ DO NOT mail on a Friday, or state holiday, unless special arrangements have been pre- arranged with DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section,

MC-1947 Texas
Department of State Health
Services Attn. Walter Douglass
(512) 776-7569 1100 West 49th
Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Specimen not in correct transport medium.
- ☐ Missing or discrepant information on form/specimen.
- ☐ Unpreserved specimen received greater than 5 hours after collection.
- ☐ Transport media was expired.
- ☐ Specimen too old.

REVISION HISTORY

March 2021

- ☐ Minor edits.

Gastroenteritis Outbreaks

Rapid investigation of gastroenteritis outbreaks of unknown etiology is critical for the identification of contaminated food vehicles or other possible sources of exposure, as well as the prevention of additional cases.

The purpose of this chapter is to provide essential information to local and regional health departments on how to investigate a gastroenteritis outbreak of known or unknown origin. Additionally, information is given on prevention and control measures to help reduce the burden of gastroenteritis outbreaks in the future.

If an etiologic agent for the outbreak is identified, refer to the investigation guideline for that specific condition.

BASIC EPIDEMIOLOGY

There are many infectious and a few noninfectious agents that can cause gastroenteritis:

- Viruses- e.g., Norovirus, hepatitis A virus, rotavirus
- Bacteria- e.g., *Shigella*, *Salmonella*, Shiga toxin-producing *E. coli*, *Campylobacter jejuni*, *Listeria monocytogenes, Yersinia enterocolitica, Vibrio* spp.
- Bacterial toxins- e.g., *Bacillus cereus* emetic and diarrheal toxins, *Clostridium perfringens* toxin,
  Staphylococcus aureus toxin, *Clostridium botulinum* toxin
- Parasites- e.g., *Cryptosporidium*, *Cyclospora cayetanensis*, *Giardia*, *Trichinella*
- Noninfectious agents- e.g., metals, scombroid, mushroom and shellfish toxins

Transmission

Transmission can occur through the ingestion of contaminated food or water or through direct contact with an infected person, fomite, animal or an animal's environment.

Incubation Period

It varies depending on the agent. Toxins often cause illness shortly after consumption (less than 24hrs), compared to a longer incubation period due to an infectious agent.

Communicability

Illnesses caused by preformed toxins (e.g., *Bacillus cereus*, *Staphylococcus aureus*, *C. botulinum* toxin) are not communicable. The communicable period varies for those infected with bacteria, viruses or parasites; please see agent specific guidelines.

Clinical Illness

Gastroenteritis is an illness triggered by the infection and inflammation of the digestive system. Typical symptoms include abdominal cramps, diarrhea, and vomiting. Other symptoms may include loss of appetite, bloating, nausea, bloody

diarrhea, lethargy and body aches.
A Foodborne Illness Chart of common foodborne disease agents, descriptions of associated symptoms and incubation periods, is available at: https://www.tdcj.texas.gov/divisions/cmhc/docs/cmhc_infection_control_policy_manual/B-14.26_FBI_Chart.pdf

DEFINITIONS

Outbreak Definition

An outbreak is defined as two or more cases with symptoms clustered in time and space.

The most common types of outbreaks reported to local and regional health departments include:

- Common event or point source outbreaks- occurs as a result of a common exposure at a defined time and place. E.g., the occurrence of gastroenteritis among people who attended an event, such as a wedding reception or party.
- Outbreaks of gastroenteritis in facilities- often caused by viruses such as norovirus (which are most commonly, but not exclusively, spread person-to-person). E.g., long term care facilities, child-care centers.
- Outbreaks of gastroenteritis allegedly related to food or a food premise- can be the result of food items contaminated from nature, by an ill food handler, by cross-contamination with a contaminated food or the environment, or by a combination of these factors. E.g., restaurant outbreak or contaminated food item in circulation.

OUTBREAK INVESTIGATION

Outbreak Investigation

Notification of an outbreak without a known etiology might be sent from a healthcare provider, hospital laboratory, event manager, or anyone else who knows of or suspects an outbreak has occurred.

If an outbreak is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676,** or email an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

Outbreak Investigation Checklist

- Prepare a linelist of all cases. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, any lab results, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food

2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- Administer questionnaires to cases in the outbreak
    - If there is no known event or other possible common exposure for the cases, use the Hypothesis Generating Questionnaire for Gastroenteritis Complaints (https://www.dshs.texas.gov/sites/default/files/EAIDU/investigation/forms/hypgen.pdf. If a common event or other possible common exposure has already been identified, then you should administer a questionnaire that is based on exposures (e.g., menus) for the common event. You will need to work with event coordinators, ill persons, and others (as needed) to obtain information on the food and beverages served at the event, as well as other possible exposures.
- Request medical records for any case-patients in your jurisdiction who died or were too ill to be interviewed and for whom there are no appropriate surrogates to interview.
- Characterize the outbreak: Compile all of the available information on all cases in the outbreak.
    - See Characterize the Outbreak below.
- Attempt to identify additional cases. Methods might include:
    - Contact health care providers/hospitals in your jurisdiction to alert them to the possibility of additional cases with similar symptoms.
    - Contact others potentially exposed to the suspected source (e.g., event attendees).
    - Release a media alert, if indicated.
- Confirm the outbreak.
    - Confirmation can be made if there are at least two cases with similar symptoms and exposure to a common event, food, or other risk factor within a reasonably short period of time.
- Create an outbreak definition that should include common suspected source of the exposure, and person place, and time.
    - The outbreak definition might be expanded or contracted during the investigation, as additional information is received.
- Arrange for appropriate laboratory testing, if needed.
    - See Laboratory Procedures section for testing available at the DSHS laboratory.
    - Specimens should not be submitted to the DSHS laboratory unless approved by EAIDU. Contact an EAIDU foodborne epidemiologist to discuss further.
- Work with regulatory staff to conduct an environmental assessment, if needed.
    - Collect information on the implicated facility including:
    - Food safety practices, operations, and anything that was unusual about the time period in question Obtain names and contact information of those present at facility during outbreak time frame, e.g., employees, food workers, customers, residents, students, etc.
    - If food is suspected:
        - Obtain menus.
        - Interview food employees for illness history and job duties.
            - Restrict individuals from handling food until they are free

from symptoms for at least 24 hours without the use of symptom suppressing medications.
        - Collect food samples or embargo food, if necessary.
            - Decisions about testing implicated food items can be made in consultations with an EAIDU foodborne epidemiologist.
        - Provide food safety education. See Control Measures Section.
    - Identify and correct any items that may have contributed to the outbreak
- Implement facility control measures. See Control Measures Section.
- Consider testing hypotheses with an epidemiological study (i.e. case control or cohort).
- Communicate regularly with all parties involved in the outbreak investigation:
    - Provide situation reports through email.
    - Hold conference calls to discuss the outbreak investigation
- Report findings at conclusion of investigation:
    - Create Outbreak Summary Report.
    - Enter outbreak into **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Notes:
For cases with raw milk exposure, please email the information about dates of raw milk consumption and place of purchase to the DSHS Milk and Dairy Unit at milk.regulatory@dshs.texas.gov and cc foodbornetexas@dshs.texas.gov

Characterize the Outbreak
Provide descriptive information in narrative, tabular, and graphic form, for the outbreak:

- Calculate or estimate the number of persons at risk.
- Calculate or estimate the number of ill persons, including primary ill, and secondary ill persons.
- Calculate or estimate the attack rate.
- Calculate or estimate the mean, median, and range for the illness incubation period.
- Calculate the number and frequency of symptoms expressed by ill persons.
- Calculate the number and percentage of ill persons who sought medical care.
- Calculate the number and percentage of ill persons hospitalized overnight.
- Calculate the number and percentage of ill persons who visited an emergency room for their illness.
- Calculate the number and percentage of ill persons who died.
- Calculate the percentage of total cases in the age groups:
- <1y, 1-4y, 5-9y, 10-19y, 20-49y, 50-74y, >75y.
- Calculate the median age and the age range.
- Calculate the gender distribution of illness (% female, % male).
- Document the illness onset dates and range of dates.
- Prepare an epi-curve for the outbreak.
- Prepare a geographic map or table for outbreak cases.

Characterize the outbreak setting, event, or food item:

- Document the likely location of exposure for the cases (e.g., food eaten at home, food eaten in a restaurant, food eaten at a hospital, etc.).
- Document any confirmed or suspected source of the outbreak (Note: More than one suspect source can be entered into NORS).

- Collect any documentation from regulatory partners regarding tracebacks they conducted.
- Document characteristics of the setting, event, or food that might have contributed to the outbreak.
- Document any food or environmental specimens that were tested for pathogens.

Exclusions

School/child-care: The standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: The standard exclusion for vomiting or diarrhea applies:

- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
    - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
    - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

CONTROL MEASURES

Control measures should be implemented as soon as a potential outbreak is recognized. Specific recommendations for the prevention of additional cases should be based on the findings of the epidemiologic investigation**.**

General Control Measures at Facilities:

- **Hand washing**
    - Hands should be washed with warm water and soap for 15-20 seconds, especially:
        - ☐ Before preparing, handling or eating any food.
        - ☐ After going to the bathroom.
        - ☐ After changing a diaper.
        - ☐ After caring for someone with diarrhea.
- **Environmental Disinfection**
    - If the facility does not have an Environmental Protection Agency-registered commercial virucide, use bleach. The CDC recommends the use of a chlorine bleach solution with a concentration of 1000–5000 ppm (5–25 tablespoons of household bleach (5.25%) per gallon of water) on all surfaces. Leave the surface wet for ≥5 minutes or follow the directions on the commercial cleaner to allow sufficient time for the bleach to kill the pathogen.
- **Exclusion and Isolation**
    - Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care until they are free from symptoms for at least 24 hours without the use of symptom suppressing medications.

Recommended Control Measures for Schools and Child-Care Centers:

- **Hand Washing**
  - Encourage children and adults to wash their hands frequently, especially before handling or preparing foods and after wiping noses, diapering, using toilets, or handling animals.
  - Wash hands with soap and water long enough to sing the "Happy Birthday" song twice.
  - Sinks, soap, and disposable towels should be easy for children to use.
  - If soap and water are not available, clean hands with gels or wipes with alcohol in them.
- **Diapering**
  - Keep diapering areas near hand washing areas.
  - Keep diapering and food preparation areas physically separate. Keep both areas clean, uncluttered, and dry.
  - The same staff member should not change diapers and prepare food.
  - Cover diapering surfaces with intact (not cracked or torn) plastic pads.
  - If the diapering surface cannot be easily cleaned after each use, use a disposable material such as paper on the changing area and discard the paper after each diaper change.
  - Sanitize the diapering surface after each use and at the end of the day.
  - Wash hands with soap and water or clean with alcohol-based hand cleaner after diapering.
- **Environmental Surfaces and Personal Items**
  - Regularly clean and sanitize all food service utensils, toys, and other items used by children.
  - Discourage the use of stuffed toys or other toys that cannot be easily sanitized.
  - Discourage children and adults from sharing items such as combs, brushes, jackets, and hats.
  - Maintain a separate container to store clothing and other personal items.
  - Keep changes of clothing on hand and store soiled items in a nonabsorbent container that can be sanitized or discarded after use.
  - Provide a separate sleeping area and bedding for each child, and wash bedding frequently.

General Food Safety:

- **Clean**- wash hands and surfaces often.
  - Wash hands properly for 15-20 seconds.
  - Wash and sanitize surfaces and utensils after each use.
  - Wash fruits and veggies - but not meat, poultry, or eggs.
- **Separate**- don't cross-contaminate.
  - Use separate cutting boards and plates for ready to eat food items such as produce and for meat, poultry, seafood, and eggs.
  - Keep meat, poultry, seafood, and eggs separate from all other foods at the grocery store and at home
- **Cook**- cook to the right temperature
  - Use a food thermometer. For a chart of safe cooking temperatures, visit http://www.foodsafety.gov/keep/charts/mintemp.html
  - Keep food hot after cooking (at 140 °F or above).
  - Microwave food thoroughly (to 165 °F).

- **Chill**- refrigerate promptly
  - Refrigerate perishable foods within two hours.
  - Never thaw or marinate foods on the counter.
  - Know when to throw food out.

For more information on food safety, please visit http://www.foodsafety.gov/.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Cases or suspected cases of illness considered being **public health emergencies, outbreaks, exotic diseases**, and unusual group expressions of disease must be reported to the local health department or DSHS **immediately**. Other diseases for which there must be a quick public health response must be reported **within one working day**.

Local and Regional Reporting and Follow-up Responsibilities

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**.
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - ☐ Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/.
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS

Available testing at DSHS laboratory for clinical specimens includes:

- Viral
  - Real time RT-PCR: Norovirus
- Bacterial
  - Enteric pathogen isolation and ID
  - EIA: Shiga-toxin producing *E. coli*
  - EHEC, shiga-like toxin assay
  - Real time RT-PCR: STEC
  - WGS
- Parasitic

    - Ova and Parasite detection and ID
    - Real time RT-PCR

Specimen Collection

Plain raw stool is best for viral testing, but most specimens should also be subdivided into Cary-Blair transport media. This will greatly enhance the possibility of bacterial recovery should the viral tests be negative.

- Viral
    - Only raw stool is acceptable for norovirus testing.
- Bacterial
    - Transfer raw stool to Cary-Blair transport media, for optimal recovery of bacterial pathogens.
    - Raw stool also acceptable up to 30 days from time of collection but not it is not the preferred specimen.
- Parasitic
    - Transfer raw stool to O & P collection vials.
        - ☐ 10% formalin & Z-PVA

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Select appropriate test(s):
    - Molecular Studies
        - ☐ Check "PCR" and "Norovirus"
    - Bacteriology
        - ☐ Check "Culture, stool" under Clinical Specimen
    - Parasitology
        - ☐ Check "Fecal ova and parasite examination" OR check "PCR" for *Cyclospora*
- Check "Outbreak association" and write in name of outbreak, (bottom of Section 2)
- Payor source (Section 6):
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Norovirus testing (only raw stool accepted)
    - Transport temperature: 2-8ºC (ice pack)
    - Transport time: as soon as possible
- Enteric pathogen isolation:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.
** For suspected Vibrio species submit at room temperature.

- Parasitic testing
  - Raw stool should be transferred within a few hours to 10% Formalin & Z-PVA vials.
  - Can be shipped at Room Temp or 2-8ºC (ice pack).
  - Do Not Freeze
- Ship specimens to:

Laboratory Services Section, MC-1947 Texas Department of State Health Services Attn. Walter Douglass (512) 776-7569 1100 West 49th Street Austin, TX 78756-3199

FOOD SAMPLES

Food is tested only upon prior approval

- Contact an EAIDU foodborne epidemiologist to discuss further.

General Policy

- Test only food samples implicated in a suspected outbreak (not associated with

single cases).
- In outbreak settings, food items will not be tested unless a pathogen has been identified in a clinical specimen.
- Food samples must be **collected by a registered sanitarian.**

Available Tests
- *Campylobacter spp.*
- *Cronobacter spp.*
- *Cyclospora cayetanensis*
- *Escherichia coli* O157:H7
- non-O157 STEC in meat products (O26; O45; O103; O111; O121; and O145)
- *Listeria monocytogenes*
- *Salmonella spp.*
- *Shigella spp.*
- *Staphylococcus aureus* enterotoxin
- *Vibrio cholerae, Vibrio parahaemolyticus, Vibrio vulnificus*
- *Yersinia enterocolitica*

Submission Form

Complete the G-23 form for each food sample submitted.

Specimen Collection and Handling
- Food samples must be **collected by a registered sanitarian.**
- Food items should be refrigerated and maintained at 0º to 4º Celsius, until arrival at the laboratory.
- Whenever possible, submit samples to the laboratory in the original, unopened containers.
- If the original container is too large, transfer representative portions to sterile containers using aseptic technique.
- Dry or canned foods that are not perishable should be collected and shipped at ambient temperature. Frozen foods should be shipped frozen.
- Do not freeze refrigerated foods.
- Collect at least 100 grams of each sample unit. (100 grams = 3.53 ounces or 0.22 pounds).
    - If the suspected food is being tested for *Salmonella* or STEC and the food item contains meat, 500 grams of each sample unit needs to be obtained (500 grams = 17.65 ounces or 1.1 pounds)

ENVIRONMENTAL SWABS

Environmental swabs are tested only upon prior approval
- Contact an EAIDU foodborne epidemiologist to discuss further.

General policy
- Test environmental swabs only from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreak settings, environmental swabs will not be tested unless a pathogen has been identified in a clinical specimen.
- Environmental swabs **must be collected by a registered sanitarian.**

Submission Form

Complete the G-23 form for each environmental swab submitted.

Specimen Collection and Handling

- Swabs must be tested within 48 hours of collection and prior to their expiration dates.
    - Acceptable swabs include Quik-Swabs (3M) or Spongesicles (Various providers).

Specimen Shipping for Clinical Samples, Food Samples, and Environmental Swabs:

- Ship specimens via overnight delivery.
- DO NOT mail on a Friday, state, or federal holiday, unless special arrangements have been pre-arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947 Texas Department of State Health Services Attn. Walter Douglass (512) 776-7569 1100 West 49th Street Austin, TX 78756-3199

REVISION HISTORY

December 2021

- Updated Outbreak Investigation and Laboratory Procedures section

March 2021

- Entire section

Haemophilus influenzae, Invasive Disease

BASIC EPIDEMIOLOGY

Infectious Agent

Haemophilus influenzae (*H. influenzae*) is a small, Gram-negative bacillus, a bacterium capable of causing a range of diseases including ear infections, cellulitis (soft tissue infection), upper respiratory infections, pneumonia, and such serious invasive infections as meningitis with potential brain damage and epiglottitis with airway obstruction. There are at least 6 serotypes of *H. influenzae* (designated a-f) distinguished by their capsular antigens, as well as unencapsulated (nontypeable) strains. *Haemophilus influenza*e, type b (Hib), however, often causes the most severe disease and is the only type which is preventable by vaccine. Despite its name, this bacterium has nothing to do with the influenza viruses. (Note also that it is spelled differently.)

Transmission

Haemophilus influenzae bacteria are found in the nose and throat, usually without causing symptoms, and are spread mainly by breathing, coughing, and sneezing. *H. influenzae* is transmitted by direct contact with respiratory droplets and discharges from the nose and throat of infected/colonized persons.

Incubation Period

The incubation period is hard to define because most persons who acquire *Haemophilus influenzae* infections are asymptomatically colonized. Those who become ill following exposure to a case usually do so within 10 days, although the risk may be slightly elevated for up to 60 days.

Communicability

As long as the organism is present in discharges from the nose or throat, *H. influenzae* can be transmitted. Communicability ends within 24 hours of initiation of appropriate chemoprophylaxis. Note, however, that treatment of invasive disease does not necessarily eradicate the organism from the nose/throat. Those exposed more than 7 days before onset of illness in the case are not at significantly increased risk. Hib cases are probably most infectious during the 3 days prior to onset of symptoms.

Clinical Illness

All types of *Haemophilus influenzae* can cause illness, although Hib is the most common cause of severe illness. Disease can take many forms, including:

- Meningitis- brain swelling
- Bacteremia- blood infection
- Periorbital or other cellulitis- skin lesions
- Septic arthritis- joint infection
- Osteomyelitis- bone infection
- Pericarditis- infection of the sac around the heart
- Pneumonia- lung infection
- Epiglottitis - Swelling of the windpipe

Onset of symptoms is usually abrupt, and may include:

- Fever
- Headache
- Lethargy
- Anorexia

- Nausea
- Vomiting
- Irritability

Progressive stupor or coma is common with meningitis. Infections spread via the bloodstream after penetration of the mucous membranes of the nasopharynx. The exact mechanism allowing the penetration is unknown, but a recent upper respiratory tract infection may facilitate invasion.

Recently, having a cochlear implant procedure has been identified as a possible risk factor for invasive disease. Asymptomatic carriage of Hib is not uncommon; in the pre-vaccine era, the organism was recovered from the upper respiratory tract of 2–5% of healthy children. Thus, isolates from sputum or other not-normally-sterile sites are *not* indicative of invasive disease. Neonatal sepsis and non-invasive upper respiratory tract disease, including otitis media, sinusitis, and bronchitis are often caused by other, non-encapsulated strains (non-type b) of *H. influenzae*. These organisms are extremely common and can be recovered from the nasopharynx of 40% to 80% of healthy children.

DEFINITIONS

Clinical Case Definition

Invasive *Haemophilus influenzae* may manifest as pneumonia, bacteremia, meningitis, epiglottitis, septic arthritis, cellulitis, or purulent pericarditis; less common infections include endocarditis and osteomyelitis.

Laboratory Criteria for Diagnosis

- Detection of *Haemophilus influenzae*-specific nucleic acid in a specimen obtained from a normally sterile body site (e.g., blood or cerebrospinal fluid [CSF]), using a validated polymerase chain reaction (PCR) assay; **OR**
- Isolation of *Haemophilus influenzae* from a normally sterile body site (e.g., cerebrospinal fluid [CSF], blood, joint fluid, pleural fluid, pericardial fluid)
- Detection of *Haemophilus influenzae* type b antigen in CSF (probable cases only)

Note: Serotyping of isolates can be performed at the DSHS laboratory. Serotyping is recommended for all *H. influenzae* isolates from sterile sites and **required** on isolates from sterile sites from children under 5 years old. Detection and isolation laboratory tests can be performed at commercial labs.

Case Classification

- **Confirmed:** A case that is laboratory confirmed
- **Probable:** Meningitis with detection of *Haemophilus influenzae* type b antigen in CSF. (Antigen test results in urine or serum are unreliable for diagnosis of *H. influenzae* disease).

Specimen Collection After Death

Specimens collected during an autopsy must be normally sterile sites and collected within 24 hours of death to be considered confirmatory. If the specimen is collected more than 24 hours after death, even if from a normally sterile site, it is now considered not sterile and will not be considered confirmatory.

Note: Conjunctivitis, otitis media, and bronchitis caused by *H. influenzae* are not invasive infections, and do not need to be reported.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate any reported cases of invasive *H. influenzae*. Health departments should also facilitate the typing of untyped specimens (from sterile sites) as soon as possible. **Submission to the DSHS laboratory for *H. influenzae* isolates from sterile sites on children under 5 for serotyping is mandated by the** Texas Administrative Code (TAC)**, regardless of typing at other facilities.** Investigations of *H. influenzae* type b should include rapid identification and evaluation of close contacts.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
  - See the Sterile Site and Invasive Disease Determination Flowchart for confirming a specimen meets the criteria for sterile site.
  - For those under 5 years old, if *Haemophilus influenzae* was isolated from a sterile site, the TAC requires an isolate be forwarded to the DSHS laboratory for typing and molecular analysis, regardless of typing results at other facilities.
  - For those 5 years or older, if *Haemophilus influenzae* was isolated from a sterile site but the type is unknown, request that the laboratory forward the isolate to the DSHS laboratory for typing and molecular analysis.
  - If an isolate is not available but *Haemophilus influenzae* is suspected, forward any specimen from a sterile site that is available.
  - DSHS Austin lab will type the isolate and notify submitter of the results.
  - **If isolate is typed, update serotype in NEDSS case investigation.**
- ☐ Review medical records or speak to an infection preventionist or physician to verify demographics, symptoms, underlying health conditions, and course of illness.
- ☐ Complete the *Haemophilus influenzae* Investigation Form by interviewing the case (or surrogate) to identify close contacts, risk factors, vaccination history, and other pertinent information.
  - **All cases of *H. influenzae*, regardless of type, should have a full investigation completed.**
- ☐ Ensure appropriate control measures are implemented (see Control Measures below).
- ☐ Refer household or close contacts that meet the prophylaxis criteria to their healthcare provider for appropriate chemoprophylaxis (See Prophylaxis Criteria below).
- ☐ **Send the completed *Haemophilus influenzae* Case Investigation Form to DSHS EAIDU via fax, secure email, or mail, regardless of age.**
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed or emailed to DSHS.
- ☐ All confirmed and probable *Haemophilus influenzae* case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- Control measures are primarily needed for Hib cases (see Prophylaxis Guidelines section below). For all *H. influenzae* cases, appropriate antibiotic treatment for the patient and good hand hygiene are needed to stop

transmission.

- All *H. influenzae* cases should remain on droplet precautions until 24 hours after initiation of effective antimicrobial therapy.
- Appropriate vaccination is the best control measure.
    - Infants (2-6 months of age)
        - CDC recommends routine administration of a Hib vaccine series beginning at age 2 months, with either:
            - 2 doses of PedvaxHIB®
              OR
            - 3 doses of ActHIB®, Hiberix®, Pentacel®, or Vaxelis™
    - Children (12-15 months of age)
        - CDC recommends a booster dose of ActHIB®, Hiberix®, Pentacel®, or PedvaxHIB® at least 8 weeks after the most recent Hib vaccination.
- Children <24 months of age who have had invasive Hib disease (culture confirmed) should still receive Hib vaccine, since many children of that age fail to develop adequate immunity following natural disease.
- Rifampin prophylaxis should be administered as rapidly as possible to eligible contacts (see below).

Managing Close Contacts

- Household contacts that were exposed within 7 days of the index case's onset date should be evaluated for appropriate prophylaxis (see below).
- The risk of Hib invasive disease for childcare center contacts of a patient with Hib invasive disease case is thought to be lower than that for a susceptible household contact.
- There are no guidelines for control measures around cases of invasive non-typeable or non-b H. influenzae disease, including if the serotype is not available at the time prophylaxis would be administered.
- If more than 14 days have passed since the last contact with the index patient, the benefit of chemoprophylaxis is likely to be decreased.

Prophylaxis Guidelines

- **For *H. influenzae,* <u>type b</u> only:**
    - Rifampin chemoprophylaxis is recommended for index case-patients (unless treated with cefotaxime or ceftriaxone) and all household contacts in households with members less than 4 years of age who are not fully vaccinated or members less than 18 years of age who are immunocompromised, regardless of their vaccinated status.
        - The recommended dose of rifampin is 20 mg/kg as a single daily dose (maximum daily dose 600 mg) for 4 days. Some providers recommend that neonates (<1 month of age) receive 10 mg/kg once daily for 4 days.
    - If the case is part of a household with a child younger than 12 months of age who has not received the three-dose primary series of Hib conjugate vaccine, all household members should receive rifampin prophylaxis.
    - If the case is part of a household with at least one contact that is younger than 48 months of age and unvaccinated or incompletely vaccinated against Hib, rifampin prophylaxis is recommended for all household contacts regardless of age.
    - If the case is part of a household with an immunocompromised child,

even if the child is older than 48 months and fully vaccinated, all members of the household should receive rifampin because of the possibility that the vaccination may not have been effective.
    - Chemoprophylaxis is not recommended for occupants of households that do not have children younger than 48 months of age (other than the index case) or when all household contacts 12 to 48 months of age are immunocompetent and have completed their Hib vaccination series.
    - In childcare facilities, prophylaxis is recommended when there have been 2 or more cases in a 60-day period AND there are under or unimmunized children at the daycare. Attendees and providers should receive rifampin prophylaxis. Additionally, under or unimmunized children should receive a dose of vaccine and should be scheduled to complete the recommended series.
    - Index patients younger than 2 years or that live with a susceptible contact, should also receive rifampin prophylaxis preferably just before hospital discharge, if the
      patient was not treated with cefotaxime or ceftriaxone.
    - Hospital personnel exposed to a child with invasive Hib disease do not need prophylaxis.
- **For non-b/non-typed *H. influenzae*:**
    - **Chemoprophylaxis is not recommended for contacts of persons with invasive disease because cases of secondary transmission have not been documented.**

Treatment
Antibiotic treatment is available to treat infection with *Haemophilus influenzae*.

Exclusion
Children with a fever from any infectious cause should be excluded from school/daycare for at least 24 hours after fever has subsided without the use of fever suppressing medications. Do not exclude exposed asymptomatic children and staff as long as they have no other reasons for exclusion.

MANAGING SPECIAL SITUATIONS

Outbreaks
DSHS does not have an official outbreak definition for *H. influenzae* given outbreaks are rare in the post-Hib vaccine era. Whether to consider a cluster of invasive *H. influenzae* cases an outbreak depends on factors such as the timing of cases, setting (community vs. institutional), strength of epi links, serotype, and whole genome sequencing.

If an outbreak of *Haemophilus influenzae* is suspected, notify EAIDU at **(800) 252-8239 or (512) 776- 7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS within 30 days of receiving a report of a confirmed or probable case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email, or mail a completed Investigation Form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616**, securely emailed to VPDTexas@dshs.texas.gov, or mailed to:

      Emerging and Acute Infectious Disease Unit
      Texas Department of State Health Services
      Mail Code: 1960
      PO Box 149347
      Austin, TX 78714-9347

    - **Cases (Hib and children under 5) should be monitored until hospital discharge,** even if all investigation and control measures have been completed.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at 512-776-7676.

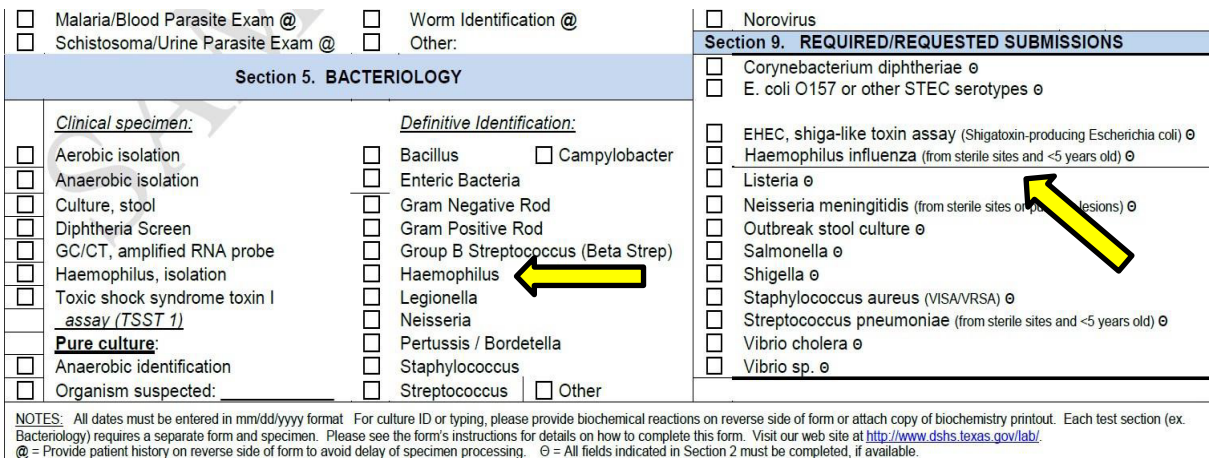
LABORATORY PROCEDURES

Serotyping of *H. influenzae* isolates is an important part of the diagnostic process, but also to aid in understanding the epidemiology of *H. influenzae* in Texas. The Texas Administrative Code (TAC) mandates the submission of *H. influenzae* isolates on children under 5 years old to the DSHS laboratory. *H. influenzae* isolates from patients of any age can be submitted to the DSHS lab and we encourage the submission of all *H. influenzae* isolates. Serotyping of *H. influenzae* isolates allow us to understand the epidemiology of *H. influenzae* and how the vaccine has affected Hib and all other *H. influenzae* types in Texas. The DSHS laboratory can perform serotyping for *H. influenzae* isolates collected from sterile sites. DO NOT submit isolates from sputum for serotyping.

Isolate Submission

- Submit isolates of *Haemophilus influenzae* on chocolate agar slants (or media that has the necessary growth requirements for *Haemophilus)* at ambient temperature.
- Ship isolate to the DSHS laboratory via overnight delivery. The viability of the organism is short lived; therefore, isolate must arrive at the DSHS lab in Austin within 48 hours after subculture.
- If a delay of more than 48 hours in transport is anticipated, use a CO_2 generator bag.

- Use Specimen Submission form G-2B.
    - **When submitting isolate from sterile site and <5 years old make sure to check the box in Section 9 shown below in addition to the correct box in Section 5. Bacteriology.**



☐ Malaria/Blood Parasite Exam @ ☐ Worm Identification @
☐ Schistosoma/Urine Parasite Exam @ ☐ Other:

Section 5. BACTERIOLOGY

Clinical specimen:
☐ Aerobic isolation
☐ Anaerobic isolation
☐ Culture, stool
☐ Diphtheria Screen
☐ GC/CT, amplified RNA probe
☐ Haemophilus, isolation
☐ Toxic shock syndrome toxin I assay (TSST 1)

Pure culture:
☐ Anaerobic identification
☐ Organism suspected: _____

Definitive Identification:
☐ Bacillus ☐ Campylobacter
☐ Enteric Bacteria
☐ Gram Negative Rod
☐ Gram Positive Rod
☐ Group B Streptococcus (Beta Strep)
☐ Haemophilus
☐ Legionella
☐ Neisseria
☐ Pertussis / Bordetella
☐ Staphylococcus
☐ Streptococcus ☐ Other

☐ Norovirus

Section 9. REQUIRED/REQUESTED SUBMISSIONS
☐ Corynebacterium diphtheriae ϴ
☐ E. coli O157 or other STEC serotypes ϴ
☐ EHEC, shiga-like toxin assay (Shigatoxin-producing Escherichia coli) ϴ
☐ Haemophilus influenza (from sterile sites and <5 years old) ϴ
☐ Listeria ϴ
☐ Neisseria meningitidis (from sterile sites or [illegible] lesions) ϴ
☐ Outbreak stool culture ϴ
☐ Salmonella ϴ
☐ Shigella ϴ
☐ Staphylococcus aureus (VISA/VRSA) ϴ
☐ Streptococcus pneumoniae (from sterile sites and <5 years old) ϴ
☐ Vibrio cholera ϴ
☐ Vibrio sp. ϴ

NOTES: All dates must be entered in mm/dd/yyyy format For culture ID or typing, please provide biochemical reactions on reverse side of form or attach copy of biochemistry printout. Each test section (ex. Bacteriology) requires a separate form and specimen. Please see the form's instructions for details on how to complete this form. Visit our web site at http://www.dshs.texas.gov/lab/.
@ = Provide patient history on reverse side of form to avoid delay of specimen processing. ϴ = All fields indicated in Section 2 must be completed, if available.

Specimen Shipping

- DO NOT mail on a Friday or a day before a state holiday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Haemophilus influenzae is considered an infectious agent, biosafety level 2. The isolate should be triple contained in accordance with federal regulations.

Causes for Rejection

- Discrepant or missing information between isolate and paperwork
    - There must be 2 identifiers such as patient first and last name AND date of birth on the specimen media.
- Expired media used

REVISION HISTORY

January 2021
- Updated Managing Close Contacts section
- Added Prophylaxis Guidelines Section
- Updated flow chart

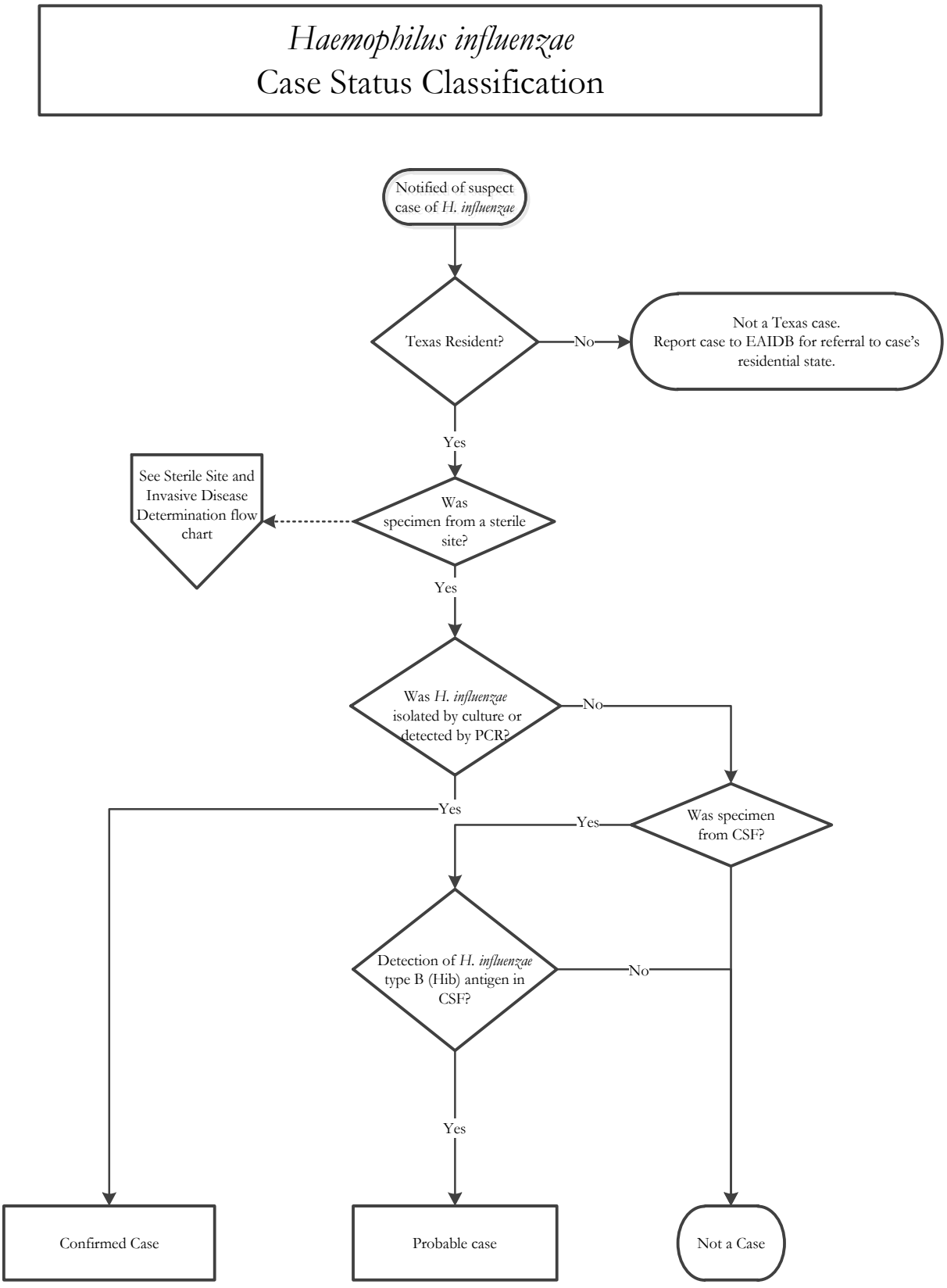
January 2022
- Updated Managing Close Contacts section
- Updated Prophylaxis Guidelines

December 2022
- Updated Case Investigation Checklist section
- Updated Laboratory Criteria for Diagnosis

- Updated Control Measures
- Updated Prophylaxis Guidelines

September 2024
- Updated Case Investigation Checklist section
- Updated Control Measures
- Updated Laboratory Criteria for Diagnosis
- Updated Outbreaks section

FLOW CHART


Haemophilus influenzae
Case Status Classification
Notified of suspect case of *H. influenzae*
Texas Resident?
No
Not a Texas case. Report case to EAIDB for referral to case's residential state.
Yes
See Sterile Site and Invasive Disease Determination flow chart
Was specimen from a sterile site?
Yes
Was *H. influenzae* isolated by culture or detected by PCR?
No
Yes
Was specimen from CSF?
Yes
Detection of *H. influenzae* type B (Hib) antigen in CSF?
No
Yes
Confirmed Case
Probable case
Not a Case

Hemolytic Uremic Syndrome, post-diarrheal

BASIC EPIDEMIOLOGY

Infectious Agent

Hemolytic uremic syndrome (HUS) is a rare, but serious disease that affects the kidneys and interrupts blood coagulation. The most common form is HUS post-diarrheal, which occurs after an infection with Shiga toxin-producing *E. coli* (STEC), specifically *E. coli* O157. Among children younger than 18 years old who develop HUS, 80% have a STEC infection. HUS is less common in persons with non-*E. coli* O157 infections. Other bacteria and viruses have been reported in association with HUS, but correlation to HUS in these cases is unknown. In Asia and Africa, *Shigella dysenteriae* has been associated to HUS.

Transmission

HUS is a clinical syndrome and is not transmissible from person to person.

Incubation Period

HUS develops one to three weeks after the initial infection.

Communicability

HUS is a clinical syndrome and does not have a period of communicability. If HUS occurs after an infection, such as STEC, the infectious agent that caused the initial infection will have a period of communicability.

Clinical Illness

Most cases of post-diarrheal HUS occur following an infection with STEC. In cases of infection, damage occurs to the red blood cells surface features, therefore clogging normal filtration by the kidneys, causing acute kidney failure. Patients may develop anemia, low platelet counts, elevated creatinine levels, blood in the urine, protein in the urine, and evidence of red blood cell destruction.

Severity

HUS is self-limited in most cases with 50-70% of patients requiring short term dialysis. Up to 25% of patients do develop chronic renal failure and hypertension, which requires long term treatment. Between 3-5% of cases with HUS die.

DEFINITIONS

Clinical Case Definition

Hemolytic uremic syndrome (HUS) is characterized by the acute onset of microangiopathic hemolytic anemia, renal injury, and low platelet count. Thrombotic thrombocytopenic purpura (TTP) also is characterized by these features but can include central nervous system (CNS) involvement and fever and can have a more gradual onset. Most cases of HUS (but few cases of TTP) occur after an acute gastrointestinal illness (usually diarrheal).

Laboratory Confirmation

The following are both present at some time during the illness:

- Anemia (acute onset) with microangiopathic changes (i.e., schistocytes, burr cells, or helmet cells) on peripheral blood smear, **AND**
- Renal injury (acute onset) evidenced by either hematuria, proteinuria, or elevated creatinine level (i.e., greater than or equal to 1.0 mg/dL in a child

aged less than 13 years or greater than or equal to 1.5 mg/dL in a person aged greater than or equal to 13 years, or greater than or equal to 50% increase over baseline)
Note: A low platelet count can usually, but not always, be detected early in the illness, but it may then become normal or even high. If a platelet count obtained within 7 days after onset of the acute gastrointestinal illness is not less than 150,000/mm3, other diagnoses should be considered.

Case Classifications

Confirmed: An acute illness diagnosed as HUS or TTP that both meets the laboratory criteria and began within 3 weeks after onset of an episode of acute or bloody diarrhea

Probable:

- An acute illness diagnosed as HUS or TTP that meets the laboratory criteria in a patient who does not have a clear history of acute or bloody diarrhea in preceding 3 weeks
  OR
- An acute illness diagnosed as HUS or TTP that a) has onset within 3 weeks after onset of an acute or bloody diarrhea and b) meets the laboratory criteria except that microangiopathic changes are not confirmed

Notes: See Shiga toxin-producing Escherichia coli (STEC. Cases meeting the criteria for both conditions should be reported separately under each condition.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of Hemolytic Uremic Syndrome (HUS). Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the Shiga Toxin-Producing *Escherichia coli* (*E. coli*) and/or Hemolytic Uremic Syndrome (HUS) Investigation Form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Verify that the laboratory has forwarded an isolate or specimen in the case there was a recent laboratory confirmed diarrheal illness before the development of HUS to the DSHS laboratory. If an isolate has not been sent, please request a specimen be submitted as required.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to get a detailed exposure history and risk factor information.
  - Use the **Shiga Toxin-Producing *Escherichia coli* (*E. coli*) and/or Hemolytic Uremic Syndrome (HUS) Investigation Form** to record information from the interview.
  - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
  - Provide education to the case or his/her surrogate about effective

hand washing, food safety practices, and animal contact/handling precautions. See Prevention and Control Measures.

- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to FoodborneTexas@dshs.texas.gov.
  - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU, noting case is LTF.
  - For HUS cases, please also submit the medical record along with the completed form
- ☐ Identify whether the case needs to be excluded based ongoing illness and either the occupation or attendance in a group setting. Examples include food handlers, child-care or health-care workers, or attend child-care as long as they have diarrhea. See Exclusions.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Suspect cases are not included in the overall case counts but are included for programmatic review. Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After handling raw food, especially poultry and beef.
  - After any contact with animals, their living areas or their food.
- Avoid consuming raw milk, unpasteurized dairy products, and unpasteurized juices (like fresh apple cider).

Follow food safety principles in the kitchen, especially:

  - Restrict any food preparation for other individuals until symptoms have resolved
  - Cook ground beef thoroughly. Ground beef and meat that has been needle- tenderized should be cooked to a temperature of at least 160°F (70˚C). Use a thermometer to verify the temperature, as color is not a very reliable indicator of how thoroughly meat has been cooked.
  - Prevent cross-contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after handling raw meat and switching to items consuming raw such as vegetables
  - Wash fresh leafy greens, fruits and vegetables thoroughly with water.
- Avoid swallowing water when swimming and playing in lakes, ponds, streams, swimming pools, and backyard "kiddie" pools.
- Avoid participating in recreational water activities such as swimming while diarrhea is present and for two weeks after diarrhea has resolved.

Exclusions

There are no specific exclusions for HUS, however it is important to evaluate if the

case has an ongoing diarrheal illness that would require exclusions for that specific condition. Please follow the exclusion criteria listed in other disease-specific chapters of this document if the case has a laboratory-confirmed diarrheal illness (such as Shiga toxin-producing *E. coli).*

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676** or email an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

The local/regional health department should:

- Determine if there is a common, laboratory-confirmed etiology between the HUS cases
- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, is lost to follow-up, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional HUS cases.
    - Review other laboratory-confirmed cases to determine if others might have attended the event as well
- If isolates have not already been submitted to the DSHS laboratory for confirmation and whole genome sequencing, request hospital/clinical labs submit isolates for confirmation and whole genome sequencing. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on, and adherence to, hand hygiene

  - Storage and preparation of food
  - Procedures for changing diapers and toilet training
  - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Exclude individuals from handling food, engaging in child-care, healthcare work, or attending child-care, if they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed and probable cases are required to be reported **within 1 week** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - Fax completed investigation forms and medical records to DSHS EAIDU at **512-776-7616** or email securely to FoodborneTexas@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676.**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases from separate households of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created, a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

There is no confirmatory testing provided at the DSHS Laboratory for HUS, however, in the case there was a recent laboratory confirmed diarrheal illness before the development of HUS, the isolate or specimen must be submitted to the DSHS Laboratory.

In the event there is an increase in HUS cases or/and an outbreak of HUS with a recent history of diarrheal illness but no laboratory confirmation, please consult with an EAIDU foodborne epidemiologist about additional stool testing.

REVISION HISTORY

December 2021
- Minor edits

March 2021
- Entire Section

Hepatitis A

BASIC EPIDEMIOLOGY

Infectious Agent
Hepatitis A virus (HAV), a picornavirus

Transmission
Hepatitis A virus is transmitted from person to person through the fecal-oral route. Common source outbreaks are rare but have been linked to contaminated water, food contaminated by infected persons where the food was not properly cooked or handled after cooking, raw or undercooked mollusks harvested from contaminated waters, and contaminated produce.

Incubation Period
Average of 28-30 days (range 15-50 days)

Communicability
Persons with HAV shed the most virus during the 1-2 weeks prior to symptom onset. In most cases, persons are no longer infectious after the first week of jaundice, although not all patients experience jaundice.

Clinical Illness
The clinical course of illness is indistinguishable from the other types of acute viral hepatitis. The illness typically has an abrupt onset of fever, malaise, anorexia, nausea, abdominal discomfort, jaundice, and dark urine. Clinical illness does not usually last longer than two months.

Up to 70% of illness in children younger than 6 years old is likely to be asymptomatic. In older children and adults, infection is usually symptomatic, with up to 70% having jaundice.

Unlike some of the other viral hepatitis infections, hepatitis A does not create a chronic carrier state. Some patients, however, may have prolonged symptoms or relapse up to six months, during which the virus may be shed.

DEFINITIONS

Clinical Case Definition
An acute illness with a discrete onset of any sign or symptom consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, abdominal pain, or dark urine), **AND**

- Jaundice or elevated total bilirubin levels ≥ 3.0 mg/dL, **OR**
- Elevated serum alanine aminotransferase (ALT) > 200 IU/L **AND**
- The absence of a more likely diagnosis

Laboratory Criteria for Diagnosis
- Immunoglobulin M (IgM) antibody to hepatitis A virus (anti-HAV IgM) positive **OR**
- Nucleic acid amplification test (NAAT; such as Polymerase Chain Reaction [PCR] or genotyping) for hepatitis A virus RNA positive

Case Classification
Confirmed:

- A case that meets the clinical case definition and is IgM anti-HAV positive

OR

- A case that has hepatitis A virus RNA detected by NAAT (such as PCR or genotyping) **OR**
- A case that meets the clinical case definition and occurs in a person who has an epidemiological link with a person who has laboratory-confirmed hepatitis A contact (i.e., household or sexual) with an infected person during the 15-50 days prior to the onset of symptoms **AND**
- A case that is not otherwise ruled out by IgM anti-HAV or NAAT for hepatitis A virus testing performed in a public health laboratory.

Probable: No probable case definition for Hepatitis A

Note: Hepatitis A labs can be performed at commercial laboratories.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of acute Hepatitis A. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use DSHS Hepatis A Case Investigation form available on the DSHS website: https://www.dshs.texas.gov/notifiable-conditions/investigation-forms.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or physician to verify demographics, symptoms, underlying health conditions, and course of illness.
- ☐ Complete the Hepatitis A Case Investigation Form by interviewing the case (or surrogate) to identify close contacts, risk factors and other pertinent information.
  - o During the interview, provide education on control measures, including proper hand hygiene.
- ☐ Ensure appropriate control measures are implemented (see Control Measures below).
- ☐ Exclude children and cases that are food-handlers from work, if within 7 days of symptom onset.
- ☐ Refer household and sexual contacts who are still within 2 weeks of exposure to their healthcare providers for appropriate chemoprophylaxis.
  - o See Prophylaxis Guidance.
- ☐ Send the completed Hepatitis A Case Track form to DSHS for all cases.
- ☐ All confirmed acute HAV case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS EAIDU.

Control Measures

- Routine hand washing with soap and warm water especially:
  - Before preparing, handling or eating any food

    - After going to the bathroom
    - After changing a diaper
    - After caring for someone with diarrhea
- Get the hepatitis A vaccine as recommended.
- Post-exposure prophylaxis is available for at-risk close contacts. See Prophylaxis Guidance.
- Patients infected with hepatitis A should be educated on enteric precautions, including adhering to strict hand hygiene for the first two weeks of symptoms and up to one week after the onset of jaundice, and should not handle food for other people for one week after onset of jaundice.

Persons at Risk for Infection with HAV

- Close contacts of HAV-infected persons*
    - Household contacts
    - Caretakers
    - Daycare, nursery, and preschool contacts
    - Sexual contacts
    - Consideration to persons with other types of ongoing, close personal contact (e.g. a regular babysitter)

  *Excludes healthcare personnel using appropriate personal protective equipment
- People who eat raw shellfish
- Men who have sex with men (MSM)
- People using illicit drugs, including intravenous and non-intravenous drug use
- People experiencing homelessness
- People who traveled to an area with possible hepatitis A exposure
- Persons with occupational risk
    - Persons working with nonhuman primates
    - Persons working with HAV in a research laboratory

Prophylaxis Guidance

- Household, caretakers, and sexual contacts should be identified immediately and those that are unvaccinated should be offered post-exposure prophylaxis with immune globulin (IG) or vaccine as follows:
    - For healthy persons ≥12 months years of age and have not previously completed the 2-dose HepA vaccine series should receive a single dose of HepA vaccine within 2 weeks of the first exposure. In addition to HepA vaccine, IG (0.1 mL/kg) may be administered to persons aged >40 years depending on providers' risk assessment.
        - Provider risk assessment can be found in the CDC MMWR v. 67, no. 43
        - For long-term immunity, the HepA vaccine series should be completed with a second dose at least 6 months after the first dose; however, the second dose is not necessary for PEP.
    - For persons ≥12 months who are immunocompromised and persons diagnosed with chronic liver disease and have not previously completed the 2-dose HepA vaccine series should receive both IG and HepA vaccine simultaneously in a different anatomical site as soon as possible after exposure and within 2 weeks of the first exposure.
    - For infants aged <12 months and persons for whom vaccine is contraindicated (who are allergic to a vaccine component) should receive IG instead of vaccine as soon as possible after exposure and

within 2 weeks after the first exposure.
    - The updated recommended dosage of IG is 0.1 mL/kg and there is no maximum dosage for hepatitis A prophylaxis.
    - Vaccine can be used if IG cannot be obtained (if the persons are not immunocompromised, have chronic liver disease, or contraindication to vaccine)
    - IG and the Hepatitis A vaccine can be given concomitantly regardless of manufacturer.
    - C Contact DSHS EAIDU and the regional Immunization Program Manager if vaccine or IG is needed.
    - Note: Ideally, the 2-week post-exposure period should be counted from the first exposure if possible. If that is not possible (e.g., a situation where there were multiple exposures, such as eating multiple times at a restaurant while an HAV-infected food handler was working, or sharing a household with an HAV-infected spouse), the usual recommendation is to calculate the 2-week post-exposure period from the last exposure to increase eligibility for PEP, with the understanding that a contact might already be outside the 2-week window from their first exposure (i.e., they could still potentially develop hepatitis A despite receiving PEP).
- Contacts who have received one dose of hepatitis A vaccine at least one month prior to exposure do not need post-exposure prophylaxis.
- Generally, IG and vaccine are not recommended for school or work contacts with the following exceptions:
    - At day care centers, IG and/or vaccine should be offered if a day care attendee or employee is IgM-positive or if two household contacts of an employee or attendee are IgM-positive.
    - If a food-handler is diagnosed with hepatitis A, the other food handlers should be offered IG and/or vaccine. Patrons generally do not need prophylaxis although it may be considered if the food-handler prepared food that was not heated, had diarrhea, and IG and vaccine can be provided within 2 weeks of exposure.

Treatment
There is no specific treatment available for hepatitis A infection.

Exclusion
Food-handlers and school children should be kept out of work or school for 7 days after the onset of symptoms.

MANAGING SPECIAL SITUATIONS

Child-care centers

- Vaccinate or provide IG to unvaccinated staff and attendees if
    - one or more cases of hepatitis A is recognized in children, **OR**
    - cases are recognized in two or more households of center attendees.
- If one or more cases of hepatitis A infection occurs among employees, PEP should be considered based on the duties, hygienic practices, and presence of symptoms at work.
- If the daycare does not provide care to children in diapers, then vaccine/IG only needs to be given to care contacts of an index-case patient.
- Post-exposure prophylaxis should also be considered for household contacts

of daycare attendees that have children in diapers.
- When an outbreak occurs (i.e. hepatitis A cases in three or more families), PEP should also be considered for members of households that have diaper-wearing children attending the center.

Food handler exposures
- If a food-handler is diagnosed with hepatitis A, the other food handlers should be offered IG and/or vaccine.
- Patrons generally do not need prophylaxis although it may be considered if the food-handler prepared food that was not heated, had diarrhea or poor hygienic practices, and IG and vaccine can be provided within 2 weeks of the first exposure.
- In settings in which repeated exposures to HAV might have occurred (e.g. institutional cafeterias), consideration of PEP use is warranted.
- PEP in this scenario should generally consist of vaccination for all age groups, though IG may be considered for exposed persons (patrons during the time the food handler was symptomatic and worked) who are immunocompromised or have chronic liver disease.
- Refer to MMWR; V. 67, No. 43, Supplement 1 for additional information.

Other settings (e.g. correctional facility, homeless shelter, psychiatric facility, group home)
- PEP should be considered for all previously unvaccinated residents and employees when a confirmed case of hepatitis A case occurs in a setting where close personal contact occurs regularly and hygiene standards are difficult to maintain.
    - In a setting containing multiple enclosed units or sections (e.g. prison ward), PEP administration should be limited only to persons in the area where there is exposure risk.

Common source exposures
- Common source outbreaks are generally identified too late for PEP to be effective, but it should be considered if still within the two-week PEP window.
- The common source should be removed from circulation.

The Hepatitis A Communication Toolkit can be used if health alerts, press releases, exposure notifications, etc. are needed to manage Hepatitis A outbreaks/exposures. Ask the VPD Team for the Toolkit.

Outbreaks
A person-to-person outbreak might be occurring when the number of reported hepatitis A cases in a jurisdiction is ≥3 standard deviations above the jurisdiction's baseline in a four-week period. Baseline is determined by calculating jurisdiction's 5-year monthly average of cases reported during the non-outbreak years.
In child-care centers, an outbreak occurs when hepatitis A cases are in three or more families.

If an outbreak of hepatitis A is suspected, notify EAIDU at **(800) 252-8239** or **(512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed and clinically suspected cases are required to be reported **within 1 workday** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** cases to DSHS within 30 days of receiving a report of confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616**, securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Emerging and Acute Infectious Disease Unit
Texas Department of State Health Services
Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at 512-776-7676.

LABORATORY PROCEDURES

Testing for hepatitis A is widely available from most hospital or commercial laboratories. If hepatitis A testing is needed through the DSHS State Laboratory, please contact the EAIDU VPD team at **(800) 252-8239** or **(512) 776-7676**.

REVISION HISTORY

January 2021

- Updated vaccine requirements to coincide with updated CDC guidelines for post-exposure prophylaxis (see Prophylaxis Guidelines)
- Updated case definition
- Updated Managing Special Situations

December 2022

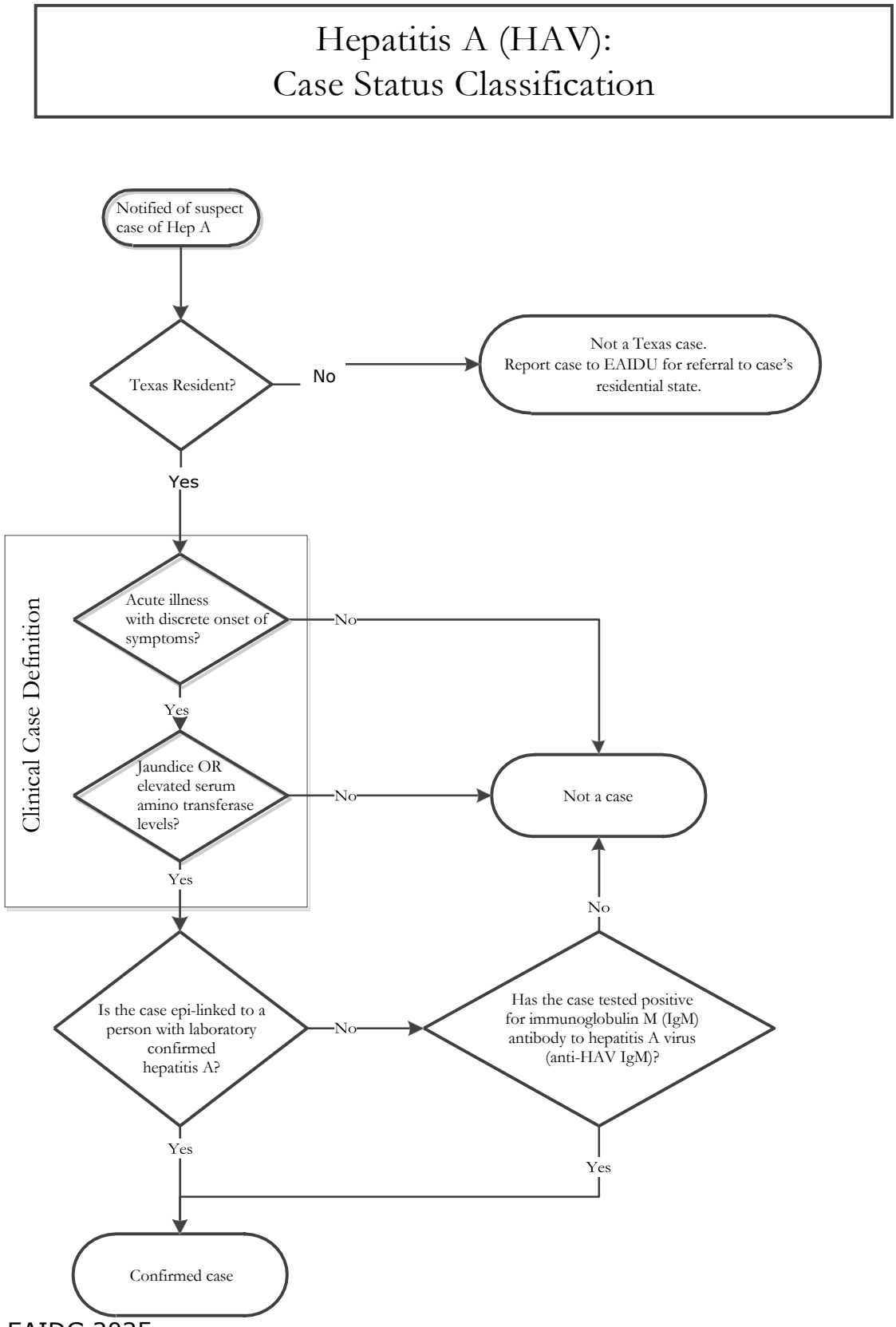
- Updated Persons at Risk for Infection with HAV

September 2024

- Updated Prophylaxis Guidelines section on how to calculate the 2-week post-exposure window

- Updated Outbreaks section to clarify child-care centers have a different definition than general outbreaks

FLOW CHART



Hepatitis B, Acute & Perinatal

BASIC EPIDEMIOLOGY

Infectious Agent
Hepatitis B virus (HBV), a hepadnavirus.

Transmission
- Sexual activity with an infected person
- Transfusion of contaminated blood or blood products
- Perinatally (either in utero or at delivery)
- Sharing or reusing non-sterilized needles, syringes, razors, toothbrushes, manicure equipment, or any other items which may contain the blood or body fluid of an infected person
- Percutaneous or mucous membrane exposure to blood or body fluids of an infected person
- Tattooing and/or body piercing

Incubation Period
The incubation period is 45–180 days with an average of 60–90 days.

Communicability
The blood of infected persons is infective many weeks before the onset of symptoms and remains infective through the acute clinical course of the disease and during the chronic carrier state, which may persist for life. The younger a person is when infected, the more likely it is he or she will become chronic disease carriers. Additionally, persons who are hepatitis B e antigen (HBeAg, also referred to as "little e antigen") positive are highly infectious.

Clinical Illness
The clinical course of acute hepatitis B is indistinguishable from that of other types of acute viral hepatitis. Clinical signs and symptoms occur more often in adults than in infants or children, who usually have an asymptomatic acute course. However, approximately 50% of adults who have acute infections are asymptomatic.

The prodromal phase from initial symptoms to onset of jaundice usually lasts from 3 to l0 days. It is non-specific and is characterized by a slow onset of malaise, anorexia, nausea, vomiting, right upper quadrant abdominal pain, fever, headache, myalgia, skin rashes, arthralgia and arthritis, and dark urine. The icteric phase is variable but usually lasts from l to 3 weeks and is characterized by jaundice, light or gray stools, hepatic tenderness and hepatomegaly (splenomegaly is less common). During convalescence, malaise and fatigue may persist for weeks or months, while jaundice, anorexia, and other symptoms disappear.

Most acute HBV infections in adults result in complete recovery with elimination of hepatitis B surface antigen (HBsAg) from the blood and the production of hepatitis B surface antibody (anti- HBs), creating immunity to future infection.

Recent hepatitis B vaccination can cause transient HBsAg positivity for up to 18

days post-vaccination. Retesting is needed to determine the true HBV infection status in patients who tested positive for HBsAg shortly after hepatitis B vaccination.

DEFINITIONS

Note: Refer to Table 1 for hepatitis B diagnostic test definitions and abbreviations and Table 2 for interpretation of hepatitis B serological tests.

Hepatitis B, Acute Clinical Case Definition

An acute illness with a discrete onset of any sign or symptom* consistent with acute viral hepatitis (e.g., fever, headache, malaise, anorexia, nausea, vomiting, diarrhea, and abdominal pain), **AND**

- Jaundice, **OR**
- Elevated serum alanine aminotransferase levels (ALT) >100 IU/L.

* A documented negative hepatitis B surface antigen (HBsAg) laboratory test result within 6 months prior to a positive test result (i.e., HBsAg, hepatitis B "e" antigen [HBeAg], or hepatitis B virus nucleic acid testing [HBV NAT] including genotype) does not require an acute clinical presentation to meet the surveillance case definition.

Laboratory Criteria for Diagnosis

- ☐ Hepatitis B surface antigen (HBsAg) positive **AND**
- ☐ IgM antibody to hepatitis B core antigen (anti-HBc IgM) positive **(if done)**

Remember, if HBsAg test alone is done for a case and is positive, it will help the case meet the criteria if it meets clinical case description. But if anti-HBc IgM is also done, then it needs to be positive along with HBsAg positive result to meet the criteria.

If a public health department must prioritize hepatitis B labs to investigate, persons with a positive HBsAg *and* a positive anti-HBc IgM should be investigated first before persons with only a positive HBsAg.

Case Classification

- ☐ **Confirmed:**
  - A case that meets the clinical case definition, is laboratory-confirmed, and is known not to have chronic hepatitis B**
- ☐ **Probable:**
  - There is no probable case definition for acute hepatitis B

** A person should be considered chronically infected if the hepatitis B surface antigen (HBsAg) has been positive for 6 months or longer or if the patient has a history of chronic hepatitis B diagnosis.

Note: Persons with chronic hepatitis B virus (HBV) infection may have no evidence of liver disease or may have a spectrum of disease ranging from chronic hepatitis to cirrhosis or liver cancer. Persons with chronic infection may be asymptomatic. **Please note that chronic hepatitis B is not a reportable condition in Texas.**

Note: Recent hepatitis B vaccination can cause transient HBsAg positivity for up to 18 days post-vaccination. Retesting is needed to determine the true HBV infection status in patients who tested positive for HBsAg shortly after hepatitis B vaccination.

Hepatitis B, Perinatal

Clinical Case Definition

Perinatal hepatitis B (HBV) in the newborn may range from asymptomatic to fulminant hepatitis.

Laboratory Criteria for Diagnosis

- ☐ Hepatitis B surface antigen (HBsAg) positive*** **OR**
- ☐ Hepatitis B e antigen (HBeAg) positive **OR**
- ☐ Detectable hepatitis B virus DNA (HBV DNA)

*** HBsAg must be tested more than 4 weeks after last dose of hepatitis B vaccine to be considered confirmatory

Case Classification

- ☐ **Confirmed:**
  - Child born in the US to a HBV-infected mother **AND**
    - Positive for HBsAg at ≥ 1 month of age and ≤ 24 months of age **OR**
    - Positive for HBeAg or HBV DNA ≥9 months of age and ≤ 24 months of age.
- ☐ **Probable**:
  - Child born in the US whose mother's hepatitis B status is unknown (i.e., epidemiologic linkage not present) **AND**
    - Positive for HBsAg at ≥ 1 month of age and ≤ 24 months of age **OR**
    - Positive for HBeAg or HBV DNA ≥9 months of age and ≤ 24 months of age.

Notes:

- If the mother is known to NOT be infected with HBV, refer to the case definition for acute hepatitis B.
- These definitions are used for surveillance purposes only, not for perinatal hepatitis B prevention case management purposes.
- A pregnant woman with hepatitis B should NOT be entered into NBS as a perinatal case. Perinatal cases must be 24 months of age or younger. Positive pregnant women with acute hepatitis B should be entered as acute cases. If a pregnant woman has chronic hepatitis B, she can be entered as a chronic case of hepatitis B if the jurisdiction chooses to maintain a database of chronic hepatitis B patients, but NBS notifications should not be submitted for chronic hepatitis B cases since this is not a reportable condition. She should be case managed through the Perinatal Hepatitis B Prevention Program.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Acute hepatitis B surveillance is used to 1) identify contacts of case-patients who may require testing or prophylaxis; 2) detect outbreaks; 3) identify infected persons who need counseling and referral for medical management; 4) monitor disease incidence and prevalence; and 5) determine the epidemiologic characteristics of infected persons, including the source of their infection, to assess and reduce missed opportunities for vaccination. See Getting the Most Out of Surveillance below for more information on conducting hepatitis B surveillance activities.

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition.
  - See Evaluating Suspected Cases below.
  - If the case is pregnant, refer to the Perinatal Hepatitis B Program regardless of acute or chronic infection. See Perinatal Hepatitis B Investigations in the Managing Special Situations section for more information.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, underlying health conditions, course of illness, vaccination status and travel history.
  - Use the Viral Hepatitis Case Tracking Form to record information.
  - See Information to Collect for Acute Hepatitis B below.
- ☐ Interview the case (See Interviewing the Patient below).
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
  - Case (or parent), ImmTrac2, school nurse records, primary care provider, etc.
- ☐ Identify and follow-up with all close contacts. See Contact Investigations below.
  - Provide education on hepatitis B.
  - Recommend testing.
  - Evaluate susceptibility status.
  - Offer or recommend vaccination as appropriate.
- ☐ If an acute case is a healthcare worker, a recent blood donor, a transplant recipient, suspected to have been infected in a healthcare setting, less than 2 years old or pregnant see the Managing Special Situations.
- ☐ Send the completed Viral Hepatitis Case Tracking Form to DSHS.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.
- ☐ Make sure to answer all the questions in Hepatitis Extended tab in NEDSS with Yes or No as far as you can if you have interviewed the case. If you were not able to interview the case due to case being lost to follow up, refused to answer, being hospitalized or deceased, you can answer the questions as unknown and give the specific reason in the NEDSS comment section.

Information to Collect for Acute Hepatitis B

The following information is epidemiologically important to collect in a case investigation for acute hepatitis B. The Viral Hepatitis Case Tracking Form includes spaces to record most of this information. All information collected during investigation should be entered into NBS.

- ☐ Demographic information
- ☐ Clinical details
  - Date of illness onset
  - Symptoms, including jaundice
  - Hospitalization
  - Provider information
- ☐ Laboratory results
- ☐ Vaccination status

- ☐ Risk behaviors and exposures
    - o Sexual
    - o Drug use
    - o Tattoos/piercings
    - o Healthcare
        - ▪ Receipt of organs/blood products
        - ▪ Accidental needle stick
        - ▪ Medical/dental procedures
        - ▪ Hospitalization/residents in long term care facilities
    - o Other blood exposure
    - o Occupational
    - o Incarceration
- ☐ Contact investigation and prophylaxis
    - o Sexual contacts
    - o Household contacts
    - o Pregnancy status
    - o Bloodborne exposures (e.g., recently donated blood or an organ)

Evaluating Suspected Cases of Acute Hepatitis B

- ☐ Evaluate the diagnosis
    - o Review laboratory tests
        - ▪ Identify all HBsAg+ and/or anti-Hep B IgM+ results in NBS or received via fax.
        - ▪ Check patient's name in NBS to see if patient was already identified as a hepatitis B case or has previous (>6 mo) positive lab results for hepatitis B.
            - If patient has a previous positive hepatitis lab result or a hepatitis B investigation, mark lab as reviewed**. HBsAg+ lab results that were not submitted via NBS should be shared with the perinatal program for women 13-50.**
    - o Contact provider
        - ▪ If patient is not identified as previously reported acute or chronic case, contact the healthcare provider for additional laboratory and clinical information, and pregnancy status if age/gender appropriate.
            - If patient is pregnant, refer to perinatal program.
            - If patient is not pregnant and the provider indicates the patient is a known chronic case OR the patient's clinical information is not consistent with acute hepatitis B, investigation can be closed.
                - Mark lab as reviewed in NBS OR
                - If an acute investigation was opened in NBS, close as "not a case" (and do not send a notification) OR
                - If desired and appropriate, enter the case in NBS as a chronic hepatitis B case. Do not submit a notification.
            - If patient is identified as acute by provider or has a clinical presentation consistent with acute hepatitis B, continue investigation.
            - Contacting the provider can be done by fax, phone, e-

mail or mail.
    - Some health departments find it useful to initiate contact with a form letter that the provider completes with information on pregnancy status, clinical information, chronic status, and any additional liver test results.

Control Measures

- ☐ Identify the source of infection
    - Obtain information on high-risk behaviors, medical/dental/commercial procedures in 45-180 days prior to onset.
        - Close contact with any household or sexual contact with acute or chronic hepatitis B infection
        - Receipt of blood transfusion or other blood products
        - History of dental or surgical care including renal dialysis
        - Blood exposure through needles, tattooing, piercing or acupuncture
        - Accidental exposure of skin, eyes, mucous membranes, or a wound to blood of another person
        - Work in occupational settings with elevated risk of exposures (e.g., medical, dental, or clinical laboratory work, or employment in facilities for mentally disabled persons)
        - Sexual contact with multiple sex partners or a sex partner with a risk factor
    - Possible sources should be pursued if additional exposures may be prevented (e.g., illegal tattooing, likely healthcare transmission, etc.).
- ☐ Identify potentially exposed persons
    - Household members
    - Sexual contacts
    - Needle-sharing contacts
    - Others potentially exposed to blood/sexual fluids
    - Evaluation special situations (see Managing Special Situations below)
        - If patient is a healthcare worker, evaluate potential for exposing patients.
        - If patient has recently donated blood/plasma, notify the blood bank. If patient is pregnant, refer patient to perinatal program.

Managing Close Contacts

- ☐ Evaluate immunization and disease history of household and sexual contacts.
    - **Susceptible:** persons who are not immune to HBV or who have not been appropriately vaccinated against HBV.
    - **Protected:** persons with adequate antibody response (anti-HBs $\geq$ 10 milli-IUs/mL) due to vaccination or natural infection.
    - **Primary non-responder:** persons who do not demonstrate adequate antibody response after three doses of hepatitis B vaccine.
    - **Non-responder:** persons who have received two complete series of the hepatitis B vaccine but still do not demonstrate adequate antibody response.
    - **Unknown:** persons whose anti-HBs status is unknown are always considered susceptible.

- ☐ Test or refer for testing as appropriate.
- ☐ Offer vaccine or refer to provider for vaccine, if susceptible (see the CDC's persons recommended to receive hepatitis B vaccination).
- ☐ Offer education on preventing hepatitis B.
- ☐ Refer to prevention and/or treatment resources.
- ☐ Refer acute cases to provider for follow-up testing to establish resolution or carrier status.
    - o Offer education on reducing risk of further transmission.
    - o Refer to treatment.

Exclusion
There is no exclusion for cases of acute hepatitis B.

MANAGING SPECIAL SITUATIONS

Perinatal Hepatitis B Investigations
Any woman that has a positive hepatitis B laboratory result AND is known to be pregnant must be referred to the Perinatal Hepatitis B Prevention Program for case management. Any woman aged 10-55 that has an unknown pregnancy status and a positive hepatitis B lab result should also be referred to the Perinatal Hepatitis B Prevention Program for further investigation of pregnancy status.

- Currently all positive hepatitis B surface antigen results for women aged 13-50 that are reported electronically to NBS are reviewed for pregnancy status by EAIDU each week.
- Labs that are connected to prenatal or obstetric care are shared with the Perinatal Hepatitis B Prevention Program for review and case management.
- Lab results that belong to women aged 13-50 with unclear pregnancy status are also referred to the Perinatal Hepatitis B Prevention Program for follow up in determining pregnancy status.
- If patient has a previous positive hepatitis lab result or a hepatitis B investigation, mark lab as reviewed. HBsAg+ lab results that were not submitted via NBS should be shared with the perinatal program for women 10-55.

Preventing perinatal transmission is perhaps the most important part of hepatitis B surveillance, and for this reason DSHS has an official Perinatal Hepatitis B Prevention Program for Texas. The program has extensive information on diagnosis, case management, and follow-up of pregnant women with hepatitis B and their infants. Their program can be accessed at: https://www.dshs.texas.gov/immunizations/what-we-do/vaccines/hepatitis-b or send any questions to txperihepb@dshs.texas.gov. Even though pregnant HBsAg + women and their infants are case managed by the perinatal program, infants infected perinatally with hepatitis B are reported to the CDC through NBS.

The information provided below is the information that is needed for perinatal hepatitis B surveillance information that is shared with the CDC via NBS. This information should be available on the perinatal hepatitis B prevention program's case management forms, a separate investigation/reporting form is not needed.

- Demographic information
    - o Infant
    - o Mother
- Clinical details

    - Laboratory results and dates for mother
    - Laboratory results and dates for infant
- Vaccination
    - Dates
    - HBIG information including date and time
    - Was series given more than once

All information collected for confirmed perinatal hepatitis B investigations should be entered into NBS within 30 days of the report of a positive hepatitis B lab on the infant. Investigation forms (or a copy of the infant and mother's perinatal program case management forms) should be submitted to EAIDU.

Positive Lab Results Received on a Child Under 2 years old

All positive laboratory results indicative of hepatitis B infection in children under 2 should be investigated to ensure the child is not a case of perinatal hepatitis B.

1. Ascertain if additional laboratory results exist in NBS.
2. Contact the submitting laboratory or provider to find additional laboratory results and information on the mother's hepatitis B status.
3. If mother is positive and child has acute or chronic infection, investigate as a potential missed perinatal case.

Case is a Health Care Worker (HCW)

If the case is a dentist, physician, nurse, or other health care worker (HCW) with potential for exposing patients by blood or other body fluids:

1. The HCW should be discouraged from working until the acute clinical illness has resolved.
2. Upon returning to work, special precautions should be practiced until the HCW is no longer infectious, including:
    a. Wearing gloves for all procedures during which the hands will be in contact with the patients' mucosal surfaces or broken skin
    b. Avoiding situations involving sharps that could lead to exposures of susceptible individuals to blood or objects contaminated with blood of the case
    c. Careful and frequent hand washing

Health Care Associated Infection is Suspected

If two or more iatrogenic (health care associated) cases occur in patients of the same dental or health care provider, residential care facility, or non-hospital health care facility (e.g., dialysis center); and the cases have no other identified plausible source of infection; or if other circumstances suggest the possibility of iatrogenic infection, notify EAIDU at **(800) 252-8239 or (512) 776-7676**.

Case is a Recent Blood Donor

If the case has donated blood or plasma within the eight weeks prior to onset of symptoms, the agency that received the blood or plasma should be notified so that any unused product can be recalled.

Case is a Recent Transfusion Recipient

If transfused blood or blood products are suspected as the possible source of infection, the blood bank or other agency that provided the implicated lot should

be notified so that aliquots of the blood still on hand (or the donors themselves) can be retested for HBsAg or tested for anti-HBc. Lot numbers for tracking are usually available through the blood bank at the hospital where the units were transfused.

Getting the Most Out of Surveillance

- Provider education
  - Providers should be educated about the importance of performing appropriate serologic tests to determine the etiology of viral hepatitis and reporting all cases of acute and perinatal HBV. Providers are required by Texas law to test pregnant women for hepatitis B.
  - Hospitals and infection control practitioners should be encouraged to report all persons with acute viral hepatitis (ICD-10 code B16), and all births to HBsAg- positive women. This is required by Texas Administrative Code (TAC).
- Case investigation
  - Case investigation is essential for determining contacts who are eligible for prophylaxis and for collection of risk factor data.
  - Analysis of risk factor data can identify populations where targeted interventions may be needed.
- Laboratory reporting
  - Laboratories should be encouraged to report all persons with serologic markers of acute or chronic hepatitis to the state or local health department.
    - Currently Texas receives over 50,000 hepatitis B laboratory results through NBS. At this time, only IgM anti-HBc and HBsAg results populate the "Documents Requiring Review" queue (where all electronic laboratory results first appear). All other hepatitis B laboratory results are automatically "swept" off that queue by the system. They are still stored in NBS and can be located by searching for a specific patient or by running a report for one or more specific laboratory results.
  - All IgM anti-HBc and HBsAg positive results should be reported.
  - To facilitate reporting, these laboratory results are included in the state's list of laboratory-reportable conditions.

- Monitoring surveillance indicators
  - Regular monitoring of surveillance indicators, including date of report, timeliness, and completeness of reporting, may identify specific areas of the surveillance and reporting system that need improvement. Important program indicators that can be monitored through the surveillance, reporting and case investigation system include the following:
    - Characteristics of cases of acute hepatitis B that occur in children and adolescents younger than 20 years of age and missed opportunities for vaccination
    - Characteristics of cases of acute hepatitis in which death has occurred
    - Characteristics of cases of acute hepatitis B in persons reporting a history of vaccination
    - Characteristics of cases of acute hepatitis B in persons over 70

years of age
    - Characteristics of cases of acute hepatitis B associated with healthcare transmission
- Registries/databases for HBsAg-positive persons

NBS can serve as a de facto chronic B registry and the positive hepatitis B results can be used to distinguish newly reported cases of infection from previously identified cases.

Outbreaks
If an outbreak of hepatitis B is suspected, notify the regional DSHS office or EAIDU at **(800) 252- 8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Perinatal hepatitis B cases are required to be reported **within one work day**. Confirmed acute hepatitis B cases are required to be reported **within 1 week** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed or probable perinatal hepatitis B as well as confirmed acute hepatitis B cases** to DSHS within30 days of receiving a report of a confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
    - Please do not send a notification on chronic hepatitis B cases entered into NBS.
- Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, autopsy report and death investigation form should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616**, securely emailed to VPDTexas@dshs.texas.gov or mailed to:

      Emerging and Acute Infectious Disease Unit Texas Department of State Health Services Mail Code: 1960 PO Box 149347 Austin, TX 78714-9347
- HBsAg-positive pregnant women (acute and chronic infections) should also be reported to the DSHS Perinatal Hepatitis B Prevention Program at **(512) 776-6634** or at https://txhhs.force.com/DSHSPeriHepBPreventionPortal/s/.
    - For information on perinatal hepatitis B prevention activities, please refer to the Perinatal Hepatitis B Prevention Program Manual at https://www.dshs.texas.gov/sites/default/files/LIDS-Immunizations/pdf/pdf_stock/59-12818.pdf.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.

LABORATORY PROCEDURES

Testing for hepatitis B is widely available from most hospital and commercial laboratories. If hepatitis B testing is needed through the DSHS State Laboratory, please contact the EAIDU VPD Team at **(800) 252-8239 or (512) 776-7676**.

For testing in regard to a possible perinatal case, please contact the Perinatal Hepatitis B Prevention Program at **(512) 776-6634**.

REVISION HISTORY

January 2021
- No updates

January 2023
- Updated prioritization of investigations criteria

September 2024
- Updated case definition
- Updated Managing Close Contact's section with updated link
- Updated Perinatal Hepatitis B Investigations with current contact information

TABLES

Table 1. Diagnostic Tests for Hepatitis B Virus (HBV) Antigens and Antibodies

Abbreviation	HBV Antigen or Antibody	Use
HBsAg	Hepatitis B surface antigen	Detection of acutely or chronically infected people; antigen used in hepatitis B vaccine
Anti-HBs	Antibody to HBsAg	Identification of people who have resolved infections with HBV; determination of immunity after immunization
HBeAg	Hepatitis B e antigen	Identification of infected people at increased risk of transmitting HBV
Anti-HBe	Antibody to HBeAg	Identification of infected people with lower risk of transmitting HBV
Anti-HBc (total)	Antibody to HBcAg	Identification of people with acute, resolved, or chronic HBV infection (not present after immunization); passively transferred maternal anti-HBc is detectable for as long as 24 months among infants born to HBsAg-positive women
IgM anti-HBc	IgM antibody to HBcAg	Identification of people with acute or recent HBV infections (including HBsAg-negative people during the "window" phase of infection)

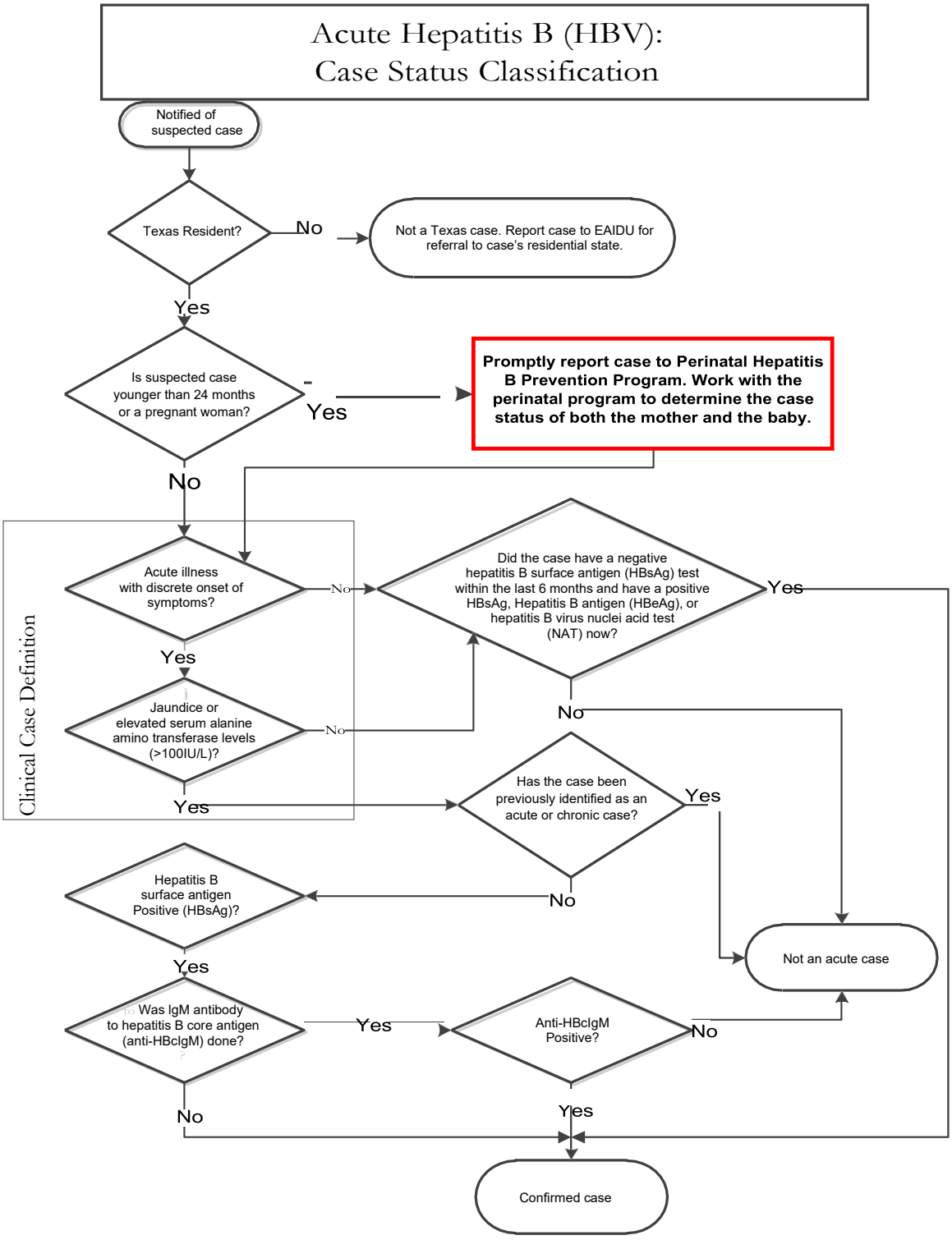
Source: American Academy of Pediatrics. Hepatitis B. In: Pickering LK, Baker CJ, Long SS, McMillan JA, eds. *Red Book: 2012 Report of the Committee on Infectious Diseases*. 29th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2012: 373.

Table 2. Interpretation of Hepatitis B Serological Tests and Health Department Response

Tests	Results	Interpretation	Health Department Response
HBsAg Anti-HBc Anti-HBs	Negative Negative Negative	Susceptible (Never infected or vaccinated)	Vaccinate or refer for vaccine if appropriate
HBsAg Anti-HBc Anti-HBs	Negative Negative Positive	Immune due to vaccination	No further action needed
HBsAg Anti-HBc Anti-HBs	Negative Positive Positive	Immune due to past infection	No further action needed
HBsAg Anti-HBc IgM anti-HBc Anti-HBs	Positive Positive Positive Negative	Acutely Infected	Initiate case investigation. If case is pregnant, refer to Perinatal Hepatitis B program. Enter case into NBS if meets confirmed case status (no probable case status for acute hepatitis b).
HBsAg Anti-HBc IgM anti-HBc Anti-HBs	Positive Positive Negative Negative	Chronically Infected	Follow-up to determine if patient may be pregnant. If pregnant, refer case to Perinatal hepatitis B program. If case is chronic, it is not required to be reported. No NBS entry required. If entry is made, please do not submit notification.
HBsAg Anti-HBc Anti-HBs	Negative Positive Negative	Four interpretations possible*	Recommend patient follow-up with physician and/or recommend more testing be completed if applicable.
*1. May be recovering from acute HBV infection. 2. May be distantly immune and test not sensitive enough to detect very low level of anti-HBs in serum 3. May be susceptible with a false positive anti-HBc. 4. May be undetectable level of HBsAg present in the serum and the person is actually a carrier.			

Source: Adapted from Centers for Disease Control and Prevention (CDC).

FLOW CHART


Acute Hepatitis B (HBV):
Case Status Classification
Notified of suspected case
Texas Resident?
No
Not a Texas case. Report case to EAIDU for referral to case's residential state.
Yes
Is suspected case younger than 24 months or a pregnant woman?
Yes
Promptly report case to Perinatal Hepatitis B Prevention Program. Work with the perinatal program to determine the case status of both the mother and the baby.
No
Clinical Case Definition
Acute illness with discrete onset of symptoms?
No
Did the case have a negative hepatitis B surface antigen (HBsAg) test within the last 6 months and have a positive HBsAg, Hepatitis B antigen (HBeAg), or hepatitis B virus nuclei acid test (NAT) now?
Yes
Yes
Jaundice or elevated serum alanine amino transferase levels (>100IU/L)?
No
No
Has the case been previously identified as an acute or chronic case?
Yes
Yes
Hepatitis B surface antigen Positive (HBsAg)?
No
Not an acute case
Yes
Was IgM antibody to hepatitis B core antigen (anti-HBcIgM) done?
Yes
Anti-HBcIgM Positive?
No
No
Yes
Confirmed case

Hepatitis E

BASIC EPIDEMIOLOGY

Infectious Agent

Hepatitis E virus (HEV), is the only member of the genus *Hepevirus* in the family *Hepeviridae*. It is a spherical, nonenveloped, single-stranded RNA virus. There are four genotypes of HEV.

Transmission

Hepatitis E virus is usually spread by the fecal-oral route. The most common source of infection, particularly in developing counties, is fecally contaminated drinking water. Fecal-oral transmission probably can occur from person-to-person, though secondary household cases are not common during outbreaks. Unlike the other major hepatitis viruses, recent studies have suggested that hepatitis E is the only member of the group to have animal reservoirs and is likely a zoonotic infection transmitted from domestic pigs and other wild animal species. Sporadic outbreaks have occurred in developed countries in association with the consumption of raw/undercooked animal products, mainly pork and venison. Hepatitis E genetic material has been detected from the meat and organs of domestic pigs, wild boar, and deer. The consumption of contaminated shellfish has also been considered a risk for transmission.

Incubation Period

The range is 15-64 days; the mean incubation period has ranged from 26 to 42 days in various epidemics.

Communicability

Not known. Hepatitis E virus has previously been detected in stools 14 days after onset of jaundice and approximately 4 weeks after consuming contaminated food or water, persisting for about 2 weeks.

Clinical Illness

The signs and symptoms of Hepatitis E are similar to those of other types of acute viral hepatitis: fever, fatigue, jaundice (skin or whites of eyes turning yellow), loss of appetite, nausea, vomiting, abdominal pain, dark urine, joint pain, and clay colored stools. Children are usually asymptomatic or have mild disease. Pregnant women are at risk for severe outcomes, e.g., liver failure and death (mortality in this population in their third trimester is about 20%).

DEFINITIONS

Clinical Case Definition

Typical clinical signs and symptoms of acute hepatitis E virus (HEV) are similar to those of other types of acute viral hepatitis and include abdominal pain anorexia, dark urine, fever, hepatomegaly, jaundice, malaise, nausea, and vomiting. Other less common symptoms include arthralgia, diarrhea, pruritus, and urticarial rash. The period of infectivity following acute infection has not been determined but virus excretion in stools has been demonstrated up to 14 days after illness onset.

In most hepatitis E outbreaks, the highest rates of clinically evident disease have been in young to middle-aged adults; lower disease rates in younger

age groups can be the result of anicteric and/or subclinical HEV infection.

No evidence of chronic infection has been detected in long-term follow-up of patients with hepatitis
E. The case fatality rate is low except in pregnant women where it can reach 20% among those infected during the third trimester of pregnancy.

Laboratory Confirmation

- IgM anti-HEV from CDC laboratory or PCR positive from reference laboratory Note: No FDA approved tests to diagnose HEV infection are available in the United States.

Case Classifications

- **Confirmed**: A case that meets the clinical case description and is laboratory confirmed
- **Probable**:
  - A case that meets the clinical case description with supportive laboratory evidence (positive IgM antibody from labs other than CDC), **OR**
  - Negative tests for other acute hepatitis markers and an epidemiological link to other confirmed cases or travel history to an endemic area during exposure period

SURVEILLANCE AND CASE INVESTIGATION

Local and regional health departments should promptly investigate all reports of Hepatitis E. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use DSHS Viral Hepatitis Case Track form available on the DSHS website:
http://www.dshs.state.tx.us/eaidu/investigation/

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to identify potential sources of infection.
  - Use the **DSHS Viral Hepatitis Case Track** to record information from the interview.
- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist FOODBORNETEXAS@dshs.texas.gov.
  - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- ☐ Identify whether there is a public health concern: persons should not work as food handlers, child-care or health care workers, or attend child-care if they have diarrhea. See Exclusions.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer

to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Prevention of Hepatitis E relies primarily on good sanitation and the availability of clean drinking water.
- When traveling internationally to areas with poor sanitary conditions:
  - Drink bottled water or water that has been boiled for at least 1 minute.
  - Don't drink fountain drinks or drinks with ice.
  - Don't eat fruits or vegetables that you don't peel yourself.
  - Avoid uncooked foods.
- Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.

Exclusions

School/child-care: No exclusions are specified for hepatitis E but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for hepatitis E but the standard exclusion for vomiting or diarrhea applies:

- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

Outbreaks of Hepatitis E in the United States are rare and are usually associated with contaminated water supply in countries with poor sanitation.

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.

- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/16	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/16	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional cases.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on and adherence to hand hygiene.
    - Storage and preparation of food.
    - Procedures for changing diapers and toilet training.
    - Procedures for environmental cleaning.
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable, and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
    - Please refer to the *NBS Data Entry Guidelines* for disease-

specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist at FOODBORNETEXAS@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
        - Outbreaks as indicated above with patients in the same household.
    - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

- Hepatitis E testing is not available at the DSHS State Laboratory.
- Testing for hepatitis E is widely available at most private laboratories.
- Testing is also available at the CDC laboratory: http://www.cdc.gov/hepatitis/HEV/LabTestingRequests.htm

REVISION HISTORY

March 2021

- Minor updates

Hookworm

BASIC EPIDEMIOLOGY

Infectious Agent

Hookworm infection is caused by what are generally called parasitic helminths or roundworms, commonly known as hookworm and are given the scientific classification Necator americanus and Ancylostoma duodenale (rarely by other Ancylostoma species, e.g. A. ceylanicum Hookworm is the third most prevalent worldwide of all soil-transmitted helminths, normally addressed along with Ascariasis and Tricuriasis as a group.

Transmission

Soil becomes contaminated with eggs shed in the feces of an individual infected with hookworm. The eggs must incubate in the soil for 5-10 days before they become infectious filariform larvae. The infectious hookworm larvae enter the human host by penetrating the skin, often the foot or hand. Oral transmission can sometimes occur from consuming improperly washed food grown or exposed to soil contaminated with feces. Transmission can also occur (rarely) between a mother and her fetus/infant via infected placental or mammary tissue.

Incubation Period

For Hookworm, the time from egg ingestion to the development of an egg-laying adult resulting in eggs being shed in the feces is 6-8 weeks. Within the human the lifecycle progresses as follows: upon penetrating the skin and entering into the circulatory system, the larvae travel to the right side of the heart and then to the pulmonary system, where they penetrate the alveoli and travel through the respiratory tract to the mouth and are swallowed where they eventually reach the small intestine after 1-2 weeks. In the small intestine, they molt twice and develop into adult sexually differentiated worms, a process that takes about 4-6 weeks. After mating the female produces up to 30,000 eggs per day, which are shed in the host feces.

Communicability

Human to human transmission of hookworm does NOT occur because part of the worm’s life cycle must be completed in soil before becoming infectious. However, vertical transmission of dormant filariform larvae can occur between a mother and neonate via contaminated breast milk. These dormant filariform larvae can live in the intestine for 1-5 years shedding eggs in feces.

Clinical Illness

Hookworm infection is often asymptomatic. Immediately following infection, a pruritic, erythematous, papular rash commonly known as “ground itch” can develop at the penetration site, typically the feet or hands. In the first two weeks of infection, minor cough and throat irritation may occur as a result of larval migration but these symptoms are rare. Light infections produce few or no symptoms but can include abdominal discomfort, diarrhea, and/or blood in the stool. Severe infections can be characterized by more severe symptoms stemming primarily from intestinal blood loss resulting in anemia. Symptoms can include nausea, fatigue, pale skin, and rarely congestive heart failure and death. Morbidity may result from asymptomatic or symptomatic infections. In children, anemia resulting from infection can cause impaired growth and delayed mental development.

DEFINITIONS

Clinical Case Definition

Most patients with hookworm are asymptomatic and are confirmed to have the disease through laboratory testing. For symptomatic cases, the clinical features of hookworm infections are typically non-specific and can be misleading. Anemia characterized by hypochromic, microcytic anemia and hypoproteinemia may correlate with a higher worm burden in adults but children may experience anemia with a lower worm burden. Complications due to anemia can result in severe fatigue, paleness, nausea, and diarrhea and can cause growth impairment and mental retardation in children.

Laboratory Confirmation

- Microscopic identification of *Ancylostoma* or *Necator* eggs in stool specimens, **OR**
- Microscopic identification of *Ancylostoma* or *Necator* species of larvae cultured from the stool, **OR**
- Examination of adult worms and identification of Ancylostomata or Necator adult worms expelled after treatment, or removed during endoscopy

Case Classifications

- **Confirmed:** A case that is laboratory confirmed

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of hookworm infection. Investigations should include an interview of the case or a surrogate to get a detailed exposure and travel history. Please use the Hookworm Investigation Form available on the DSHS website:
http://www.dshs.texas.gov/eaidu/investigation/

Note:

- If an imported case (acquired outside of Texas) of Hookworm is diagnosed/identified in a refugee with a current Texas address, it should be investigated and counted as a Texas case. If a case currently has an address outside of your jurisdiction or the refugee plans to move to another state or country, fax the available investigation information, with the new address, to DSHS EAIDU. This information will be forwarded to the appropriate jurisdiction.
- Cases include Texans who acquired the disease while traveling out of the country.
- Disease may be acquired within Texas.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
  - Eggs of *Necator americanus* and *Ancylostoma duodenale* species in stool specimens are indistinguishable during microscopic identification. Speciation is unnecessary for clinical management and is not required for a case to be investigated.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to get detailed exposure history and risk factor information.

- Use the **Hookworm Investigation Form** to record information from the interview.
- If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- If the case did not travel internationally during the previous two years (or during their lifetime if less than two years old) and may have been exposed to a within-jurisdiction soil environment hospitable to helminths, carry out an in-person investigation at the exposure site. If applicable, interview others exposed at the site such as household members about their exposure and travel histories. Arrange for specimen collection from other exposed individuals. Contact DSHS Central Office at the Emerging and Acute Infectious Disease Unit to arrange environmental sampling if warranted.
- Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and the possibility of transmission if soil is contaminated. See Prevention and Control Measures.

☐ Please upload a copy of the investigation form to NBS or if another surveillance system is used, send the form to Central Office and the Regional Office.

- Make three attempts to contact a case on different days and at different times of day before classifying the case as lost to follow-up (LTF). If the case may have acquired the disease locally, call the case LTF after attempting to contact them in-person, when resources permit. For LTF cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and indicate the reason for any missing information.

☐ If case is part of an outbreak or cluster, see Managing Special Situations section.

☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water.
- Proper disposal of human waste products such as feces is necessary to prevent contamination of soil.
- Avoid areas where human waste contamination of soil or water is likely.
- Wear shoes or other clothing to prevent contact with soil.
- Thoroughly wash fruits and vegetables to remove soil/fertilizer residue.
- Provide information about services for testing and treating exposed persons.

Exclusions

Human-to-human transmission is rare and has only been documented from nursing mothers to neonates via breast milk, therefore no exclusion from work, school or daycare is required for disease control purposes unless the individual has diarrhea. If the individual has diarrhea, the standard exclusion until diarrhea free for 24 hours without the use of diarrhea suppressing medications applies. Diarrhea is defined as 3 or more episodes of loose stools in a 24-hour period.

MANAGING SPECIAL SITUATIONS

Outbreaks/Clusters

If an outbreak or cluster is suspected, notify the DSHS Emerging and Acute Infectious Disease Branch (EAIDU) at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, race/ethnicity, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and exposures to a soil environment hospitable to helminths and where the exposure occurred (e.g., farm, ranch, domicile lacking adequate plumbing, recreational area, or another occupational site), possible zoonotic transmission (e.g., exposure to pig manure), and the patient's travel history (e.g., travel location, duration, household members who traveled).

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Risks	Notes
1	NT	34	F	White/non - Hispanic	12/4/16	Diarrhea, Anemia	Lived in Vietnam last 5 years, currently lives in same neighborhood as ID 2	Brother ill
2	PR	4	M	Unknown	11/30/16	Anemia, bloody stool	Poor sanitation near home, lives in same neighborhood as ID 1	Lost to follow up (LTF)

- If the outbreak was reported in association with an apparent common risk factor (e.g., work or live near a possible site of soil contamination, members of the same household with similar travel), recommend that anyone displaying symptoms seek medical attention from a healthcare provider.
- If several cases in the same family or geographic area are identified and there is a possibility for similar exposures (e.g., travel to the same country, poor sanitation), testing of potentially exposed persons or treatment may be warranted.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** cases.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Please upload a copy of the investigation form to NBS or if another surveillance system is used, send the form via secure file transfer protocol or email an encrypted copy of the investigation form to Central Office and the Regional Office.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676.**

LABORATORY PROCEDURES

Fecal Ova and Parasite testing for helminth eggs (fecal O&P examination) is widely available from most private laboratories, and the DSHS laboratory is available for specimen submission. Adult worm specimen identification may not be available at private laboratories therefore submission to the DSHS laboratory is available and highly recommended. Contact an EAIDU epidemiologist to discuss further.

Specimen Collection

- Submit a stool specimen in an O&P stool collection kit (5-10 % formalin & Zn-PVA fixatives).
    - Required volume: Stool 5 g solid or 5 mL liquid.
- Adult worms should be submitted in either 5-10% formalin or 70% ethanol.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name and date of birth or medical number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, diagnosis/symptoms, and all required fields.

Specimen Shipping

- Transport temperature: May be shipped at ambient temperature.
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday, or state holidays, unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947 Texas Department of State Health Services 1100 West 49th Street
Austin, TX 78756-3199
Attn. Walter Douglass (512) 776-7569

Possible Causes for Rejection:

- Specimen not in correct transport medium.

- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Unpreserved specimen received greater than 24 hours after collection. (Specimen may still be submitted as an attempt will be made to complete testing on compromised material.)
- Call Medical Parasitology Lab (512) 776-7560 with specific questions about specimen acceptance criteria.

REVISION HISTORY

March 2021

- Minor updates

Influenza A-Novel/Variant

BASIC EPIDEMIOLOGY

Infectious Agent
Novel or variant influenza is caused by an influenza virus that is not known to circulate in humans. Some animals (avian and swine populations) are considered higher risk for transmitting a novel/variant influenza strain to humans.

Transmission
The transmission route of novel/variant influenza viruses is likely to be similar to seasonal influenza which is primarily by droplet spread. Transmission may also occur by direct or indirect contact with oral secretions or fecal material from infected animals.

Incubation Period
The incubation period is likely to be similar to seasonal influenza with an incubation period of 1 to 4 days.

Communicability
The communicability of novel/variant influenza viruses is unknown and strain specific. It may range from low to high communicability depending on how well adapted the strain is to humans. Susceptibility is considered to be universal since by definition a novel/variant influenza strain is one that is not known to circulate in humans.

Clinical Illness
Symptoms are likely to be similar to seasonal influenza with fever, chills, muscle aches, headache, sore throat and cough. Many novel/variant influenza infections have had increased incidence of gastrointestinal symptoms such as vomiting and diarrhea.

Severity
The severity of illness is unknown and may vary from mild to severe depending on the specific strain and characteristics of the population.

DEFINITIONS

National Case Definition: Novel Influenza A Virus Infections (2014)

Clinical Case Definition
An illness compatible with influenza virus infection such as fever >100 degrees Fahrenheit with cough and/or sore throat

Laboratory Confirmation
Identification of an influenza A virus subtype or strain that is different from currently circulating human influenza H1 and H3 strains as confirmed by the Centers for Disease Control and Prevention's (CDC) influenza laboratory, by public health laboratories using CDC-approved protocols for that specific strain or by labs using Food and Drug Administration (FDA)-authorized tests for specific strains

- ☐ Novel/variant subtypes include, but are not limited to, H2, H5, H7 and H9 subtypes.

- ☐ Influenza H1 and H3 subtypes originating from a non-human species or from genetic re- assortment between animal and human viruses are also novel/variant subtypes or strains.
- ☐ Methods available for detection of currently circulating human influenza viruses at public health laboratories (e.g., RT-PCR) will also detect suspected novel/variant subtypes and strains.
- ☐ Initial confirmation that a specific influenza A virus represents a novel/variant virus will be performed by CDC's influenza laboratory.
- ☐ Currently, only viral isolation, RT-PCR, gene sequencing or a 4-fold rise in strain-specific serum antibody titers are considered confirmatory for case classification purposes.

Case Classifications

- ☐ **Confirmed**: A case of human infection with a laboratory confirmed novel/variant influenza A virus
- ☐ **Probable**: A case meeting the clinical criteria and epidemiologically linked to a confirmed case, but for whom no confirmatory laboratory testing for novel/variant influenza virus infection has been performed or test results are inconclusive for a novel/variant influenza A virus infection
- ☐ **Suspect***:* A case meeting the clinical criteria in which influenza A has been detected but is pending laboratory confirmation. Any case of human infection with an influenza A virus that is different from currently circulating human influenza H1 and H3 viruses is classified as a suspect case until the confirmation process is complete.
    - Typically, sporadic novel/variant influenza cases will have a history of either
        - Close contact with ill animals known to transmit novel/variant subtypes of influenza A (such as wild birds or poultry, swine or other mammals) **OR**
        - Travel within 14 days of onset, to any country where a novel/variant influenza A virus (such as highly pathogenic avian influenza A H5N1) has been recently identified in animals or people.

Criteria for Epidemiologic Linkage

- ☐ The patient has had contact with one or more persons who either have or had the disease
  AND transmission of the agent by the usual modes of transmission is plausible.
- ☐ A case may be considered epidemiologically linked to a laboratory confirmed case if at least one case in the chain of transmission is laboratory confirmed.

<u>Interim Case Definitions for Novel Influenza A (H5N1) and A (H7N9), and Novel Influenza A Viruses with the Potential to Cause Severe Disease in Humans (e.g., H5N2)</u>

Novel influenza virus knowledge is constantly evolving; therefore, CDC publishes interim definitions for novel influenza viruses that are currently associated with severe disease in humans (e.g., H5N1, H7N9) or have the potential to cause severe disease in humans (e.g., H5N2). The case definitions for these novel influenza viruses may differ from the published national case definition for novel

influenza A virus infections. Please consult the CDC websites for the most up-to-date definitions.

Novel Influenza A Viruses **Associated with** Severe Disease in Humans: cdc.gov/flu/avianflu/h7n9/specimen-collection. For case definitions, see: H5N1 and H&N9: Bird Flu | Bird Flu | CDC.

- ☐ Case Under Investigation: Illness compatible with influenza in a patient meeting any of the exposure criteria below and for whom laboratory confirmation is not known or pending.
  - Exposure criteria:
    - Patients with recent travel (within <10 days of illness onset) to areas where human cases of avian influenza A (H5N1) or (H7N9) virus infection have become infected or to areas where avian influenza A (H5N1) or (H7N9) viruses are known to be circulating in animals[1]. **OR**
    - Patients who have had recent close contact (within <10 days of illness onset) with confirmed or suspected[2] cases of human infection with avian influenza A (H5N1) or (H7N9) virus. Close contact may be regarded as coming within about 6 feet (2 meters) of a confirmed or suspected case while the case was ill (beginning 1 day prior to illness onset and continuing until resolution of illness). This includes healthcare personnel providing care for a confirmed case, family members of a confirmed case, persons who lived with or stayed overnight with a confirmed or suspected case, and others who have had similar close physical contact[3]. **OR**
    - Unprotected exposure to live avian influenza A (H5N1) or (H7N9) virus in a laboratory.

~~Footnotes~~:

1H5N1: See Outbreaks of Highly Pathogenic Avian Influenza (subtype H5N1) in poultry notified to the OIE from the end of 2003 to 28 November 2016 and Avian influenza A (H7N9) virus outbreak. H7N9: (10/30/17) China is the only country where avian influenza A (H7N9) viruses are known to be circulating in animals (poultry) or where human cases have become infected.

2Patients suspected of having infection with a novel influenza A virus can include probable cases, cases under investigation for infection with avian influenza A (H5N1) or (H7N9) virus, and other patients for whom available clinical and epidemiologic information support a diagnosis of infection with avian influenza A (H5N1) or (H7N9) virus.

3Limited, non-sustained, person-to-person transmission of highly pathogenic avian influenza A (H5N1) virus has been reported in several countries following close, prolonged unprotected contact with a severely ill H5N1 patient, including in household and hospital settings. Limited data are available for avian influenza A (H7N9) virus in which limited, non- sustained, person-to-person transmission could not be excluded in some family clusters.

Novel Influenza A Viruses **with the Potential to Cause** Severe Disease in

Humans. See: http://www.cdc.gov/flu/avianflu/severe-potential.htm

- ☐ Case Under Investigation: Illness compatible with influenza[1] in a patient meeting any of the exposure criteria below and for whom laboratory test results are not known or are pending[2]:
    - Patients who have had recent contact[3] (within 10 days of illness onset) with birds potentially infected with avian influenza (AI) viruses (i.e., sick or dead birds [domestic poultry, wild aquatic birds, or captive birds of prey that have had contact with wild aquatic birds][4], or flocks where AI virus infection has been confirmed)
      OR
    - Patients who have had recent close contact (within 10 days of illness onset) with confirmed or suspected[5] cases of human infection with AI or other novel influenza viruses. Close contact may be regarded as coming within about 6 feet(2 meters) of a confirmed or suspected case while the case was ill (beginning 1 day prior to symptom onset and continuing until resolution of illness). This includes healthcare personnel providing care for a confirmed or suspected case, family members of a confirmed or suspected case, persons who lived with or stayed overnight with a confirmed or suspected case, and others who have had similar close physical contact in a community or workplace environment.
      OR
    - Unprotected exposure to live AI virus in a laboratory.

Footnotes:

1Illness compatible with influenza may present as influenza-like illness (ILI) [fever ≥100°F plus cough or sore throat] or other signs and symptoms associated with influenza such as rhinorrhea, fatigue, myalgia, arthralgia, headache, and difficulty breathing. Note that influenza may not cause fever in all patients (especially in patients under 5 years of age, over 65 years of age, or patients with immune-suppression), and the absence of fever should not supersede clinical judgment when evaluating a patient for illness compatible with influenza. Atypical presentations of influenza may include nausea, vomiting, or diarrhea. While a rare sign of seasonal influenza, conjunctivitis has been reported as a sign of avian influenza virus infection.

2Note that commercially available rapid influenza diagnostic tests (RIDTs) cannot distinguish between influenza A virus subtypes (i.e., they do not differentiate between human and animal influenza A viruses); thus, a positive RIDT test result cannot confirm AI virus infections. Commercially available RIDTs also may not detect AI viruses in clinical specimens; therefore a negative RIDT result does not exclude infection with AI virus.

3Contact may include: direct contact with birds (e.g., handling, slaughtering, defeathering, butchering, preparation for consumption) or direct contact with surfaces contaminated with feces or bird parts (carcasses, internal organs, etc.) or prolonged exposure to birds in a confined space.

4Exposures that occur in geographic regions in the United States where newly detected avian influenza viruses have been identified are of most concern.

[5]Suspected cases of AI virus infection include probable cases, cases under investigation, and other patients for whom available clinical and epidemiologic information support a diagnosis of infection with AI virus.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of suspected novel/variant influenza. Please use the General Influenza Investigation Form and the Influenza Investigation Form Supplemental Pages (if applicable) which are available on the DSHS website at http://www.dshs.texas.gov/eaidu/investigation/. Healthcare providers may report suspected cases of novel/variant influenza. Only the state laboratory or the CDC can identify a confirmed or probable case of novel/variant influenza.

Case Investigation Checklist for Suspect Cases Pending Confirmatory Testing

- ☐ Determine why the healthcare provider suspects novel/variant influenza and evaluate the patient as a candidate for testing.
  - Consult the Definitions section (above), particularly the "Interim Case Definitions for Novel Influenza A (H5N1) and (H7N9), and Novel Influenza A Viruses with the Potential to Cause Severe Disease in Humans (e.g., H5N2)".
  - **Patients who meet the "Case Under Investigation" criteria should be tested for novel influenza.**
- ☐ Use the current influenza season's DSHS Influenza Laboratory Surveillance Protocol to give instructions for the collection and submission of specimens. Also, follow instructions in the Laboratory Procedures section (below).
- ☐ Ensure that appropriate infection control measures have been implemented (see Control Measures section, below).
- ☐ Complete and fax or securely email a copy of the General Influenza Investigation Form to DSHS.
- ☐ Do **not** enter suspect cases into NBS unless specifically requested.

Case Investigation Checklist for Confirmed, Probable and Suspect (Unsubtypeable Influenza A Pending Subtyping) Cases

- ☐ Ensure that appropriate infection control measures have been implemented (see Control Measures section, below).
- ☐ Confirm that the laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or physician to verify underlying health conditions and course of illness.
- ☐ Notify the State Influenza Surveillance Coordinator in DSHS EAIDU about the case under investigation as soon as enough information is available to determine that the case meets case definition.
- ☐ Interview the case (or surrogate) to identify travel history, animal contact and other risk factors.
- ☐ Identify close contacts and determine if secondary cases have occurred.
- ☐ See Public Health Follow Up section below.
- ☐ Enhance surveillance for ILI and influenza:
  - Ensure that all regular influenza reporters are reporting ILI data to public health.
    - If the case occurs outside of flu reporting season, contact regular flu reporters and request that they report ILI for at

least 4 weeks.

- ☐ Contact local hospitals and large clinics to see if any increases in ILI activity have occurred.
  - Follow-up with hospitals and large clinics weekly for at least 4 weeks.
- ☐ Contact local schools to see if any increases in ILI activity have occurred.
  - Follow-up with schools weekly for at least 4 weeks.
- ☐ When non–travel-related novel/variant influenza cases are detected, health departments should work with providers to increase specimen submissions for influenza surveillance (PCR) testing.
- ☐ Refer to the state pandemic influenza plan (*Public Health Preparedness, Surveillance, and Response Plan for Texas: Respiratory Viruses Having Pandemic Potential*) for a list of responsibilities by department and program area.
- ☐ If applicable, complete the steps in the Managing Special Situations section.
- ☐ Complete the General Influenza Investigation Form and the Influenza Investigation Form Supplemental Pages and fax these forms to DSHS.
- ☐ DSHS may also request completion of other novel/variant influenza investigation forms, if needed.
- ☐ Enter and submit for notification in the NEDSS Base System (NBS) all confirmed and probable case investigations.

Control Measures

- ☐ Provide education on influenza to contacts of the case as needed.
- ☐ Provide guidance on infection control in healthcare settings.
  - **Standard, contact, and airborne precautions** are recommended when managing patients who may be infected with novel influenza A viruses, including confirmed cases, probable cases, suspect cases, cases under investigation for infection with a novel influenza A virus, and other patients for whom available clinical and epidemiologic information strongly support a diagnosis of infection with a novel influenza A virus.
  - See CDC's "Interim Guidance for Infection Control Within Healthcare Settings When Caring for Confirmed Cases, Probable Cases, and Cases Under Investigation for Infection with Novel Influenza A Viruses Associated with Severe Disease" at http://www.cdc.gov/flu/avianflu/novel-flu-infection- control.htm for more information.
- ☐ Recommend that anyone with risk factors experiencing symptoms or anyone with severe illness be evaluated by a healthcare provider.
- ☐ Remind local healthcare providers to consider influenza and report suspected cases.
- ☐ Antivirals may be used to treat and prevent influenza according to CDC guidance.
  - The Texas Medical Board recently changed its rules (Texas Administrative Code, Title 22, Part 9, Chapter 190, Subchapter B, §190.8) regarding the prescribing of prophylaxis for close contacts of patients with certain infectious diseases. Physicians can now prescribe antiviral medications to contacts of influenza cases without first medically evaluating the contacts.

School/Daycare Exclusion Criteria

Children are required to be excluded from school and daycare for at least 24 hours

after fever has subsided without the use of fever suppressing medications. It is recommended that adults not return to work for at least 24 hours after fever has subsided without the use of fever suppressing medications. In the event of a pandemic or unusually severe presentation the exclusion period may be extended.

PUBLIC HEALTH FOLLOW UP

Public health follow-up (PHFU) for close contacts is required for all confirmed and probable novel/variant influenza cases. The extent of follow-up required may depend on the number of cases identified, the severity of illness or interest from public health leaders or media. PHFU requirements may cease in specific situations (e.g., in the case of an ongoing pandemic), as specified by DSHS EAIDU.

Routine contact tracing:

- ☐ Routine follow up should be done for all suspected (i.e., unsubtypeable influenza A pending subtyping), probable and confirmed novel/variant influenza cases.
- ☐ Complete the Respiratory Contact Tracking Form located on the DSHS website at http://www.dshs.texas.gov/eaidu/investigation and provide a copy to DSHS.
- ☐ Advise contacts of signs and symptoms of illness and refer them to their healthcare providers if they experience any symptoms compatible with influenza or ILI within 10 days of their last contact with the confirmed/probable case.
- ☐ Prioritize contacts for laboratory testing and collect specimens.
    - Collect specimens from any contacts with influenza or ILI symptoms within 10 days of last contact with the confirmed/probable case.
    - Prioritize specimen collection from symptomatic contacts according to degree and frequency of contact (e.g., prioritize household contacts over coworkers).
    - Do not delay specimen collection or testing to wait for more specimens to become available (i.e., do not batch specimens!).
- ☐ Provide close contacts with a Novel/Variant Influenza fact sheet.
    - A fact sheet will be developed by DSHS EAIDU.
- ☐ Close contacts of persons with confirmed or suspected cases can be counseled about the early signs and symptoms of influenza and advised to contact their healthcare providers immediately if clinical signs or symptoms develop. Healthcare providers may choose to provide an influenza antiviral prescription to exposed persons at higher risk for complications of influenza virus infection. Prophylaxis recommendations will likely vary with the severity of disease. Guidance will be provided by CDC or DSHS.
    - The Texas Medical Board recently changed its rules (Texas Administrative Code, Title 22, Part 9, Chapter 190, Subchapter B, §190.8) regarding the prescribing of prophylaxis for close contacts of patients with certain infectious diseases. Physicians can now prescribe antibiotics to contacts of influenza cases without first medically evaluating the contacts.

Enhanced Public Health Follow Up:

- ☐ Enhanced public health follow up should be performed when DSHS EAIDU advises.
- ☐ Enhanced public health follow up includes all routine contact tracing requirements plus:

- Close contacts should be actively monitored for symptoms of ILI for a minimum of 10 days (i.e., follow-up should be performed at regular intervals).
- Consider testing asymptomatic close contacts in addition to symptomatic close contacts.

Close contacts definition: Close contacts are defined as persons who were within about 6 feet of a suspected (i.e., unsubtypeable influenza A pending subtyping), probable or confirmed case while the case was ill (beginning 1 day prior to the case's illness onset and continuing until the case's resolution of illness). This includes household and family contacts, healthcare personnel, laboratory workers and other persons who were known to be within about 6 feet of the case. Assess workplace, school and social settings for close contacts as well.

MANAGING SPECIAL SITUATIONS

Animal (Swine or Avian) Exposure Identified

If the influenza case is determined to be a novel/variant strain and if exposure to domestic or wild animals is identified during the investigation, DSHS EAIDU should be notified immediately so that partners in DSHS Zoonosis Control, the Texas Animal Health Commission (TAHC) and/or Texas Parks and Wildlife (TPW) can be included in the investigation.

Extensive efforts should be made to identify all animal contacts in the 2 weeks prior to onset of illness. Zoonosis Control, TAHC or TPW will conduct trace backs and investigations on animal contacts.

Multiple Cases of Novel/Variant Influenza Identified

If more than one case of novel/variant influenza is identified, enhanced surveillance will be expanded.

The local/regional health department should:

- ☐ Alert all acute care healthcare providers in the area to be cognizant of possible cases and encourage reporting of suspected cases.
- ☐ Continue to work with existing influenza surveillance partners and hospitals/large clinics in the area to track influenza-like illness and identify new cases.
- ☐ Investigate common exposures among the cases and work with any identified facilities or entities.
  - Recommend control measures based on the type of entity or setting.
    - Recommendations should be jointly developed with TAHC/TPW if animals are present.
- ☐ Encourage anyone with symptoms to be evaluated by a healthcare provider.
- ☐ Perform enhanced contact tracing for close contacts of confirmed/probable cases.
- ☐ Ensure specimen submission at an adequate level from the local/regional area to determine the prevalence of the novel/variant influenza virus in Texas according to Influenza Virologic Surveillance Right Size guidelines. DSHS will provide guidance on specimen volume and representativeness required to achieve this objective.
- ☐ See the Texas Influenza Surveillance Handbook for more information on control measures and outbreak response.
- ☐ Refer to the state pandemic influenza plan (*Public Health Preparedness,*

Surveillance, and Response Plan for Texas: Respiratory Viruses Having Pandemic Potential) for a list of responsibilities by department and program area.

Pandemic

During a pandemic, DSHS will determine what information should be collected on individual cases of pandemic influenza or if only aggregate data will be collected. It is anticipated that a complete novel/variant influenza investigation will be performed on initial cases. A specific investigation form will be provided for this purpose. As the case count increases, a General Influenza Investigation Form should be completed for all or a subset of cases.

Once a pandemic influenza strain becomes widespread in Texas it is likely that individual investigations will no longer be performed for all cases and only aggregate reporting of cases or full investigation of a subset of cases will be needed. Individual investigations may continue for a subset of cases such as influenza-associated deaths among pregnant/postpartum women or other groups of interest.

Refer to the state pandemic influenza plan (*Public Health Preparedness, Surveillance, and Response Plan for Texas: Respiratory Viruses Having Pandemic Potential*) for a list of responsibilities by department and program area. Investigation and reporting guidance specific to the pandemic will be shared by DSHS.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Clinically suspected cases are required to be reported **immediately** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.** Healthcare providers are encouraged to report suspected cases of influenza with a recent history of international travel or with recent contact with swine or poultry.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ Report the case to the regional DSHS office or to EAIDU at **512-776-7676.**
- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases within 30 days of receiving a report of a confirmed or probable case.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completion of the investigation.
- ☐ **Investigation forms should be faxed or securely emailed as soon as an investigation has been completed.**
  - Investigation forms may be faxed to **512-776-7616** or securely emailed to the IRID team lead or State Influenza Surveillance Coordinator

When an outbreak is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office

or to EAIDU at **512-776-7676.**

- ☐ Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.
  - Fax or send a secure email to the DSHS regional office and/or to EAIDU at 512- 776-7676. The secure email should be sent to the IRID team lead or State Influenza Surveillance Coordinator at EAIDU.
  - The Respiratory Disease Outbreak Summary Form is available at http://www.dshs.texas.gov/eaidu/investigation.

LABORATORY PROCEDURES

Specimens associated with suspected novel/variant influenza cases should be submitted to the DSHS Laboratory or Laboratory Response Network (LRN) laboratory following the protocol for seasonal influenza surveillance. The protocol is available by request from DSHS EAIDU or from the regional influenza surveillance coordinator.

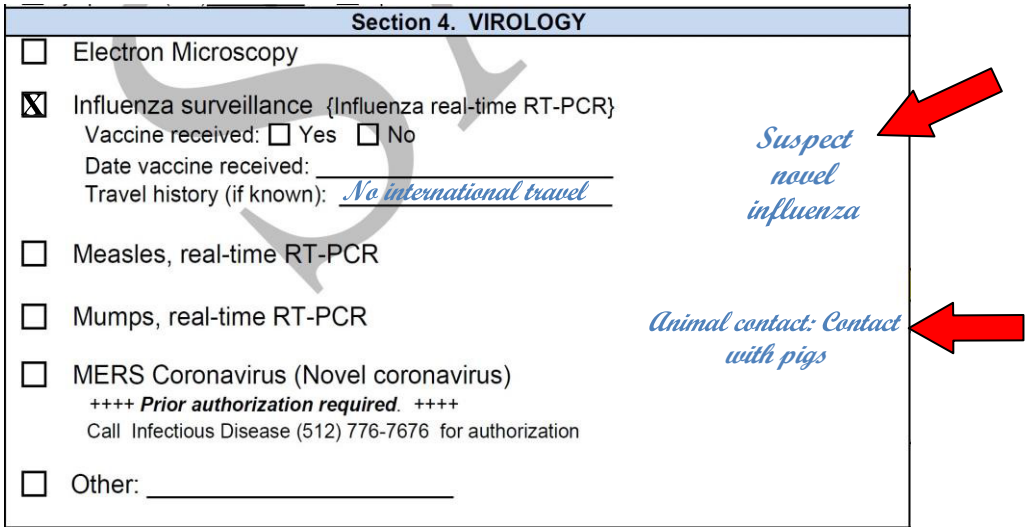
Specimen Collection

- ☐ For H5N1, H7N9, and novel influenza A viruses with the potential to cause severe disease in humans (e.g., H5N2), follow CDC's specimen collection guidance at: cdc.gov/flu/avianflu/h7n9/specimen-collection and CDC-novel-flu-infection-control.
  - Ensure that proper infection control precautions are followed when collecting specimens from persons with suspected or known infection with a novel influenza A virus (CDC-novel-flu-infection-control).
  - The following should be collected as soon as possible after illness onset: (i) a nasopharyngeal swab, or (ii) a nasal aspirate or wash, or (iii) two swabs combined into one viral transport media vial (e.g., nasal or nasopharyngeal swab combined with an oropharyngeal swab). If these specimens cannot be collected, a single nasal, or oropharyngeal swab is acceptable.
  - For patients with lower respiratory tract illness, a lower respiratory tract specimen (e.g., an endotracheal aspirate or bronchoalveolar lavage fluid) is preferred for suspected H5N1 or H7N9 infection because these specimens have a higher yield for detecting avian influenza H5N1 and H7N9 viruses. For novel influenza A viruses with the potential to cause severe disease in humans (e.g., H5N2), a lower respiratory tract specimen may be preferred.
  - Specimens should be placed into sterile viral transport media and immediately placed on refrigerant gel-packs or at 4°C (refrigerator) for transport to the laboratory.
  - If possible, in order to increase the potential for novel influenza virus detection, multiple respiratory specimens from different sites should be obtained from the same patient on at least two consecutive days.
- ☐ The current influenza season's DSHS Influenza Laboratory Surveillance Protocol should be consulted for storage, packaging, and shipping instructions.
- ☐ Refer to situation-specific guidance from DSHS EAIDU, if provided.

Submission Form (if submitting specimen(s) to DSHS Austin)

- ☐ Use the DSHS Laboratory G-2V Specimen Submission Form for specimen submission.
  - On the form, under the Virology section, check the box for "Influenza

surveillance {Influenza real-time RT-PCR}". In the blank space to the right of "Influenza surveillance {Influenza real-time RT-PCR}", write "suspect novel influenza".



- Indicate the patient's flu vaccination status for the current season and the date of vaccination, if known.
- Indicate the patient's travel history.
- In the blank space to the right of "Influenza surveillance {Influenza real-time RT- PCR}", write "Animal contact" and the type of animal contact with which the patient had contact, if applicable.
- Make sure the patient's name and approved secondary identifier on the form exactly match what is written on the specimen tube.
  - An approved secondary identifier should be one of the following: date of birth, medical record number, social security number, Medicaid number, or CDC number.
- Make sure to fill in the date and time of collection in addition to the patient demographics on the form.
- Follow the submission form instructions found in the current influenza season's DSHS Influenza Laboratory Surveillance Protocol.

Specimen Shipping

- ☐ **Notify the laboratory that you will be shipping the specimen and provide the shipment date and tracking number.**
- ☐ Transport temperature: Store the specimen at 2º-8ºC if the specimen will be received at the laboratory within 72 hours of collection; ship the specimen on cold or freezer packs. Otherwise, the specimen must be stored frozen (-70ºC) and shipped on dry ice.
- ☐ Ship specimens for overnight delivery.
  DO NOT mail specimens on a Friday or the day before a holiday unless special arrangements have been made in advance with the DSHS or LRN Laboratory.
- ☐ If shipping specimens to DSHS Austin, ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street

Austin, TX 78756-3199

Common Causes for Rejection:

- ☐ There is a discrepancy between the patient name on the specimen tube and the name on submission form.
- ☐ The specimen is not shipped in viral transport medium or the medium is expired.
- ☐ The specimen is received more than 72 hours after collection (if refrigerated).
- ☐ The specimen is received at ambient temperature.

REVISION HISTORY

January 2018

- ☐ Definitions: updated a web address/link and made a minor formatting change
- ☐ Surveillance and Case Investigation: added that the completed investigation forms can be securely emailed to DSHS and made minor formatting changes
- ☐ Reporting and Data Entry Requirements: added that a case of novel/variant influenza A should be reported to the DSHS regional office or DSHS EAIDU and that completed investigation forms may be sent to the IRID team lead or State Influenza Surveillance Coordinator by secure email

Influenza-Associated Pediatric Mortality

BASIC EPIDEMIOLOGY

Infectious Agent
Influenza A, B or C virus

Transmission
Transmission occurs via droplet spread. After a person infected with influenza coughs, sneezes, or talks, influenza viruses contained in the respiratory droplets travel through the air; other persons nearby can become infected if these droplets land in their noses or mouths. These droplets can also contaminate surfaces, and people can become infected when they touch an object or a surface on which these droplets have landed and then touch their noses or mouths. Transmission may also occur by direct contact, such as kissing.

Incubation Period
The incubation period is 1 to 4 days with most infections occurring within 2 days of exposure to an infected individual.

Communicability
Influenza is easily transmitted from person to person. Infected persons can start shedding virus up to 24 hours before the onset of symptoms. Shedding of the virus is greatest during the first 3 days of illness. The duration of virus shedding may be longer in young children and immunocompromised persons. Additionally, some persons who become infected with influenza remain asymptomatic.

Clinical Illness
Symptoms of influenza may include fever, cough, sore throat, myalgia (muscle aches), headaches and fatigue. Among children, otitis media, nausea, vomiting and diarrhea are also commonly reported. Influenza is usually a self-limiting infection, but in people with chronic medical conditions such as heart or lung disease, it can lead to pneumonia and other life-threatening complications.

Severity
An estimated 23,607 (range: 3,349-48,614) deaths (all ages) associated with influenza occur every year in the United States.

DEFINITIONS

Clinical Case Definition
An influenza-associated death is defined for surveillance purposes as a death resulting from a clinically compatible illness that was confirmed to be influenza by an appropriate laboratory or rapid diagnostic test. There should be no period of complete recovery between the illness and death. Influenza-associated deaths in all persons aged <18 years should be reported.

A death should not be reported if there is
- ☐ No laboratory confirmation of influenza virus infection,
- ☐ The influenza illness is followed by full recovery to baseline health status prior to death,

- ☐ The death occurs in a person 18 years of age or older, or
- ☐ After review and consultation there is an alternative agreed upon cause of death which is unrelated to an infectious process.
    - For example, a child with a positive influenza test whose death clearly resulted from trauma after a car accident would not qualify as a case. However, a child with a respiratory illness and a positive influenza test whose death is attributed to another infectious cause such as staphylococcal pneumonia would still qualify as a case.

Laboratory Confirmation

Laboratory testing for influenza virus infection may be done on pre- or post-mortem clinical specimens, and may include identification of influenza A or B virus infections by a positive result by at least one of the following:

- ☐ Influenza virus isolation in tissue cell culture from respiratory specimens
- ☐ Reverse-transcriptase polymerase chain reaction (RT-PCR) testing of respiratory specimens
- ☐ Immunofluorescent antibody staining (direct or indirect) of respiratory specimens
- ☐ Rapid influenza diagnostic testing of respiratory specimens
- ☐ Immunohistochemical (IHC) staining for influenza viral antigens in respiratory tract tissue from autopsy specimens
- ☐ Four-fold rise in influenza hemagglutination inhibition (HI) antibody titer in paired acute and convalescent sera

Case Classifications

- ☐ **Confirmed**: A death meeting the clinical case definition that is laboratory confirmed
- ☐ **Probable**: No probable case definition

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of suspected influenza- associated death in any person under 18 years of age. Please use the Influenza-Associated Pediatric Mortality Case Report Form available on the DSHS website at http://www.dshs.texas.gov/eaidu/investigation/. Please use the most recent version of the form (the form is updated annually, usually in September before the coming flu season).

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, underlying health conditions and course of illness.
- ☐ Notify the State Influenza Surveillance Coordinator in DSHS EAIDU about the case under investigation as soon as enough information is available to determine that the case meets case definition.
- ☐ Complete the Influenza-Associated Pediatric Mortality Case Report Form using medical records and information from healthcare providers, and by interviewing the case's parent/guardian or surrogate to identify vaccination status and risk factors.
- ☐ Sources of vaccination status include parent/guardian, school, primary care provider and ImmTrac. All sources of vaccination history should be explored

before deciding that vaccination status is unknown.

- ☐ If multiple attempts were made to contact the parent/guardian or surrogate and attempts were unsuccessful, please fill out the case investigation form with as much information as possible and indicate the reasons for missing information (e.g., "lost to follow-up – parent did not return call; multiple messages left").
- ☐ Ensure that any available (pre- or post-mortem) respiratory specimens and autopsy specimens are forwarded to the DSHS lab for influenza testing.
- ☐ If the case is associated with an outbreak, see the Managing Special Situations section.
- ☐ Fax or send a secure email of the completed Influenza-Associated Pediatric Mortality Case Report Form to DSHS.
- ☐ The initial report should be submitted within 2 weeks of death.
- ☐ The final completed report should be submitted upon conclusion of the investigation.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS).
- ☐ Copies of the death certificate and autopsy report should be faxed or securely emailed to DSHS when they become available. Copies of the medical records (admission report, history and physical, progress notes, laboratory results, radiology reports, discharge summary, etc.) are also appreciated.

Control Measures

- ☐ Provide education on influenza as needed:
  - Get vaccinated for influenza every year.
  - Wash hands frequently with soap and water, especially after coughing or sneezing.
  - Use alcohol-based hand sanitizers when facilities are not available for hand washing.
  - Cover coughs and sneezes with disposable tissues or your arm/sleeve.
  - Avoid touching your eyes, nose or mouth.
  - Avoid close contact with people who are sick.
  - When you are sick, limit contact with others and stay home until fever free for24 hours without the use of fever-reducing medications.
  - Take antiviral medications if prescribed by your doctor.
    - The Texas Medical Board recently changed its rules (Texas Administrative Code, Title 22, Part 9, Chapter 190, Subchapter B, §190.8) regarding the prescribing of prophylaxis for close contacts of patients with certain infectious diseases. Physicians can now prescribe antiviral medications to contacts of influenza cases without first medically evaluating the contact.
- ☐ Recommend that anyone with risk factors experiencing symptoms or anyone with severe illness be evaluated by a healthcare provider.
- ☐ See the Texas Influenza Surveillance Handbook for additional influenza control measures.

School/Daycare Exclusion Criteria

Children with influenza are required to be excluded from school and daycare for at least 24 hours after fever has subsided without the use of fever suppressing medications. It is recommended that adults with influenza not return to work for at least 24 hours after fever has subsided without the use of fever suppressing

medications.

MANAGING SPECIAL SITUATIONS

Outbreaks

Influenza-associated pediatric deaths may result in high levels of media and public attention. If the death is linked to an influenza outbreak, then the outbreak investigation may also be subject to additional media or public attention. If an outbreak of influenza is suspected, notify DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

The local/regional health department should:

- ☐ Work with the facility to ensure that staff and students/residents get hand hygiene and respiratory etiquette education.
- ☐ Recommend that staff with influenza be restricted from working until 24 hours after fever has subsided without the use of fever suppressing medications.
- ☐ Recommend that anyone with risk factors experiencing symptoms or anyone with severe illness be evaluated by a healthcare provider.
- ☐ See the Texas Influenza Surveillance Handbook for more information on control measures and responding to influenza outbreaks.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed and clinically suspected cases are required to be reported **within 1 workday** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ Notify DSHS EAIDU of the case by phone or e-mail as soon as enough information is collected to confirm a case.
- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed** cases within 30 days of receiving a report of a confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completion of the investigation.
- ☐ **Fax or send a secure email of an investigation form (may be incomplete) within 2 weeks of death.**
    - Document any reasons for delays in reporting the death (e.g., found during death certificate review, delayed reporting the health department, etc.).
- ☐ Fax or send a secure email of a completed investigation form upon conclusion of the investigation.
    - Investigation forms may be faxed to **512-776-7616 or securely emailed to the State Influenza Surveillance Coordinator.**

When an outbreak of influenza or an influenza-like illness is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office

or to EAIDU at **512-776-7676.**

- ☐ Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.
  - Fax or securely email a copy to the DSHS regional office and/or to EAIDU at 512-776-7676. The secure email should be sent to the State Influenza Surveillance Coordinator at EAIDU.
  - The Respiratory Disease Outbreak Summary Form is available at https://www.dshs.texas.gov/eaidu/investigation/.

LABORATORY PROCEDURES

Specimens for influenza testing **should** be submitted to the DSHS Laboratory (or a Texas Laboratory Response Network [LRN] laboratory) for all influenza-associated pediatric mortality cases. It is especially important to submit specimens if influenza was suspected but not confirmed or only confirmed with a rapid influenza test.

If available, respiratory specimens collected pre- or post-mortem (e.g., nasopharyngeal swabs, throat swabs, lower respiratory tract specimens, etc.), and post-mortem (autopsy) specimens should be submitted for influenza testing. The DSHS Austin Laboratory and the Texas Laboratory Response Network (LRN) laboratories can perform influenza PCR testing on respiratory specimens; post-mortem tissue specimen testing is performed by the CDC Pathology Laboratory.

Specimen Collection

Pre- or Post-Mortem Respiratory Specimens/Swabs

- ☐ Follow the specimen collection instructions in the current influenza season's DSHS Influenza Laboratory Surveillance Protocol. The protocol is available by request from DSHS EAIDU or from the regional influenza surveillance coordinator.
- ☐ A nasopharyngeal swab is the preferred specimen type. Other respiratory specimens may be accepted as described in the current protocol.
- ☐ Refrigerate (2º–8 ºC) or freeze (-70ºC) specimen vials immediately after collection.

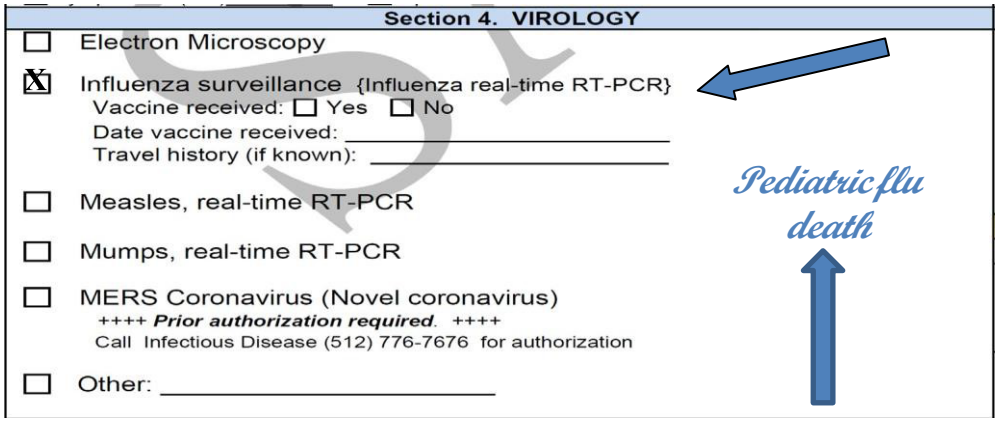
Post-mortem tissue specimens/slides collected during autopsy

- ☐ CDC can test post-mortem specimens collected during an autopsy for influenza, other viruses (upon request), and bacterial co-infections.
- ☐ Contact EAIDU at (800) 252-8239 or (512) 776-7676 for instructions on post-mortem autopsy specimen collection and submission.

Submission Form (if submitting specimen(s) to DSHS Austin)

Pre- or Post-Mortem Respiratory Specimens/Swabs

- ☐ Use the DSHS Laboratory G-2V Specimen Submission Form for specimen submission.
  On the form, under the Virology section, check the box for "Influenza surveillance
  {Influenza real-time RT-PCR}". In the blank space to the right of "Influenza surveillance
  {Influenza real-time RT-PCR}", write "pediatric flu death".



- ☐ Indicate the patient's flu vaccination status for the current season and the date of vaccination, if known.
- ☐ If applicable, indicate the patient's travel history and/or animal contact history.
    - For animal contact history, write "Animal contact" and the type of animal contact with which the patient had contact in the blank space to the right of "Influenza surveillance {Influenza real-time RT-PCR}".
- ☐ Make sure the patient's name and approved secondary identifier on the form exactly match what is written on the specimen tube.
    - An approved secondary identifier should be one of the following: date of birth, medical record number, social security number, Medicaid number, or CDC number.
- ☐ Make sure to fill in the date and time of collection in addition to the patient demographics on the form.

Post-mortem tissue specimens/slides collected during autopsy

- ☐ Contact EAIDU at (800) 252-8239 or (512) 776-7676 for instructions on post-mortem autopsy specimen collection and submission.

Specimen Shipping

Pre- or Post-Mortem Respiratory Specimens/Swabs

- ☐ Transport temperature: Store the specimen at 2º-8ºC if the specimen will be received at the laboratory within 72 hours of collection; ship the specimen on cold or freezer packs. Otherwise, the specimen must be stored frozen (-70ºC) and shipped on dry ice.
- ☐ Ensure that the specimen is triple-contained and that the outer shipping container is properly labeled for "Biological Substance, Category B" shipments.
- ☐ Ship specimens for overnight delivery.
- ☐ DO NOT mail specimens on a Friday or the day before a holiday unless special arrangements have been made in advance with the DSHS or LRN Laboratory.
- ☐ If shipping specimens to DSHS Austin, ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services

Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Post-mortem tissue specimens/slides collected during autopsy

- ☐ Contact EAIDU at (800) 252-8239 or (512) 776-7676 for instructions on post-mortem autopsy specimen collection and submission.

Common Causes for Rejection

- ☐ There is a discrepancy between the patient name on the specimen tube and the name on submission form.
- ☐ The specimen is not shipped in viral transport medium or the medium is expired.
- ☐ The specimen is received more than 72 hours after collection (if refrigerated).
- ☐ The specimen is received at ambient temperature.

REVISION HISTORY

January 2018

- ☐ Surveillance and Case Investigation: added that the completed Influenza-Associated Pediatric Mortality Case Report Form and accompanying documents may be submitted to DSHS by secure email.
- ☐ Reporting and Data Entry Requirements: updated the web address on where to find the Respiratory Diseases Outbreak Summary Form and added that completed case investigation forms and the Respiratory Disease Outbreak Summary Form may be sent to the State Influenza Surveillance Coordinator by secure email.

Legionellosis

BASIC EPIDEMIOLOGY

Infectious Agent

Legionella species are Gram-negative bacilli commonly found in water. There are over 50 species and approximately 70 serogroups currently recognized. *L. pneumophila* serogroup 1 is primarily responsible for human disease followed by *L. micdadei, L. bozemanii, L. dumoffi, and L. longbeachae*.

Transmission

Transmission occurs by inhaling aerosols from a water source contaminated with the *Legionella* bacteria. An example is breathing in steam or mist from a contaminated hot tub. Transmission may also occur by aspirating contaminated water. (See Legionella Ecology and an Introduction to Environmental Health video for more information.)

Incubation Period

The incubation period for Legionnaires' disease is 2–14 days with most infections occurring 5–6 days after exposure. Pontiac Fever can occur in 5–72 hours after exposure, but most often occurs 24-48 hours after exposure.

(Note: The incubation period for Legionnaires' disease is most commonly 2-14 days, with an average of 5-6 days, but has been reported to be up to 26 days in rare cases. For surveillance purposes, exposure histories are collected for the 14 days prior to onset.)

Communicability

No human-to-human transmission occurs.

Clinical Illness

- **Legionnaires' disease** is a common cause of pneumonia. Symptoms may include a high fever, shortness of breath, chills, non-productive cough, muscle aches and headache. Chest pain, altered mental status, abdominal pain, nausea, vomiting and diarrhea are also common.
- **Pontiac Fever** presents as a self-limited febrile illness that does not result in pneumonia. Symptoms may include fever, cough, headaches and muscle aches. Complete recovery usually occurs within a week without antibiotics.

Severity

Almost all patients with Legionnaires' disease require hospitalization, and the case fatality rate of Legionnaires' disease is 10% to 25%. The case fatality rate is often higher in nosocomial cases. Pontiac fever generally does not result in death and hospitalization is rarely required.

DEFINITIONS

Clinical Case Definition

Legionellosis is associated with three clinically and epidemiologically distinct illnesses: Legionnaires' disease, Pontiac Fever, and extrapulmonary legionellosis. Clinical criteria alone, however, are not sufficient for diagnosis

- Legionnaires' disease (LD) is characterized by fever, myalgia, cough, and other symptoms with clinical or radiological pneumonia.

- Pontiac Fever is a milder illness that could present similar, less severe symptoms as LD but without pneumonia.
- Extrapulmonary legionellosis: *Legionella* can cause disease at sites outside the lungs (for example, associated with endocarditis, wound infection, joint infection, graft infection). A diagnosis of extrapulmonary legionellosis is made when there is clinical evidence of disease at an extrapulmonary site and diagnostic testing indicates evidence of *Legionella* at that site.

Laboratory Confirmation
A clinically compatible case that meets at least one of the confirmatory laboratory criteria:

- Isolation (culture) of any *Legionella* organism from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site
- Detection of any *Legionella* species from lower respiratory secretions, lung tissue, pleural fluid, or extrapulmonary site by a validated nucleic acid amplification test (e.g. PCR)
- Detection of *Legionella pneumophila* serogroup 1 antigen in urine using validated reagents
- Demonstration of seroconversion by a fourfold or greater rise in specific serum antibody titer between paired acute and convalescent phase serum specimens to *Legionella pneumophila* serogroup 1 using validated reagents

Note: DFA tests for *Legionella* are not considered confirmatory for determining the case classification of Legionellosis cases.

Case Classifications

- **Confirmed**: A clinically compatible case that meets at least one of the confirmatory laboratory criteria
- **Probable:** A clinically compatible case with an epidemiologic linkage* during the 14-day incubation period

  **Epidemiologic linkage criteria:*
  *1)*Linkage to a setting with a confirmed source of *Legionella* (e.g. positive environmental sampling result associated with a cooling tower, public accommodation, hot tub, etc.)
  OR
  *2)*Linkage to a setting with a suspected source of *Legionella* that is associated with at least one confirmed case

Case Categories (Confirmed cases of Legionellosis may be further categorized to describe type of exposure.)

- Travel-associated case
  - A case that has a history of spending at least one night away from home, either in the same country of residence or abroad, in the 14-day incubation period
- Healthcare-associated (nosocomial) case
  - Presumptive: A case with 10 or more days of continuous stay at a healthcare facility* during the 14 days before onset of symptoms
  - Possible: A case that spent a portion of the 14 days before date of symptom onset in a healthcare facility*, but does not meet the criteria for a presumptive healthcare-associated case

  **These definitions apply to cases with multiple facility stays as well*

Cluster and Outbreak Definitions

- Cluster:
  - Two or more cases linked by areas of residence (building, street block, neighborhood, etc.), work or places visited, with sufficient closeness in dates of onset of illness to warrant further investigation.
- Outbreak:
  - Two or more cases associated with the same facility (e.g., hotel, gym, etc.) or other common location (e.g., amusement park) within 1 year, OR
  - One presumptive healthcare-associated case or two or more possibly healthcare-associated cases within 1 year associated with the same healthcare facility.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of clinically suspected Legionellosis. Investigations should **always** include an interview of the case-patient or a surrogate to obtain a detailed exposure history. Please use the Legionellosis Investigation Report Form available on the DSHS website: http://www.dshs.texas.gov/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm that the laboratory results meet the case definition.
  - Urinary antigen and respiratory culture are preferred testing methods for clinical *Legionella* confirmation.
  - If only one antibody test was performed and symptoms are consistent with Legionellosis, consider requesting that the attending physician order a convalescent antibody test or a urinary antigen test, especially in an outbreak setting.
- ☐ Review medical records or speak to an infection preventionist or physician to verify demographics, symptoms, underlying health conditions and course of illness.
- ☐ Interview the case-patient (or surrogate).
  - Use the Legionellosis Investigation Report Form available on the DSHS website: http://www.dshs.texas.gov/eaidu/investigation/.
    - If cruise ship exposure is reported during the incubation period, interview the patient with the DSHS Legionellosis Investigation Report Form AND the Legionellosis Cruise Ship Questionnaire at Legionnaires' disease Investigations | LD Investigations | CDC
    - Jurisdictions that are experiencing a significant increase in Legionellosis cases should interview patients with the DSHS Legionellosis Investigation Report Form AND also consider completing the Legionellosis Hypothesis-Generating Questionnaire at Legionnaires' disease Investigations | LD Investigations | CDC
  - Determine the patient's onset date. This may be difficult for patients with complex medical histories or those with atypical symptoms. When onset date is uncertain for these reasons, consult all of the following sources:
    - Patient or surrogate interview
    - Medical summaries and progress reports, consultations, radiology (chest x-ray) reports, and medication records (specifically antibiotics) for all medical facilities visited in the 2-4 weeks prior to suspected symptom onset

- For the 14 days prior to illness onset, identify risk factors, travel history and other potential exposures such as hospital, dental and long-term care facility visits/stays or visits to any other location where aerosolization of water may have occurred (e.g., gyms, saunas, restaurants with outdoor misters or fountains, truck stops with showers, etc.).
  - Obtain detailed information on travel or facility exposures including exact dates, room numbers, the name of the facility, and the facility's complete physical address (since facilities may have similar names and multiple locations).
- If at least three, unsuccessful attempts were made to contact the case-patient or surrogate, please complete the case investigation form with available information and indicate the reason for missing information (e.g., lost to follow-up – patient did not return call; multiple messages left).
- If initially the patient is unable to communicate for interview due to severity of illness, conduct the initial interview with the patient's surrogate and interview the patient when the patient is able to communicate.

- ☐ Implement control measures for cases, contacts and/or facilities in the assigned jurisdiction (see list of control measures below).
- ☐ If suspected healthcare-associated, travel-related or other exposures are identified, notify DSHS and other jurisdictions, if necessary, in which the possible exposure occurred, using appropriate notification channels.
  - **Notify DSHS within 1 business day of when a healthcare-associated or travel-related exposure is identified.**
  - DSHS tracks potential Legionellosis exposures in Texas.
  - DSHS will share all out-of-state exposures and in-state exposures that may affect out-of- state residents with the Centers for Disease Control and Prevention (CDC) who will notify other states/jurisdictions as needed.
- ☐ When cases report travel or exposure to healthcare facilities or other institutions during their incubation periods, or in the event of a cluster or outbreak, complete the applicable steps in the Managing Special Situations section.
- ☐ In the event of a death, a copy of the discharge summary, death certificate, or autopsy report should be obtained.
- ☐ Complete the investigation form(s) and send a secure email to DSHS. If unable to send via email, contact the IRID team by phone or email at irid@dshs.texas.gov.
- ☐ Copies of the medical records (admission report, history and physical, progress notes, laboratory results, radiology reports, discharge summary, etc.) accompanying completed case investigation form(s) is strongly recommended.
- ☐ Enter all confirmed Legionellosis case investigations and submit a notification in the NEDSS Base System (NBS).
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.

Prevention and Control Measures

Cases, contacts and the general public

- Provide education on Legionellosis as needed. Emphasize the following:
  - Low risk of Legionnaires' disease for most healthy individuals
  - No human-to-human transmission

    - Close contacts of the case at risk only if exposed to the same source as the case
    - Increased risk of infection for individuals who are immunosuppressed, have chronic obstructive pulmonary disease (COPD) or have other risk factors such as diabetes or history of smoking
- Recommend using sterile water for respiratory therapy devices. Do not use tap water.
- Recommend that high risk sources such as hot tubs are maintained properly including:
    - Maintenance of appropriate pH (7.2–7.8) and disinfectant levels
    - Removal of slime or biofilm
    - Replacement of filters as recommended by the manufacturer
    - For more information, see: Healthy Swimming | Healthy Swimming | CDC
- Recommend that anyone experiencing symptoms be evaluated by a medical provider.
    - Collect demographic information and symptom history on ill contacts.
- No environmental testing of water is recommended for a single case that is only possibly associated with a facility/exposure.
- General prevention messages include:
    - Don't smoke.
    - Don't use hot tubs or whirlpools that are not well maintained.
    - Don't use tap water in humidifiers or respiratory therapy devices.
    - Thoroughly clean and maintain any humidifiers, respiratory therapy devices, hot tubs, fountains or other devices or equipment that can aerosolize water per the manufacturer's directions.
- Women planning a water birth
    - Women who are planning a water birth should educate themselves on the process, carefully considering the documented benefits and risks of water birth at different stages of labor.
    - Research birth providers and facilities to ensure that infection prevention plans are in place for water births and are actively in use to protect patients.
    - Read the DSHS Midwifery Board's Waterbirth Guidelines: "Information for Client Discussion Regarding the use of Water during Labor and Birth", "Guidelines for Water Immersion and Waterbirth", and "Pool Setup and Cleaning Recommendations" (combined document) at http://www.dshs.texas.gov/eaidu/disease/legionnaires/links/.

Healthcare providers and facilities (healthcare and non-healthcare)

- Remind local healthcare providers to consider Legionellosis as a cause of pneumonia and report confirmed or clinically suspected cases.
    - Indications for *Legionella* testing: Clinical Features of Legionnaires' Disease and Pontiac Fever | Legionella | CDC
        - Patients who have failed outpatient antibiotic therapy for community-acquired pneumonia
        - Patients with severe pneumonia, in particular those requiring intensive care
        - Immunocompromised patients with pneumonia
        - Patients with pneumonia in the setting of a Legionellosis outbreak
        - Patients with a travel history in the two weeks prior to illness onset

        - Patients suspected of healthcare-associated pneumonia
- Notify the director of any facility that the case-patient stayed at or visited during the incubation period.
- Request that the facility notify the health department if any guest/customer/resident/patient complains of respiratory illness or pneumonia after staying/visiting there.
    - If there were additional complaints of illness, collect suspected case-patient names, room numbers and contact information.
- Remind the facility of the importance of proper maintenance.
    - See CDC's Water Systems Maintenance website: Controlling Legionella | Control Legionella | CDC
    - Facilities should take steps to minimize the risk of Legionellosis associated with building water systems. Refer to the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) current guidance (ASHRAE Guideline 12-2020 and ANSI/ASHRAE Standard 188-2018) and the CDC toolkit "Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards" for more information.
    - Recommend review of maintenance procedures of hot tubs, pools, whirlpools, birthing tubs, cooling towers, decorative fountains or any other sources of possible aerosolization of water. Important features in maintenance plans include procedures for:
        - Maintaining appropriate hot and cold water temperatures
        - Maintaining and monitoring pH and disinfectant levels including residual free chlorine
        - Replacing filters per manufacturer's recommendations
        - Performing emergency disinfection/remediation as needed
        - For more information, see: About Legionella Control | Controlling Legionella | CDC
    - Encourage the facility to hire a professional maintenance company for their equipment (e.g., hot tubs, pools) if the facility employees are unfamiliar with proper maintenance procedures.
- Remind the facility to enforce the maximum bather load for pools and hot tubs/spas.
- Encourage facilities to educate physicians to heighten their suspicion for cases of healthcare- associated Legionellosis and to use appropriate methods for its diagnosis. Facilities should also educate patient-care, infection-control and engineering personnel about measures to control healthcare-associated Legionellosis.
- Facilities should ensure that nebulizers and other semi critical respiratory care equipment are cleaned with sterile water. Enteral tubes should be flushed with sterile water and enteral feedings should be diluted with sterile water.
    - Providers should make sure that patients who use these devices are aware of these recommendations.
- Each hospital and long-term care facility should form a team of representatives from various departments to develop and write a Legionellosis control plan. The team should be led by a hospital epidemiologist or an infection control professional.
    - This operational plan should encompass several components including:
        - Surveillance strategies
        - Whether environmental culturing is recommended

        - Remediation strategies (if and when necessary)
        - Reporting procedures
    - Hospitals and long-term care facilities should regularly review and update their Legionellosis control plans.
    - For more information, see the Report of the Texas Legionnaires' Disease Task Force.
- Point-of-use filtration (0.2 micrometer) may be used at specific faucets, showerheads and other outlets as an added control measure. (This is more commonly recommended in an outbreak setting.)
- Water testing is generally not recommended in response to single cases that are only possibly associated with a facility.
- For additional information specific to facilities review the Managing Special Situations section.

Providers and facilities that offer water birthing

- For a complete list of recommendations see the DSHS Midwifery Board's Waterbirth Guidelines at http://www.dshs.texas.gov/eaidu/disease/legionnaires/links/
- Be aware of the potential risks of water birth-associated infections and educate expectant parents on these risks.
- Provide written procedures and guidelines to expectant parents regarding water birth, and document acknowledgment of procedures.
- Ensure the use of proper equipment for water birthing.
- Create written procedures for cleaning and maintaining birthing tubs and associated components.
- Maintain, disinfect, and properly store equipment used for water birthing.
- Maintain recommended water quality of tubs utilized by the facility during water birthing. Water quality measures should be guided by the instructions provided by the manufacturer.
- Document equipment maintenance, chemical additives used to maintain water quality, and preparation and use of equipment for each birth.
- Train all staff midwives and anyone involved in the use of water during labor and/or birth on all facility specific procedures developed for waterbirth and retain records of employee training.

School/Daycare Exclusion Criteria

No exclusion from work, school or daycare is required for disease control purposes.

MANAGING SPECIAL SITUATIONS

TRAVEL-ASSOCIATED CASES

One travel-associated case

If a **single** confirmed case of Legionellosis reported staying at a hotel for at least one day/night during the incubation period, the hotel should be notified. Do not share the patient's name or exact date of stay. With only one confirmed case, the exposure may or may not have occurred at the hotel.

For a **single** confirmed case, the local/regional health department should:

- Notify the hotel in writing of the case and
    - Request that the hotel notify the health department if any guest complains of respiratory illness or pneumonia after staying there.
    - Recommend that the hotel review their maintenance procedures for their cooling system, decorative fountains, pools and any hot tubs/whirlpools.
        - Recommend review of American Society of Heating, Refrigerating

and Air- Conditioning Engineers, Inc. (ASHRAE) Guideline 12-2020, ANSI/ASHRAE Standard 188-2018, the Model Aquatic Health Code, and other resources at: Controlling Legionella | Control Legionella | CDC
    - A sample letter is available from EAIDU upon request.
    - Note: Do not share enough details for the hotel to identify the case.
- Environmental (water) sampling and testing is not recommended for a single case staying at a hotel.

Multiple travel-associated cases
If **two or more** unrelated, confirmed cases of Legionellosis reported staying at least one night/day at the same hotel within a one-year period, notify EAIDU at (800) 252-8239 or (512) 776-7676. (Cases are considered related if they are members of the same household, traveling together, staying in the same room and otherwise spending significant amounts of time together outside of suspected travel exposure. For example, a husband and wife staying in the same room and traveling together would count as related but members of the same sports team staying in different rooms would not be related.)

For **two or more** unrelated confirmed cases, the local/regional health department should:
- Notify the hotel in writing of the cases and
    - Request that the hotel notify the health department if any guest complains of respiratory illness or pneumonia after staying there.
    - Recommend that the hotel review their maintenance procedures for their cooling system, decorative fountains, pools and any hot tubs/whirlpools.
        - Recommend review of ASHRAE Guideline 12-2020, ANSI/ASHRAE Standard 188-2018, the Model Aquatic Health Code, and other resources at: Controlling Legionella | Control Legionella | CDC
    - A sample letter is available from EAIDU upon request.
    - Note: Do not share enough details for the hotel to identify the cases.
- Consider posting an Epi-X call for cases to notify other state and local health departments of the cluster and to encourage reporting of additional cases.
- Work with the hotel to conduct an environmental assessment to determine possible sources of exposure and to verify maintenance procedures are being followed. The environmental assessment should be completed by the health department or by an independent contractor familiar with water systems and with documented *Legionella* remediation experience.
    - Note: The environmental assessment is a way to gain a thorough understanding of a facility's water systems and assist facility management with minimizing the risk of Legionellosis. It is not the same as environmental sampling.
    - Use the CDC's *Legionella* Environmental Assessment Form Legionnaires' disease Investigations | LD Investigations | CDC to conduct the assessment. The form should be completely filled out. (Videos providing information and instruction on environmental assessment and sampling are available at: Environmental Assessment and Sampling Resources | LD Investigations | CDC
    - Ask the facility to provide maps of the hotel and water system in order to identify exposure locations and to select sites for environmental sampling (if planned).
- Recommend that the hotel take measures to reduce/eliminate *Legionella* from

its water system.
    - The hotel should follow ASHRAE Guideline 12-2020 and ANSI/ASHRAE Standard 188- 2018 for controlling and preventing Legionellosis associated with building water systems. The CDC developed a toolkit aimed to provide an easy-to-understand interpretation of ASHRAE Standard 188: Legionnaires' disease Investigations | LD Investigations | CDC
    - Recommend that the hotel hire an environmental consultant familiar with water system assessment and with documented *Legionella* remediation experience.
        - The hotel owner should work with the consultant to minimize any risks of *Legionella* colonization and transmission associated with the facility, including addressing any modifiable issues identified by public health or the consultant.
    - CDC's instructions on "Disinfection of Hot Tubs Contaminated with *Legionella*" may be found at: Legionnaires' disease Investigations | LD Investigations | CDC
- Recommend environmental sampling (i.e., collection of water and biofilm swab samples to test for *Legionella*), if warranted.
    - Environmental sampling should be considered when more than one case of Legionellosis is associated with a hotel within a one-year period and the epidemiological investigation or environmental assessment identifies potential exposures or sources of infection.
    - Environmental sampling should be done if remediation efforts were implemented and a new case is identified with exposure occurring after remediation was done.
    - Please see the Environmental Sampling and Testing section near the end of this chapter for sample sites, collection protocols, and testing instructions.
    - Do not delay interventions necessary to prevent additional cases of Legionellosis (e.g., closing a hot tub to bathers) pending the results of environmental sampling.
    - If environmental sampling is done, the hotel should provide a copy of the testing results to the health department.

HEALTHCARE-ASSOCIATED CASES

One possibly healthcare-associated case
If **one confirmed, possibly healthcare-associated case** of Legionellosis reported exposure to a healthcare facility during his/her incubation period, the healthcare facility should be notified. With only one possibly healthcare-associated case, the exposure may or may not have occurred at the facility. Consult with EAIDU if it is an outpatient exposure at (800) 252-8239 or (512) 776-7676.

Note: The healthcare-associated Legionellosis recommendations may be used for cases associated with closed, non-healthcare institutions (e.g., correctional facilities). Recommendations may need to be modified slightly to reflect differences in healthcare facilities and non-healthcare facilities.

For **one possibly healthcare-associated case**, the local/regional health department should:

- Notify (in writing) the infection preventionist or medical director of the healthcare facility at which the case-patient stayed to verify that the facility is aware of the case and
    - Request that the facility notify the health department if additional nosocomial Legionellosis cases are suspected or identified.
    - Recommend that the facility implement active surveillance to identify new cases if the confirmed case reported an inpatient/resident stay at the facility (during the incubation period).
        - At minimum, active surveillance should include daily review of chest x-rays, sputum cultures and new diagnoses of pneumonia.
        - All patients who develop pneumonia two or more days after admission over the next 60 days should be tested by urinary antigen test; culture testing is also recommended in addition to urinary antigen testing.
        - Once implemented in response to a possible or definite case, active surveillance should continue for at least six months.
    - Recommend that the facility review their maintenance procedures for any possible sources of aerosolized water (including cooling towers, evaporative condensers, water heaters, pools/hot tubs/whirlpools, decorative fountains, respiratory therapy equipment, etc.).
        - Review of the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) Guideline 12-2020 ANSI/ASHRAE Standard 188-2018, and the CDC toolkit "Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards," is also recommended (see Controlling Legionella | Control Legionella | CDC).
    - Recommend that the facility review and update (if necessary) the facility's Legionellosis control plan (see Report of the Texas Legionnaires' Disease Task Force for more information).
- Environmental (water) testing is not recommended when a facility has only one possibly healthcare- associated case.

One or more definitely healthcare-associated case OR multiple possibly healthcare-associated cases

If **one or more definitely healthcare-associated or two or more possibly healthcare-associated cases** occur in patients of the same dental or healthcare provider, hospital, residential care facility or other long- term care facility AND the cases have no other identified plausible source of infection OR if other circumstances suggest the possibility of healthcare-associated infection, notify EAIDU at (800) 252-8239 or
(512) 776-7676. If there are outpatient visits in the cluster, please consult with EAIDU before declaring it a cluster.

For **≥ 1 definitely healthcare-associated case or ≥ 2 possibly healthcare-associated cases**, the local/regional health department should:

- ☐ Notify the infection preventionist or medical director of the healthcare facility at which the case- patients stayed to verify that the facility is aware of the cases.
    - If any of the patients reported exposures to multiple facilities during their incubation periods, make sure that all facilities are notified.
    - Notify facilities of cases and public health recommendations, in writing.
- ☐ Work with the facility to conduct retrospective and prospective surveillance to

notify potentially missed or new cases for a minimum of 6 months before the earliest onset date and after the most recent onset date, respectively.
    - Retrospective surveillance should include a review of patient medical records and laboratory results from the past 6 months to identify clinically compatible cases.
    - Active surveillance should include daily review of chest x-rays, sputum cultures and new diagnoses of pneumonia.
    - Once implemented in response to a possible or definite case, active surveillance should continue for at least 6 months following the onset date of the most recent healthcare- associated case.
    - Request that the facility notify the health department if additional healthcare-associated Legionellosis cases are suspected or identified.
- ☐ Recommend testing of patients with compatible symptoms at least 60 days before the earliest onset date of a healthcare-associated case and at least 60 days after the onset date of the most recent healthcare-associated case.
    - All patients who developed pneumonia in the last 60 days should be tested with a urinary antigen test.
    - All patients who develop pneumonia two or more days after admission over at least 60 days after the latest onset date of a health-care associated case should be tested by both culture **and** urinary antigen. This testing should be extended beyond 60 days when there is evidence of ongoing transmission or when recommended prevention and control measures have not been completed.
    - Testing may be done in-house or by a commercial laboratory.
    - Clinical *Legionella* isolates/cultures should be retained (not discarded) by the hospital/lab or sent to the state public health lab (with approval form the public health lab).
- ☐ Remind the facility to report to its regulatory authority as appropriate.
- ☐ Notify facility staff about the outbreak so that medical personnel consider Legionellosis in the differential diagnosis for patients with nosocomial and community-acquired pneumonia, and test and report suspected cases as directed.
- ☐ Consider clinically-compatible illnesses in facility staff.
- ☐ Review the facility's infection control measures to prevent Legionellosis exposures and work with the facility to identify potential gaps.
    - Review and update (if necessary) the facility's Legionellosis control plan. Refer to the Report of the Texas Legionnaires' Disease Task Force for detailed Legionellosis response measures in acute care hospitals and long-term care facilities.
- ☐ Recommend that the facility review their maintenance procedures for any possible sources of aerosolized water (including cooling towers, evaporative condensers, water heaters, pools/hot tubs/whirlpools, decorative fountains, respiratory therapy equipment, etc.).
- ☐ Review of the ASHRAE Guideline 12-2020 and ANSI/ASHRAE Standard 188-2018 is also recommended.
- ☐ Work with the facility to conduct an environmental assessment to determine possible sources of exposure and to verify that maintenance procedures are being followed. The environmental assessment should be completed by the health department or by an independent contractor familiar with water systems and with documented *Legionella* remediation experience.
    - Note: the environmental assessment is a way to gain a thorough understanding of a facility's water systems and assist facility

management with minimizing the risk of Legionellosis. It is not the same as environmental sampling.
    - Use and complete the CDC's *Legionella* Environmental Assessment Form: Legionnaires' disease Investigations | LD Investigations | CDC to conduct the assessment. (Videos providing information and instruction on environmental assessment and sampling are available at: Environmental Assessment and Sampling Resources | LD Investigations | CDC
    - Ask the facility to provide maps of the facility and water system (if available) in order to identify exposure locations and to select sites for environmental sampling (if planned).
- ☐ Consider using methods to limit exposure of high-risk patients to potentially contaminated water sources, pending successful reduction in levels of *Legionella* colonization within the facility's water system including:
    - Restrictions on showering
    - Restrictions on use of potable hot water: shift to using sterile water for bathing, drinking, oral hygiene, wound care, and dilution of drinks (bottled water may also be an option for some activities)
    - Installing point-of-use filtration at faucets and showerheads
    - Suspending water births (until water restrictions are lifted)
- ☐ Recommend that the facility take measures to reduce/eliminate *Legionella* from its water system.
    - The facility should follow ASHRAE Guideline 12-2020 and ANSI/ASHRAE Standard 188- 2018 for controlling and preventing Legionellosis associated with building water systems. The CDC developed a toolkit aimed to provide an easy-to-understand interpretation of ASHRAE Standard 188 (Legionnaires' disease Investigations | LD Investigations | CDC).
    - Recommend that the facility hire an environmental consultant familiar with water system assessment and with documented *Legionella* remediation experience. The facility owner should work with the consultant to minimize any risks of *Legionella* colonization and transmission associated with the facility, including addressing any modifiable issues identified by public health or the consultant.
- ☐ Recommend environmental sampling (i.e., collection of water and biofilm swab samples to test for *Legionella*), if warranted.
    - Water testing should be considered when one definite healthcare-associated case or two or more possible healthcare-associated cases of Legionellosis are associated with a facility within a one-year period.
    - Sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. The sampling plan should be approved by the health department.
    - Water testing should be done if remediation efforts were implemented and a new case is identified with exposure occurring after remediation was done.
    - Please see the Environmental Sampling and Testing section near the end of this chapter for sample sites, collection protocols, and testing instructions.
    - Do not delay interventions necessary to prevent additional cases of Legionellosis (e.g., cleaning equipment, implementing water restrictions, installing point-of-use filters) pending the results of environmental sampling.

- If environmental sampling is done, the healthcare facility should provide a copy of the testing results to the health department.

☐ If needed, conduct a case-control study to identify specific exposures within the facility.

CASES ASSOCIATED WITH A GYM, SPA, OR OTHER "OPEN" FACILITY

One facility-associated case

If **one confirmed case** of Legionellosis reported exposure to a source of aerosolized water (pool, whirlpool, hot tub, mister, etc.) at a public/communal facility during at least one day/night during the incubation period, the facility should be notified. Do not share the patient's name or exact date of exposure. With only one confirmed, possibly facility-associated case, the exposure may or may not have occurred at the facility.

For a **single case**, the local/regional health department should:

☐ Notify the facility in writing of the case and
- Request that the facility notify the health department if any customer complains of pneumonia after visiting the facility.
- Recommend that the facility review their maintenance procedures for any possible sources of aerosolized water (including pools, hot tubs/whirlpools, misters, etc.).
  - Recommend review of American Society of Heating, Refrigerating and Air- Conditioning Engineers, Inc. (ASHRAE) Guideline 12-2000, ANSI/ASHRAE Standard 188-2015, the Model Aquatic Health Code, the CDC toolkit "Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards," and other resources at: Controlling Legionella | Control Legionella | CDC.
- A sample letter for hotels is available from EAIDU upon request. This letter can be modified for any facility.
- Note: Do not share enough details for the facility to identify the case.

☐ Environmental (water) sampling and testing is not recommended for a single case reporting exposure to the facility.

Multiple facility-associated cases

If **two or more confirmed cases** of Legionellosis reported exposure to a source of aerosolized water (pool, whirlpool, hot tub, mister, etc.) at a facility during at least one day/night during the incubation period* within a one-year period, notify the EAIDU at (800) 252-8239 or (512) 776-7676.

For **multiple cases**, the local/regional health department should:

☐ Notify the facility in writing of the cases and
- Request that the facility notify the health department if any customer complains of pneumonia after visiting the facility.
- Recommend that the facility review their maintenance procedures for any possible sources of aerosolized water (including pools, hot tubs/whirlpools, misters, etc.).
  - Recommend review of ASHRAE Guideline 12-2020, ANSI/ASHRAE Standard 188-2018, the Model Aquatic Health Code, the CDC toolkit "Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards," and other resources at:

Controlling Legionella | Control Legionella | CDC.
    - A sample letter for hotels is available from EAIDU upon request. This letter can be modified for any facility.
    - Note: Do not share enough details for the facility to identify the case.
- ☐ Contact local hospital infection control staff and emergency room staff to determine whether they have observed an increase in community-acquired pneumonia patients admitted to the facility.
    - If cultures/isolates or respiratory specimens are available on potential cases, these should be held (i.e., not discarded) in case further testing is requested.
- ☐ Inform primary care physicians, emergency room staff and radiologists in the potential outbreak area and any other locations necessary of the following:
    - That there is a cluster of Legionellosis cases
    - The signs and symptoms of Legionellosis
    - The recommended lab tests to confirm Legionellosis
    - Reporting requirements and contact information for the health department
- ☐ Consider clinically-compatible illnesses in staff of the affected facility.
- ☐ Work with the facility to conduct an environmental assessment to determine possible sources of exposure and to verify maintenance procedures are being followed. The environmental assessment should be completed by the health department or by an independent contractor familiar with water systems and with documented *Legionella* remediation experience.
    - Note: the environmental assessment is a way to gain a thorough understanding of a facility's water systems and assist facility management with minimizing the risk of Legionellosis. It is not the same as environmental sampling.
    - Use and complete the CDC's *Legionella* Environmental Assessment Form Legionnaires' disease Investigations | LD Investigations | CDC to conduct the assessment. (Videos providing information and instruction on environmental assessment and sampling ~~a~~re available at: Environmental Assessment and Sampling Resources | LD Investigations | CDC.
    - Ask the facility to provide maps of the facility and water system (if available) in order to pinpoint exposure locations and to select sites for environmental sampling (if planned).
- ☐ Recommend that the facility take measures to reduce/eliminate *Legionella* from the water system.
    - The facility should follow ASHRAE Guideline 12-2020 and ANSI/ASHRAE Standard 188- 2018 for controlling and preventing Legionellosis associated with building water systems.
        - CDC's toolkit "Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards" is an easy-to-understand interpretation to ASHRAE 188 (Legionnaires' disease Investigations | LD Investigations | CDC).
    - Recommend that the facility hire an environmental consultant familiar with water system assessment and with documented *Legionella* remediation experience. The facility owner should work with the consultant to minimize any risks of *Legionella* colonization and transmission associated with the facility, including addressing any modifiable issues identified by public health or the consultant.
    - CDC's instructions on "Disinfection of Hot Tubs Contaminated with

Legionella" maybe found at: Legionnaires' disease Investigations | LD Investigations | CDC.

- ☐ Recommend environmental sampling (i.e., collection of water and biofilm swab samples to test for *Legionella*), if warranted.
  - Environmental sampling should be considered when more than one case of Legionellosis is associated with a facility within a one-year period and the epidemiological investigation or environmental assessment identifies potential exposures or sources of infection.
  - Sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. The sampling plan should be approved by the health department.
  - Environmental sampling should be done if remediation efforts were implemented and a new case is identified with exposure occurring after remediation was done.
  - Please see the Environmental Sampling and Testing section near the end of this chapter for sample sites, collection protocols, and testing instructions.
  - Do not delay interventions necessary to prevent additional cases of Legionellosis (e.g., closing a hot tub to bathers) pending the results of environmental sampling.
  - If environmental sampling is done, the hotel should provide a copy of the testing results to the health department.

CASES ASSOCIATED WITH A COMMUNITY

If **multiple confirmed cases** of Legionellosis (e.g., in residents, visitors/travelers, etc.) are reported within a one-year period with exposure to the same community AND no potential common source has been identified, notify EAIDU at (800) 252-8239 or (512) 776-7676.

A cluster of Legionellosis cases with a common exposure can involve both Legionnaires' disease and Pontiac fever and health departments should be alert to this possibility. Questions regarding ill contacts of Legionnaires' disease case patients should not be limited to persons with symptoms of pneumonia.

The local/regional health department should:

- ☐ Identify the investigation team and available resources
  - Contact DSHS if assistance is needed.
- ☐ Establish the existence of an outbreak
  - Acquire and examine baseline data, if available
  - Verify that the "outbreak" is not a reporting or surveillance artifact
- ☐ Verify the diagnosis
  - Obtain clinical records and lab reports
  - Conduct additional clinical testing if needed
  - Ask facilities to retain *Legionella* isolates/cultures (if culture was performed)
- ☐ Construct a case definition (define person, place and time)
- ☐ Find cases systematically and develop a line listing
  - Promptly initiate case finding in the community.
    - Inform primary care physicians, emergency room staff and radiologists in the potential outbreak area and any other locations necessary of the following:
      - That there is a cluster of Legionellosis cases

- The signs and symptoms of Legionellosis
- How a case of Legionellosis is diagnosed
- Preferred testing methods to identify Legionellosis cases
- Recommendations for which patients to test (e.g., patients with community- acquired pneumonia)
- Reporting requirements and contact information for the health department

        - Contact local hospital infection control staff and emergency room staff to determine whether they have observed an increase in community-acquired pneumonia patients admitted to the facility.
        - Cultures should be requested to be sent to the public health laboratory and held appropriately.
    - Consider notifying state and national partners, providers and healthcare facilities of the increase (e.g., Epi-X notification).
    - Case finding will involve passive and active surveillance.
    - All cases should be interviewed* with the Legionellosis Investigation Report Form or with a Legionellosis hypothesis-generating form.
- ☐ Perform descriptive epidemiology/develop hypotheses
    - Interview the cases with a hypothesis-generating questionnaire or other extensive, open-ended questionnaire in order to identify common exposures.
        - The CDC's hypothesis-generating questionnaire for Legionellosis is available at: Legionnaires' disease Investigations | LD Investigations | CDC.
    - Map cases to identify commonalities in location or proximity to possible environmental sources.
    - Create an epidemic curve.
- ☐ Evaluate hypotheses/perform additional studies as necessary
    - Conduct epidemiologic studies (e.g., case-control study) necessary to identify the source(s) of the outbreak.
    - Conduct an environmental investigation
        - Assess the community to identify possible sources of exposure (e.g., cooling towers, chiller units, supermarket/restaurant misters, swamp coolers, decorative fountains, whirlpool spas, municipal water system, wells and streams)
        - Collect and test environmental samples for *Legionella* as appropriate.
        - Ask environmental testing labs to retain cultures/isolates that are outbreak-related so that these may be compared to clinical isolates.
- ☐ Implement control measures
    - General control measures should be implemented immediately.
    - Control measures for source control should be implemented as soon as a likely source is identified.
        - Do not wait for laboratory results on suspected sources before implementing control measures.

*Note: The incubation period for Legionnaires' disease is most commonly 2-10 days, with an average of 5-6 days, but has been reported to be up to 19 days in rare cases. For routine surveillance purposes, exposure histories are collected for the 10 days prior to onset. However, in outbreak settings where it is important to consider a wide range of possible sources, use of a 14-day incubation period is often desirable.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed and clinically suspected cases of Legionellosis should be reported **within 1 week** of suspicion to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ **Notify DSHS within 1 business day of when a healthcare-associated or travel-related exposure is identified.**
- ☐ Notify facilities (e.g., hotels, long-term care facilities, hospitals, etc.) within the LHD/HSR's jurisdiction when these facilities are identified by an investigation of a confirmed Legionellosis case- patient as possible sources of exposure during the case's incubation period.
- ☐ Enter the case into NBS and submit an NBS notification on all confirmed cases to DSHS within 30 days of receiving a report of confirmed Legionellosis.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
- ☐ Fax, securely e-mail, or mail a completed investigation form **as soon as the investigation is complete**.
    - DSHS compares reported exposure information on investigation forms to that of previously reported Legionellosis cases in order to identify clusters and outbreaks. Since exposure history is not captured in NBS, the investigation form is the only way in which this information is usually reported.
    - Investigation forms may be faxed to **512-776-7616**, securely emailed to the IRID Epidemiologist I or IRID team lead, or mailed to:

      Infectious Disease Control Unit
      Texas Department of State Health Services Mail Code: 1960
      PO Box 149347
      Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676**.
- ☐ Submit a completed **National Outbreak Reporting System (NORS)** outbreak form at the conclusion of the outbreak investigation.
    - Enter into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
    - To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
        - Please put in Subject Line: NORS User Account Request
        - Information needed from requestor: name, email address, and agency name
        - After an account has been created a reply email will be sent with a username, password and instructions for logging in.
- ☐ Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.

- Please include a copy of the completed environmental assessment and *Legionella* environmental testing results, if done.
- Fax or send a secure email of a copy to the DSHS regional office and/or to EAIDU at 512- 776-7676. The secure email should be sent to the IRID inbox: IRID@dshs.texas.gov.
- The Respiratory Disease Outbreak Summary Form is available at http://www.dshs.state.tx.us/eaidu/investigation/.

CLINICAL LABORATORY PROCEDURES

Specimens and isolates associated with Legionellosis cases are not routinely submitted to the DSHS laboratory in Austin. When multiple Legionellosis cases are associated with a single facility, DSHS will accept **isolates** from other laboratories conducting environmental testing if patient isolates (*Legionella* culture from clinical specimens) are available for comparison.

Contact EAIDU at 512-776-7676 for approval:

- ☐ When submitting clinical or environmental isolates to the DSHS Austin lab that are related to an outbreak
- ☐ To request molecular typing at CDC's lab to confirm that isolates from cases are identical (case- patients are exposed to the same source)

Specimen Collection

Clinical specimen

- ☐ Acceptable specimens: sputum, bronchial washing, tracheal aspirate, or lung biopsy
- ☐ Bronchial washing or tracheal aspirate:
  - Collect washing or aspirate using sterile water, not saline
  - 2mL minimum volume needed
  - Refrigerate at 2º–8 ºC. Do not freeze.
- ☐ Sputum, expectorated:
  - Collect in a sterile container
  - Collect specimen under the direct supervision of a nurse or physician
  - Have patient rinse or gargle with water first to remove excess oral flora
  - Instruct patient to cough deeply to produce a lower respiratory specimen (not postnasal fluid)
  - For pediatric patients unable to produce a sputum specimen, a respiratory therapist should collect a specimen via suction. The best specimen should have <10 squamous cells/100X field (10X objective and 10X ocular).
  - Refrigerate at 2 º–8 ºC. Do not freeze.
- ☐ Sputum, induced:
  - Collect in a sterile container
  - Have patient rinse mouth with water after brushing gums and tongue
  - With the aid of a nebulizer, have patient inhale approximately 25 ml of 3-10% sterile saline
  - Refrigerate at 2 º–8 ºC. Do not freeze.
- ☐ Lung biopsy:
  - Collect during surgery or cutaneous biopsy procedure
  - Place in an anaerobic transport system or sterile, screw-cap container
  - Add several drops of sterile saline to keep small pieces of tissue moist

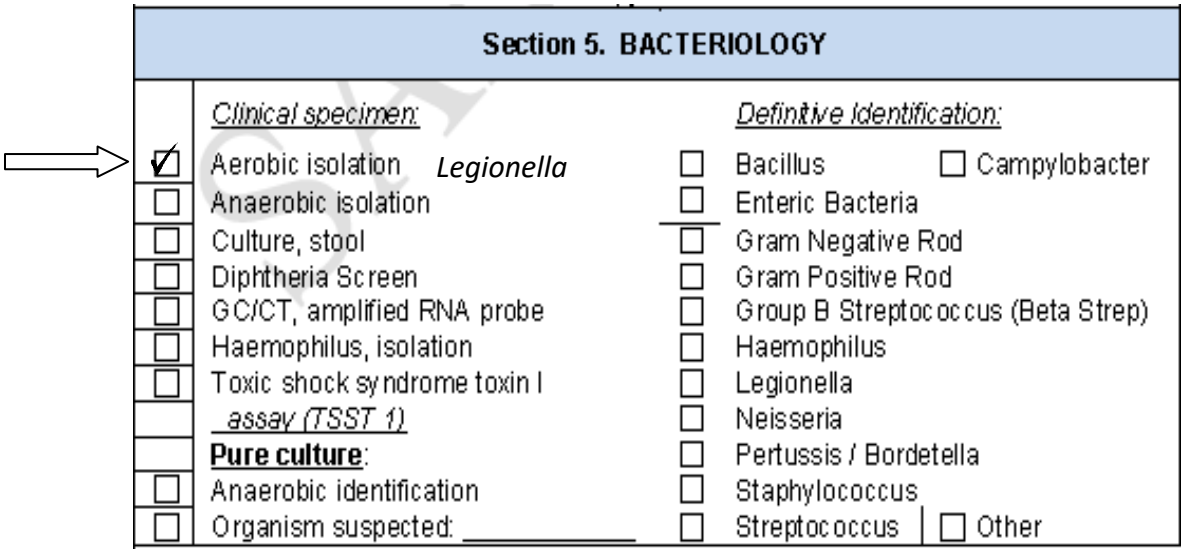
- Always submit as much tissue as possible. If excess tissue is available, save a portion of surgical tissue at -70°C in case further studies are needed. Never submit a swab that has been rubbed over the surface of a tissue.
- Refrigerate at 2º–8ºC. Do not freeze.
- Do not suspend the specimen in formalin or other preserving liquid.

Clinical isolates (pure cultures)

- ☐ Submit a pure culture on a BCYE slant
- ☐ May be kept at ambient temperature

Laboratory Submission Form

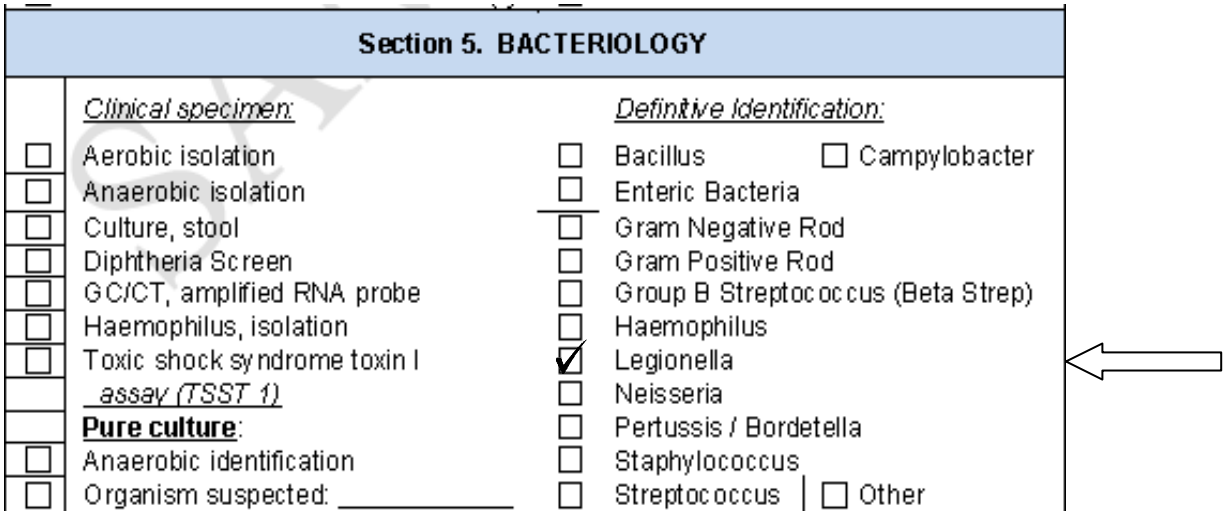
- ☐ For clinical specimens and isolates, use the DSHS Laboratory G-2B Submission Form.
  - For clinical specimens: On the form under "Section 5. BACTERIOLOGY" check the box for "Aerobic isolation" under "Clinical Specimen" and write "Legionella" in the open space.



Section 5. BACTERIOLOGY

	Clinical specimen:		*Definitive Identification:*	
☑	Aerobic isolation *Legionella*	☐	Bacillus	☐ Campylobacter
☐	Anaerobic isolation	☐	Enteric Bacteria	
☐	Culture, stool	☐	Gram Negative Rod	
☐	Diphtheria Screen	☐	Gram Positive Rod	
☐	GC/CT, amplified RNA probe	☐	Group B Streptococcus (Beta Strep)	
☐	Haemophilus, isolation	☐	Haemophilus	
☐	Toxic shock syndrome toxin I	☐	Legionella	
	assay (TSST 1)	☐	Neisseria	
	Pure culture:	☐	Pertussis / Bordetella	
☐	Anaerobic identification	☐	Staphylococcus	
☐	Organism suspected: _____	☐	Streptococcus	☐ Other

  - For clinical isolates: On the form under "Section 5. BACTERIOLOGY" check the box for "Legionella" under "*Definitive Identification"*.



Section 5. BACTERIOLOGY

	Clinical specimen:		*Definitive Identification:*	
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☐	GC/CT, amplified RNA probe	☐	Group B Streptococcus (Beta Strep)	
☐	Haemophilus, isolation	☐	Haemophilus	
☐	Toxic shock syndrome toxin I	☑	Legionella	
	assay (TSST 1)	☐	Neisseria	
	Pure culture:	☐	Pertussis / Bordetella	
☐	Anaerobic identification	☐	Staphylococcus	
☐	Organism suspected: _____	☐	Streptococcus	☐ Other

- ☐ For clinical specimens and isolates, make sure the patient's name and approved secondary identifier on the form exactly match what is written on the specimen tube. Make sure to fill in the date of collection, date of onset and diagnosis/symptoms.
    - An approved secondary identifier should be one of the following: date of birth, medical record number, social security number, Medicaid number, or CDC number.

Specimen Shipping

- ☐ Transport temperature for clinical specimens: Keep at 2º–8ºC (refrigerated/ice packs). Do not use dry ice.
- ☐ Transport temperature for isolates (pure culture): May be shipped at ambient temperature. Do not use dry ice.
- ☐ Ship specimens via overnight delivery on cold packs or wet ice (double bagged) within 24 hours of collection if possible.
    - Note: While *Legionella* may survive extended transport, their isolation may be compromised by overgrowth of commensal bacteria in the specimens; therefore, specimens should arrive at the laboratory as soon as possible for the best results.
- ☐ DO NOT ship specimens on a Friday or the day before a state holiday unless special arrangements have been made with the DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Frequent Causes for Rejection:

- ☐ Sputum specimen consists of saliva only
- ☐ Insufficient quantity submitted for testing
- ☐ Discrepancy between name on specimen container and name on submission form
- ☐ Container broken in transport
- ☐ Expired media used

Results Available:

- ☐ Culture results typically available in 3–21 days (15 days of no growth = negative result)

ENVIRONMENTAL SAMPLING AND TESTING

Inhalation of aerosols containing *Legionella* is presumed to be the primary means of acquiring Legionellosis. Aerosolized waters from cooling towers, evaporative condensers, showers and humidifiers have been identified as sources of infection. *Legionella* species have been recovered from a wide variety of domestic water systems and are ubiquitous in freshwater environments. Domestic water systems are complex environments in which concentrations of legionellae can fluctuate considerably depending upon water temperature, biocide levels and presence of natural hosts (i.e., protozoa) for legionellae to parasitize.

Recommendations for Environmental Sampling

When to Sample:

- ☐ Hotels, gyms, spas and other similar facilities
  - Baseline environmental sampling (in the absence of associated cases) is not recommended.
  - Environmental testing is not recommended for a single case whose illness may be associated with a hotel or similar facility.
  - Environmental sampling should be considered when more than one case of Legionellosis is associated with a hotel or similar facility within a one-year period and the epidemiological investigation or environmental assessment identifies potential exposures or sources of infection.
  - Environmental sampling should be done if remediation efforts were implemented and a new case is identified with exposure occurring after remediation was done.
  - Sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. The sampling plan should be approved by the health department.
- ☐ Healthcare facilities
  - Baseline environmental sampling for *Legionella* (no patient cases detected)
    - All healthcare facilities should, in implementing their Legionellosis control plan, assess their risk of *Legionella* transmission. Each facility should evaluate environmental, engineering and patient population factors to determine whether there is a reasonable potential for nosocomial transmission.
    - Baseline water distribution system cultures should be performed if the results of the risk assessment indicate the facility has a significant risk of *Legionella* transmission.
    - For more information on assessing a facility's risk of *Legionella* transmission, seethe Report of the Texas Legionnaires' Disease Task Force (www.dshs.texas.gov/eaidu/disease/legionnaires/taskforce/) and ANSI/ASHRAE Standard 188-2018.
  - Environmental sampling in the context of a patient case(s)
    - Water testing should be considered when one definite healthcare-associated case or two or more possible healthcare-associated cases of Legionellosis are associated with a facility within a one-year period.
    - Water testing should be done if remediation efforts were

implemented and a new case is identified with exposure occurring after remediation was done.

Sampling Considerations and Procedures:

- ☐ Purpose of sampling: To determine the source of transmission and extent of colonization
- ☐ Sampling should only be performed after a thorough environmental assessment has been done and a sampling plan has been made. The sampling plan should be approved by the health department.
- ☐ If environmental sampling is pursued, the samples should be collected and processed in a way that maximizes the recovery of *Legionella*.
- ☐ Instructional/training videos: "How to Make a Sampling Plan", "How to Sample Potable Water", "How to Sample Cooling Towers", and "How to Sample Spas and Fountains" at: Environmental Assessment and Sampling Resources | LD Investigations | CDC.
- ☐ **Choosing Sites for Sampling:**
    - See CDC's "Sampling Procedure and Potential Sampling Sites" document: Legionnaires' disease Investigations | LD Investigations | CDC.
        - Potential sampling sites for hotels include hot tubs/whirlpools (including filters, jets, tanks, water lines, etc.); swimming pools (including skimmer baskets); showerheads and faucets in pool showering facilities, if applicable; decorative fountains; potable water supply to and within the facility (including hot water heaters, holding tanks, water returns, etc.); cooling towers; sprinkler systems; and potential sources of exposure in guest rooms (faucets, showerheads, etc.).
        - Potential sampling sites for healthcare facilities include potable water supply to and within the facility (including hot water heaters, holding tanks, water returns, etc.); potable water outlets (faucets, showers, etc.), especially those in or near patient rooms; ice machines; cooling towers and evaporative condensers; humidifiers (e.g., nebulizers) and other respiratory therapy equipment; and other potential sources of exposure (e.g., decorative fountains, whirlpools, safety showers and eyewash stations, etc.).
    - All showers and faucets in all case rooms (primary room where case stayed and other rooms where case exposures may have occurred [e.g., surgical recovery rooms]) should be sampled, along with showers and sink faucets in additional rooms.
    - Choose rooms proximal and distal to risers or hot water heaters and on various floors based on the results of the environmental assessment.
    - Ideally, sample at least a couple of outlets on every floor and/or wing. Some sites should also be selected at random for sampling.
    - In most situations, it is appropriate to sample only the hot water. However, there are situations where taking some cold water samples is helpful.
        - For example, in hot climates (like Texas!), the cold water may be warm enough for rapid *Legionella* amplification (>77°F).
            - Note: In most recent *Legionella* outbreak investigations in Texas, some cold water samples were collected in addition to hot water samples.
        - Desalination may elevate cold water temperature.

        - Cold water could be warm due to lack of insulation between hot and cold water pipes.
        - The results of the environmental assessment (if done properly/completely) can help to determine if cold water samples should be collected.

☐ **Number of Samples to Collect:**

- The number of samples to be collected should be based on a plan (to limit the expense and time associated with sample collection and testing)
    - The sampling plan should be based on the findings of the environmental assessment and available epidemiologic data (i.e., water sources and locations where patients may have been exposed)
- The number of samples to collect may depend on:
    - The size and design of the facility (e.g., number of floors, wings, rooms, buildings, etc.)
    - The design and configuration of the water system including the presence of dead legs, number and type of components, types of heating systems, etc.
    - The facility's sources of possible aerosolized or aspirated water (e.g., cooling towers, air handling systems, showers, faucets, decorative fountains, ice machines, whirlpools, etc.)
    - The number of Legionellosis cases associated with the facility and their reported exposures in/near the facility
    - The facility's patient population
    - Other factors specific to the facility
- In the smallest facilities, at least 10 environmental samples should be collected; however, in most cases 10 samples will not be sufficient for representative sampling. In larger or more complex facilities, 100+ samples may need to be collected in order to be representative and increase the odds of detection of *Legionella* that may be in the water system.
- See CDC's "Sampling Procedure and Potential Sampling Sites": Legionnaires' disease Investigations | LD Investigations | CDC.
- DSHS Austin and CDC can offer assistance in determining the number of samples and locations of sample sites.

☐ **Collection Recommendations and Procedures:**

- Environmental sampling should be a joint effort by the facility (particularly building systems staff/facilities engineers), the facility's *Legionella* consultant, the testing laboratory and the local health department (epidemiologist and environmental health specialist).
- Environmental sampling should be well planned in advance to ensure that all required staff and supplies are present.
- For sample collection procedures, please refer to CDC's "Sampling Procedure and Potential Sampling Sites" document: Legionnaires' disease Investigations | LD Investigations | CDC. This document covers:
    - Materials (required and optional)
    - Safety precautions
    - Sampling procedures:
        - Potable water at the points of use
            - Additional note on collection of water from handheld showerheads:
                - Handheld showerheads differ from traditional

fixed showerheads because water may stagnate in the tubing increasing the risk for Legionella growth.
- If the facility has handheld showerheads, collect a sample from the handheld showerhead tubing before collecting the bulk water sample. Collect a swab sample (if feasible) from the tubing and collect a water sample by capturing the water from the tubing.
- Sampling from handheld showerheads will result in additional samples (2 biofilm swabs [1-flexible tubing, 1- water pipe], 2 bulk water [1-tubing residual, 1-bulk water from pipe]).

- Potable water at the hot water heaters
- Whirlpool spas

- List of potential sampling sites (from potable water, cooling towers, whirlpool spas, and other sources)

- Collection of 1 (one) liter (1 L) of water is preferred.
  - If a liter cannot be collected from a sample source, the **minimum acceptable sample size during an active investigation is 250 ml**.
  - Larger volumes of water (1 to 10 liters) are needed to detect legionellae in water that has very low concentrations of these bacteria such as municipal water supplies.
- In addition to water samples, biofilm swabs should be taken from most sites, when possible.
- The sampling team should also test the water quality (i.e., residual chlorine, temperature and pH) at sampling sites.
- All samples should be transported to the laboratory in insulated coolers as protection against extreme heat or cold.
  - Samples that will not reach the laboratory within 72 hours should be refrigerated before shipping.
  - Samples that reach the laboratory but cannot be processed within 72 hours of collection should be refrigerated.
- Recommended minimum frequency of (environmental) retesting, in an outbreak setting:
  - Once interventions are in place, culture water to detect any legionellae:
    - Every 2 weeks for 3 months; if cultures are negative, then
    - Once per month for the next 3 months
  - If legionellae are detected the 6 month process must be restarted.

Laboratory Testing of Environmental Specimens

- ☐ Testing of environmental samples should be performed by an ELITE-certified laboratory capable of culturing *Legionella* species. A list of ELITE-certified laboratories is available at https://wwwn.cdc.gov/elite/Public/MemberList.aspx.
- ☐ Inform the testing laboratory that the testing is being performed as part of an outbreak investigation. (Some laboratories have different protocols for collecting and testing specimens for non-outbreak purposes.)
- ☐ The traditional ISO spread plate method should be used for testing during outbreak investigations (i.e., during initial detection and throughout remediation and repeat testing cycles).

- ☐ *Legionella* isolates from environmental testing related to clusters or outbreaks should be speciated, serotyped and retained for future studies.
    - If isolates cannot be retained by the testing laboratory, they may be forwarded to the DSHS Austin lab once approval is received from EAIDU.
- ☐ The DSHS laboratory will accept isolates (for speciation and serogrouping) from environmental sources if there is also an isolate available from a human case associated with the facility for comparison.
- ☐ Molecular typing of *Legionella* isolates is available from CDC (contact DSHS to request this testing) and can be helpful to:
    - Confirm that isolates from cases are identical (i.e., case-patients were exposed to the same source)
    - Compare clinical to environmental isolates to narrow down the list of potential environmental sources

ADDITIONAL RESOURCES

Training and Informational Videos

- ☐ CDC's *Legionella* Environmental Investigation Videos: Environmental Assessment and Sampling Resources | LD Investigations | CDC.
    - *Legionella* Ecology and an Introduction to Environmental Health and Engineering
    - Conducting and Interpreting the Environmental Assessment
    - How to Make a Sampling Plan
    - How to Sample Potable Water
    - How to Sample Cooling Towers
    - How to Sample Spas and Fountains
- ☐ CDC *Legionella* training videos and presentations that were part of the Water, Sanitation, and Hygiene (WASH) webinar series in 2010 are available from DSHS upon request:
    - WASH Webinar #1: Legionellosis Outbreak Investigations; Environmental Assessment
    - WASH Webinar #3: Public Health Response; Importance of Molecular Typing

National Guidance for Environmental and Laboratory Investigation

- ☐ Additional resources for environmental sampling and testing are available from CDC's Legionella Epidemiologist Investigation Tools website at: Legionnaires' disease Investigations | LD Investigations | CDC or Investigation Resources | LD Investigations | CDC.
- ☐ Occupational Safety and Health Administration (OSHA) Legionnaires' disease eTool (sources identification and control procedure, and water sampling guidelines for *Legionella*—Section II): https://www.osha.gov/dts/osta/otm/legionnaires/

Water System Maintenance

- ☐ CDC's Water System Maintenance website: Controlling Legionella | Control Legionella | CDC
- ☐ Model Aquatic Health Code (for swimming pools, hot tubs/whirlpool spas, interactive fountains, waterparks): https://www.cdc.gov/mahc/index.html
- ☐ American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE)- Guideline 12-2020--Minimizing the Risk of Legionellosis Associated with Building Water Systems: https://www.ashrae.org/technical-resources/standards-and-guidelines/guidance-on-reducing- the-risk-of-legionella
- ☐ ANSI/ASHRAE Standard 188-2018--Legionellosis: Risk Management for Building

Water Systems: https://www.ashrae.org/technical-resources/bookstore/ansi-ashrae-standard-188-2018- legionellosis-risk-management-for-building-water-systems CDC's FAQ for ASHRAE 188- 2015: Legionnaires' disease Investigations | LD Investigations | CDC l

- ☐ CDC's toolkit -- Developing a Water Management Program to Reduce Legionella Growth and Spread in Buildings: A Practical Guide to Implementing Industry Standards: Legionnaires' disease Investigations | LD Investigations | CDC.
- ☐ Operating Public Hot Tubs: Operating and Managing Public Pools, Hot Tubs and Splash Pads | Healthy Swimming
- ☐ Disinfection of Hot Tubs Contaminated with *Legionella*: Legionnaires' disease Investigations | LD Investigations | CDC
- ☐ Other pool and hot tub operation recommendations: Healthy Swimming | Healthy Swimming | CDC
- ☐ EPA's -- Technologies for Legionella Control in Premise Plumbing Systems: Systematic Review: https://www.epa.gov/ground-water-and-drinking-water/technologies-legionella-control-premise- plumbing-systems

REVISION HISTORY

October 2024

- Undated links from CDC and other sources
- Minor grammar changes

December 2021

- Removed or updated links that were no longer active
- Added IRID inbox email as a contact

January 2021

- Case classification: Added Probable case classification

Listeriosis

BASIC EPIDEMIOLOGY

Infectious Agent
Listeria monocytogenes, a Gram-positive, rod-shaped bacterium.

Transmission
Transmission primarily occurs through ingestion of contaminated food. Transmission also occurs *in utero*
from mother to fetus.

Incubation Period
Typically, 2 or 3 weeks. However, cases have occurred up to 70 days after a single exposure to a contaminated food. Median incubation period is longer among pregnant women.

Communicability
Transplacental infections and nosocomial transmission to newborns are the mostly likely sources of direct human to human transmission. Though infected individuals can shed the bacteria in stools for months, secondary cases among household contacts are rare to nonexistent.

Clinical Illness
Usually consist in a mild illness with fever, malaise, headache, back pain, and gastrointestinal symptoms. Most severe cases occur in immunocompromised, elderly or pregnant individuals. Invasive manifestations are less common and include meningitis and septicemia.

Severity
Illness in pregnant women can cause miscarriage, preterm delivery and/or infection of the fetus/newborn. Case fatality is 20% - 30% in newborns.

DEFINITIONS

Clinical Case Definition
In adults, invasive disease caused by *Listeria monocytogenes* manifests most commonly as meningitis or bacteremia; infection during pregnancy can result in fetal loss through miscarriage or stillbirth, or neonatal meningitis or bacteremia. Other manifestations can also be observed.

Laboratory Confirmation
- ☐ Isolation of *L. monocytogenes* from a normally sterile site*, e.g., blood, cerebrospinal fluid (CSF), or less commonly, joint, pleural, or pericardial fluid, **OR**
- ☐ Isolation of *L. monocytogenes* from products of conception at time of delivery and non-sterile sites of neonates obtained within 48 hours of delivery, **OR**
- ☐ In the setting of miscarriage or stillbirth, isolation of *L. monocytogenes* from placental or fetal tissue, **OR**
- ☐ In the setting of pregnancy or live birth, isolation of *L. monocytogenes* from mother’s or neonate’s blood or other sterile site, or from placental or amniotic fluid.

*See the Sterile Site and Invasive Disease Determination Flowchart in Appendix A, for confirming a specimen meets the criteria for sterile site.

Note: As required by Texas Administrative Code (TAC), all *Listeria monocytogenes* isolates must be submitted to the DSHS laboratory.

Case Classifications

- ☐ **Confirmed:** A clinically compatible case that is laboratory confirmed
- ☐ **Probable:** The mother of a neonate with confirmed or probable listeriosis, even if the laboratory criteria are not met for the mother; a neonate born to a mother with confirmed or probable listeriosis, even if laboratory criteria are not met for the neonate; or a clinically compatible case detected through use of a culture independent laboratory testing method.
- ☐ **Suspect:** Isolation of *L. monocytogenes* from a non-invasive clinical specimen, e.g., stool, urine, wound.

Notes:

- ☐ Pregnancy loss and intrauterine fetal demise are considered maternal outcomes and would be counted as a single case in the mother.
- ☐ Cases in neonates and mothers should be reported separately when each meets the case definition. A case in a neonate is counted if live-born.
- ☐ A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of listeriosis. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the *Listeria* Case Form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Verify that the laboratory has forwarded the isolate to the DSHS laboratory, as required. If an isolate has not been sent, please request a specimen be submitted.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
    - Use information from medical records to complete the Supplemental Medical History Form of the *Listeria* Case Form.
- ☐ Interview the case to get detailed food history and risk factor information.
    - Use the ***Listeria* Case Form** to record information from the interview.
    - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
    - Provide education to the case or his/her surrogate about effective hand washing and food safety practices. See Prevention and Control Measures.
- ☐ Fax completed forms to DSHS EAIDU at 512-776-7616 or email securely to FOODBORNETEXAS@dshs.texas.gov.
    - An EAIDU foodborne epidemiologist will fax or email the form (deidentified) to the CDC.

- Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
- For lost to follow-up (LTF) cases, please complete as much information, obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.), on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.

- Hospitalized cases should be followed until discharge and patient's outcome recorded on the *Listeria*
- Case Form
  - Initial reports can be sent to DSHS prior to discharge.
- In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU.
- If case is part of an outbreak or cluster, see Managing Special Situations section.
- All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- ☐ Avoid consuming raw milk and other unpasteurized dairy products.
- ☐ Rinse raw produce, such as fruits and vegetables, thoroughly under running tap water before eating, cutting, or cooking.
- ☐ Scrub the surface of melons, such as cantaloupes, with a clean produce brush under running water and dry them with a clean cloth or paper towel before cutting.
- ☐ Follow food safety principles in the kitchen, especially:
  - Cook or reheat meat thoroughly. Reheated meats should be steaming hot (165°F).
  - Prevent cross-contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after they touch raw meat.
  - Separate uncooked meats, hot dogs and other meat packaging from vegetables, uncooked food and ready to eat foods.
  - Keep the refrigerator at 40°F or lower and the freezer at 0°F or lower.
  - Clean up all spills in your refrigerator right away–especially juices from hot dog and lunch meat packages, raw meat, and raw poultry.
- ☐ Pregnant women and immunocompromised individuals should avoid high risk food items, such as:
  - Smoked fish
  - Soft cheeses such as feta, queso blanco, queso fresco, brie, Camembert, blue-veined, or panela
  - Refrigerated pâté or meat spreads
  - Ready to eat meat, hot dogs, luncheon meats, cold cuts, deli meats, fermented/dry sausage, or leftover food unless heated until steaming hot.
- ☐ Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After any contact with animals or their living areas.

Exclusions

School/child-care: No exclusions are specified for listeriosis but the standard exclusion for diarrhea or fever applies:

- ☐ Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- ☐ Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for listeriosis but the standard exclusion for vomiting or diarrhea applies:

- ☐ Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- ☐ Interview all cases suspected as being part of the outbreak or cluster.
- ☐ Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- ☐ Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- ☐ If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your

jurisdiction to alert them to the possibility of additional listeriosis cases.

- ☐ If isolates have not already been submitted to the DSHS laboratory for confirmation and whole genome sequencing (WGS), request hospital/clinical labs submit isolates for confirmation and WGS testing. See Laboratory Procedures.
- ☐ Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
  - Policies on and adherence to hand hygiene.
  - Storage and preparation of food.
  - Procedures for changing diapers and toilet training.
  - Procedures for environmental cleaning.
- ☐ Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- ☐ Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child- care, if they are symptomatic. See Exclusions in Case Investigation section.
- ☐ Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing clusters:

- ☐ For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- ☐ Local/regional health departments with cases in their jurisdiction should:
  - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
    - Fax the completed questionnaire promptly within timeframe designated in cluster notification to DSHS EAIDU at **512-776-7616** or email securely to FOODBORNETEXAS@dshs.texas.gov.
  - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
  - If an interview is unattainable or the case is lost to follow-up, fax/email securely medical records and any case information to DSHS EAIDU.
    - Please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- ☐ Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:

- ☐ If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.

- ☐ Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- ☐ Fax completed *Listeria* case forms to DSHS EAIDU at **512-776-7616** or email securely to FOODBORNETEXAS@dshs.texas.gov.
  - An EAIDU foodborne epidemiologist will fax the form (de-identified) to the CDC.
  - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
  - For lost to follow-up (LTF) cases, please complete as much information, obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.), on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.

When an outbreak is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676**
- ☐ Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- ☐ To request a NORS account, please email FoodborneTexas@dshs.texas.gov.

- Please put in Subject Line: NORS User Account Request
- Information needed from requestor: name, email address, and agency name
- After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

All *Listeria monocytogenes* isolates must be submitted to the DSHS laboratory.

CLINICAL SPECIMENS:

Specimen Collection

- ☐ Submit pure culture on an agar slant.
- ☐ If a pure culture is not available, you may submit:
  - Blood, CSF, amniotic fluid, placental tissue or fetal tissue, shipped on wet ice within 48 hours of collection.
    - Blood should be collected in tiger or red top vacutainer.

Submission Form

- ☐ Use DSHS Laboratory G-2B form for specimen submission.
- ☐ Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- ☐ Fill in the date of collection and select the appropriate test.
- ☐ If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- ☐ Payor source:
  - Check IDEAS" to avoid bill for submitter

Specimen Shipping

- ☐ Transport temperature: Submit pure cultures on an agar slant at ambient temperature. Blood should be kept at 2º - 25º C (refrigerated or at room temperature); tissue must be kept refrigerated at 2º-8º C.
- ☐ Ship specimens via overnight delivery on cold packs or wet ice (double bagged). Pure isolates and blood may be shipped without ice or cold packs.
- ☐ Do NOT mail on a Friday, or state holiday, unless special arrangements have been pre-arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Incorrect source of specimen.
- ☐ Specimen not in correct transport medium.
- ☐ Missing or discrepant information on form/specimen.

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Listeria monocytogenes* is available at the DSHS laboratory. Decisions about testing implicated food items can be made after

consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- ☐ The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- ☐ In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- ☐ Food samples or environmental swabs must be **collected by a registered sanitarian**.

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

- ☐ March 2021
  Updated Laboratory Confirmation and Case Classifications statements under Definition section.

Measles

BASIC EPIDEMIOLOGY

Infectious Agent
The measles virus-a single-stranded, RNA-encoded paramyxovirus

Transmission
Virus is spread directly from person to person by inhalation of suspended droplet nuclei or by contact with infective nasopharyngeal secretions. It can also be transmitted indirectly by objects (fomites) contaminated with nasopharyngeal secretions. Measles is one of the most contagious of all infectious diseases, with >90% attack rates among susceptible close contacts.

Incubation Period
The incubation period ranges from 7–21 days (average 10–12 days) from exposure to the onset of prodromal symptoms.

Communicability
Measles is most communicable during the 3 - 4 days preceding rash onset. Persons with measles have been shown to shed virus between 4 days prior to rash onset (with the onset of prodromal symptoms) and for 4 days after the rash has appeared.

Clinical Illness
Measles is characterized by a generalized maculopapular rash (a flat, red area on the skin that is covered with small confluent bumps), fever, and one or more of the following: cough, coryza (runny nose), conjunctivitis (eye inflammation or red eyes). There are three stages of illness:

- **Prodrome**
  - Measles has a distinct prodromal stage that begins with a mild to moderate fever (as high as 105°F) and malaise. Usually within 24 hours, there is an onset of conjunctivitis, photophobia (sensitivity to light), coryza (sneezing, nasal congestion, and nasal discharge), an increasingly severe cough, swollen lymph nodes (occipital, postauricular and cervical at the angle of the jaw), and Koplik's spots (seen only for a day or two before and after onset of rash). These spots are seen as bluish-white specks on a rose-red background appearing on the cheek and lip mucosa usually opposite the molars.
- **Rash**
  - The rash begins with flat, faint eruptions usually on the upper lateral parts of the neck, behind the ears, along the hairline and on the posterior parts of the cheeks. The rash may appear from 1–7 days after the onset of the prodromal symptoms, but usually appears within 3–4 days. Individual lesions become more raised as the rash rapidly spreads over the entire face, neck, upper arms and chest. In severe cases, the lesions may merge together to form large rash masses. In mild cases, the rash may be macular and more nearly pinpoint, resembling that of scarlet fever.
- **Fever**
  - Fever is mild to moderate early in the prodrome and goes up when the rash appears. Temperatures may exceed 40°C (104°F), and

usually falls 2–3 days after rash onset. High fever persisting beyond the third day of the rash suggests that a complication (e.g., ear infection) may have occurred.

DEFINITIONS

Clinical Case Definition

An illness characterized by all of the following criteria:

- A generalized maculopapular rash lasting at least 3 days, **AND**
- A temperature ≥ 101.0°F (≥ 38.3°C), **AND**
- Cough, coryza, or conjunctivitis.

Laboratory Criteria for Diagnosis

- Isolation of measles virus* from a clinical specimen; or
- Detection of measles-virus specific nucleic acid* from a clinical specimen using polymerase chain reaction; or
- IgG seroconversion* or a significant rise in measles immunoglobulin G antibody* using any evaluated and validated method; or
- A positive serologic test for measles immunoglobulin M antibody*‡; or

*Not explained by MMR vaccination during the previous 6-45 days.
‡Not otherwise ruled out by other confirmatory testing or more specific measles testing in a public health laboratory. For instance, if a suspect case has a positive IgM result from a commercial laboratory but then a negative PCR result from the DSHS Laboratory, the PCR result would outweigh the IgM result, and the case status would be not a case.

Case Classification

- **Confirmed**: An acute febrile rash illness (temperature can be lower than 101°F and rash ≤3 days) that is:
  - Laboratory confirmed, **OR**
  - Epidemiologically linked to a laboratory confirmed measles case.
- **Probable**: No probable case definition

Note: While the confirmed case definition does not require cough, coryza, or conjunctivitis, the presence of one or more of these symptoms in a suspected measles case increases the likelihood of a true measles infection.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

In the current setting of measles elimination in the United States, rapid investigation and reporting of all suspected measles cases is extremely important to ensure that measles remains controlled.

Measles investigations are high priority and time sensitive. The investigation steps below describe public health activities that should be completed when a suspect measles case is reported.

These steps should be completed even if the suspect measles case does not meet all clinical criteria, but they have other risk factors, like travel to an outbreak area, not vaccinated, contact with known case, etc.

Case Investigation Checklist *(stand-alone version available at the end of chapter)*

- ☐ Immediately isolate anyone with suspected measles.
  - Isolate either at home or in the hospital under airborne precautions (respiratory isolation in negative air pressure room, if possible).
- ☐ Initiate the investigation and contact the provider AND case patient (or proxy) the same day the report is received.
- ☐ Confirm that clinical presentation and laboratory results meet the case definition.
  - If laboratory specimens have not been collected, make arrangements to have them collected as soon as possible.
  - Vaccinated individuals may have atypical symptoms.
  - Someone with known exposure and prodromal symptoms without a rash should be considered a measles suspect.
  - If the suspect case was reported within 3 days of rash onset, there should be appropriate follow-up to establish a rash duration of at least 3 days.
  - See Suspect Cases Who Have Recently Received Measles-containing Vaccine below.
- ☐ Notify DSHS EAIDU and/or your regional office immediately.
- ☐ Verify that the laboratory has forwarded viral and serology specimens to the DSHS laboratory. See Laboratory Procedures.
  - Testing at a public health laboratory (e.g., DSHS Lab in Austin) is preferred.
    - PCR is also available at the following commercial laboratories: LabCorp (advertises a turnaround time of 3 days) and Quest (approximately 7-10 days turnaround time, as samples are sent to a California lab and batch-tested). Other commercial labs may also begin offering testing.
      - The DSHS Laboratory does not need to re-test a commercial laboratory's PCR result to validate it.
  - Collection of throat (preferred), NP, and/or urine specimens for PCR are strongly encouraged and as soon as possible.
    - PCR is fast, unlike culture and should be collected as soon as possible after rash onset. Detection of measles via PCR is most successful between the first day of rash through the 3 days following rash onset but may still be detected as late as 10-14 days post rash onset.
    - PCR is preferred for vaccinated individuals.
    - Only PCR specimens can be genotyped.
    - Measles IgM may be falsely positive due to previous vaccination or the use of less accurate tests used in most commercial laboratories.
    - Measles IgM may be falsely negative if collected within the first three days after rash onset.
    - Serum tested at commercial labs can be forwarded to the DSHS Lab for confirmatory testing. If this needs to be done, notify EAIDU to facilitate this process.
    - Urine specimens will be tested at the Minnesota Department of Public Health Laboratory and results will be delayed.
    - Acceptable mediums: VTM (preferred) and UTM. Note: AMIES is not acceptable.

- ☐ If a private provider/hospital cannot or will not collect specimens, public health staff should make every arrangement to collect specimens instead.
- ☐ Interview patient and review medical records or speak to an infection preventionist or physician to verify case exposure, underlying health conditions, course of illness, vaccination status and travel history.
    - Request copies of admission and discharge summaries and laboratory results.
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
    - ☐ Case (or parent), ImmTrac2, school records, primary care provider, etc.
- ☐ Risk factors and timeframes (within 3 weeks prior to rash onset):
    - Exposure to a confirmed measles case
    - Travel to a measles endemic/outbreak area or contact with a traveler from a measles endemic/outbreak area
    - Transit through an international airport
    - Exposure to international visitors or venues that may attract international visitors. Previous outbreaks have been identified at:
        - US tourist venues (e.g., Disneyland or Orlando, FL)
        - International sports competitions (e.g., Olympics, Little League World Series)
        - Conferences (e.g., international trade show)
    - Use of public transit in a major U.S. city
    - Check the news or with the VPD team to identify any current outbreaks that the patient may have been exposed to.
- ☐ Alert other health departments of exposures that may have occurred in their jurisdictions as soon as possible.
    - Notify EAIDU if other states/counties need to be notified.
- ☐ Determine whether a contact investigation should be initiated (See the Determine Whether to Initiate a Contact Investigation Section).
- ☐ If applicable, identify all close contacts and manage based on risk level and susceptibility. PEP needs to be given in a short time period, so assess contacts quickly.
    - See Managing Contacts of Confirmed or Highly Suspicious Measles Cases flowchart at the end of this chapter.
    - For details on identification and prioritization of contacts see the following segments:
        - Identify Contacts
        - Prioritize Contacts
    - For details on prophylaxis see the following segments:
        - Provide Post Exposure Prophylaxis for Susceptible Contacts
        - Control Measures
        - Post-exposure Prophylaxis (PEP) and Quarantine Protocol for Measles Exposures Based on Pregnancy and Immunocompromised Status table
    - For details on monitoring contacts for development of symptoms, see Monitor Measles Contacts.
- ☐ If more than one case is identified or an outbreak occurs, see Managing Special Situations.
- ☐ All confirmed and suspect case investigations must be entered in NBS. Suspect cases should be updated to "not a case" or "confirmed" once status is determined. Confirmed cases should be submitted for notification in the

NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- Susceptible contacts to suspected cases should be vaccinated with measles vaccine within 72 hours of exposure OR should have IG administered within six (6) days of exposure. Contact DSHS EAIDU and the regional Immunizations Program Manager if IG/vaccine is needed.
- If vaccination of exposed contact is contraindicated (or the PEP window has passed), exclude exposed contact from school or work for at least 21 days after last rash onset. Exclusion from school or daycare of unvaccinated, exposed children for 21 days from last rash onset is required by Texas Administrative Code, Title 25, Chapter 97, Subchapter A, Rule §97.7.
- Table 2 (and its extensive footnotes) has contact and setting specific recommendations for prophylaxis, testing, quarantine/exclusion, and symptom monitoring.

Suspect Cases Who Have Recently Received Measles-Containing Vaccine

Ten percent of recipients of measles-containing vaccine may develop fever and rash approximately 6-12 days after vaccination. Vaccination causes production of IgM antibody that cannot be distinguished from the antibody resulting from natural infection, particularly in the first 5 days after vaccination.

A positive measles IgM test cannot be used to confirm the diagnosis of measles in persons with measles-like illness who received a measles vaccine 6–45 days before onset of rash, as there is no way to differentiate between vaccination strain and wild-type infection based on serologic testing alone. A negative test would exclude the diagnosis, however.

All exposed persons with symptom onset between 6-21 days post-vaccination should have PCR and MeVA testing conducted (MeVA is available at select public health labs). If a recently vaccinated person shows measles-like symptoms **without** suspected exposure, testing is not recommended. Exposed persons with symptom onset <5 days post-vaccination can be tested with a measles PCR test, as the vaccine strain is not expected to be detectable that soon after vaccination (particularly testing respiratory specimens) and any detection of measles would be wild type. If a person was vaccinated within 6-45 days of rash onset and has **no** known measles exposure, PCR testing is not recommended.

Transmission of the vaccine virus does not occur from a vaccinated person, even in those who develop a rash, as the viremia is too low. Person-to-person transmission of vaccine virus has never been documented. No special precautions (e.g., exclusion from school or work, contact investigations, etc.) need be taken.

Source: Plotkin, S., Orenstein, W., Offit, P., & Edwards, K. (2018). Measles Vaccines. In *Plotkin's Vaccines* (7th ed., pp. 593–593). chapter, Elsevier.

Communications

When health departments confirm a case of measles, they should conduct the following communication activities. Ask the VPD Team for materials to assist with these activities.

- Issue a health alert to all area providers, hospitals and urgent care clinics.

- Describe the situation.
- Provide instructions on ensuring staff immunity.
- List symptoms to look for.
- Instruct on what to do if a suspect case is identified (e.g., isolation, testing, reporting, etc.).

- ☐ Contact all entities likely to have exposure (e.g., if measles case is school-aged, notify schools).
  - Describe the situation.
  - Provide instructions on checking vaccine records.
  - List symptoms to look for.
  - Instruct on what to do if symptomatic persons are identified.
- ☐ Issue a press release if wide-spread community exposure is suspected.
- ☐ Have a 24/7 phone for providers to call if measles is suspected (existing reporting/afterhours/on call numbers can be used).
- ☐ Initiate active surveillance for additional cases and continue for a minimum of 6 weeks after the onset of the last case.
  - Contact healthcare providers in the jurisdiction to notify them of the situation and request reporting of any suspect case.
- ☐ Provide a daily line list of suspects and cases to DSHS EAIDU (during an outbreak).

Determine Whether to Initiate a Contact Investigation

- ☐ If a case is highly suspicious for measles (e.g., clinically compatible illness in an under/unvaccinated person with exposure or history of travel), a contact investigation should be initiated even if laboratory confirmation of the case is not yet available.
- ☐ If a suspect measles case is not strongly suspicious for measles (e.g., clinically compatible illness in a person who has received two doses of MMR vaccine and does not have measles exposure), the results of laboratory testing should be obtained before initiating a contact investigation.
- ☐ If an IgM positive test result has already been obtained for a *vaccinated* suspect case who is not strongly suspicious for measles, repeat IgM testing or additional measles testing (PCR) can be performed at a public health or commercial laboratory before a contact investigation is initiated.
- ☐ Contact the VPD team
  - if assistance is needed determining whether a contact investigation should be initiated.
  - if a contact investigation is initiated.

Identify Contacts

- ☐ A contact of a measles case is anyone who has shared the same airspace with a person who is infectious with measles.
  - Anyone in the same airspace (same room, no minimum amount of time) as the suspected case up to 2 hours after the case has left should be considered exposed,
  - The infectious period is four days before rash onset through four days after rash onset [day of rash onset is day 0].
- ☐ No minimum time period has been established for exposure, but it is presumed that longer exposures are more likely to result in measles transmission than brief, transient exposures.
- ☐ When exposures have occurred in venues in which it is not possible to identify individuals, it is helpful to notify local health care providers so that they can be on the alert for possible cases. In addition, some health

jurisdictions have issued press releases to notify the public.
- If the case was traveling by plane, ship, bus or train during the infectious period, obtain all travel information (obtain boarding pass or e-reservation, if possible) and call EAIDU, who will contact the CDC.
    - Appendix B has more information on how these types of exposures/notifications are handled.

Prioritize Contacts for Investigation

In the event that contacts have to be prioritized, please contact your Regional Office and ask for assistance. Measles is considered a public health emergency and every effort should be made to assess all contacts to interrupt transmission.

However, if it is not feasible to investigate all possible contacts in an exposure setting, possible contacts should be prioritized for investigation.

The following contacts, if susceptible to measles, are at the greatest risk of infection or severe disease, or are more likely to transmit measles to others and should be prioritized for investigation:
- Household contacts
- Healthcare personnel of any age or others with occupations that require interaction with high-risk populations (e.g., daycare workers)
- Pregnant women
- Immunocompromised people
- Persons under five years of age in settings with known unvaccinated persons (e.g., childcare settings)
- Infants

There are scant data on factors that make transmission of measles more likely, however if it is necessary to prioritize the investigation further, possible information to consider includes the following:
- Length of time of exposure to case
- Proximity to case
- Ventilation in the exposure setting, and
- The time of exposure related to when the case left the setting

In addition, the infectiousness of the case at the time of exposure may increase or decrease the possibility of transmission. Persons with measles are most infectious at the late prodromal phase of illness immediately prior to rash onset when cough and coryza are at their peak. The presence and frequency of cough in the case may affect the possibility of transmission. Cases who have received measles-containing vaccine in the past may be less symptomatic and also less infectious.

Determine Susceptibility of Contacts

Non high-risk people† can be presumed to be immune to measles for the purposes of measles case investigations if they:
- were born prior to 1957, regardless of nationality; or
- have written documentation with dates of receipt of at least one dose of measles-containing vaccine given on or after their first birthday in 1968 or later*; or
- have documented IgG+ test for measles*; or
- laboratory confirmation of previous disease.*

*Regardless of nationality or birth origin

Managing Close Contacts

Monitor Measles Contacts

Measles contacts, even vaccinated contacts, should monitor themselves for measles symptoms from day 5 after first exposure through day 21 after last exposure (day of exposure is day 0). Information containing the recommended follow-up of measles contacts is available as Table 3 in the tables portion of the measles Investigation Guidance document (end of this chapter). Contacts should be instructed to isolate themselves immediately if measles symptoms develop and notify their health department. If they plan to seek medical care, they should contact the hospital or doctor's office ahead of time to notify them that they might have measles.

Contacts that are unvaccinated should be asked to stay home (children at school or daycare must stay home) and monitored by the health department in addition to self-monitoring. The contacts should be called every few days to ensure they are still feeling well.

Prophylaxis Guidelines (see Table 1)

Provide Post-Exposure Prophylaxis for Susceptible Contacts

- The MMR vaccine may be given within 72 hours of exposure to persons ≥6 months of age with 1 or no documented doses of MMR, if not contraindicated.
- Immune globulin (IG) may be given to exposed susceptible people of any age through day 6 after exposure.
    - The recommended dose of IG is 0.5 mL/kg (maximum dose=15 mL) intramuscularly (IM).
        - For persons weighing >30 kg, 15 mL of IG may not be effective and should seek medical expertise to discuss if the IG provided enough protection to end isolation before 21 days.
    - Pregnant women and immunocompromised individuals should get IGIV.
        - Arrangements will need to be made with the women's healthcare provider.
    - For persons already receiving IGIV therapy prior to exposure, ≥400 mg/kg <3 weeks before measles exposure should be sufficient to prevent measles infection.
    - Note: IG should not be used to control measles outbreaks, but rather to reduce the risk for infection and complications in the person receiving it (Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP)).
- IG may prolong the incubation period so extending the monitoring period for individuals who received IG as PEP may be considered (Manual for the Surveillance of Vaccine-Preventable Diseases: Measles - Control Measures). If symptoms consistent with measles occur within 28 days of exposure, persons who have received IG should be instructed to isolate themselves immediately and notify their health department.
- Children under 1 year of age that receive MMR will still need to have two doses of MMR after 1 year of age.

Requesting Prophylaxis from DSHS

- DSHS has IGIM and the MMR vaccine for measles exposures and outbreaks.

Contact the regional DSHS office or VPD Team to start the requisition process.

- ☐ DSHS does NOT have IGIV.

Table 1. Prophylaxis Guidelines		
Risk Factor	**Time from first exposure**	
	< 72 hours	**72 hours through day 6**
Infant less than 6 months old	Give intramuscular IG: 0.5 mL/kg	Give IGIM: 0.5 mL/kg
Infant age 6 through 11 months	Give MMR vaccine if no contraindications	Give IGIM: 0.5 mL/kg
Susceptible pregnant woman	Give IGIV: 400 mg/kg	Give IGIV: 400 mg/kg
Severely immunocompromised	Give IGIV: 400 mg/kg	Give IGIV: 400 mg/kg
Susceptible close contact over 1 year old	Give MMR vaccine if no contraindications	Give IGIM: 0.5 mL/kg of body weight—for those ≥66 pounds,15 mL is the maximum dose

Administer Immune Globulin

- ☐ Screen for contraindications.
  - Immunoglobulin A deficiency (IgA)
  - Severe thrombocytopenia or any coagulating disorder that prevents intramuscular injections
  - History of anaphylactic reaction to a previous dose of IG.
- ☐ Provide product information, available at: http://www.fda.gov/downloads/BiologicsBloodVaccines/BloodBloodProducts/ApprovedProducts/LicensedProductsBLAs/FractionatedPlasmaProducts/UCM371376.pdf
- ☐ Give immune globulin (IG) intramuscularly (IM) to children and adults with a 1 to 2-inch needle, depending on recipient's weight.
  - Regardless of age, the dose is 0.5 ml/kg.
  - The maximum dose is 15 mL IM (anyone over 66 pounds will get the max dose).
  - Pregnant women and immunocompromised persons should receive IGIV from their healthcare provider.
- ☐ Select a large muscle mass that can support the administration of a large volume of IG.
  - For children <3 years of age, administer IG into the vastus lateralis (outer thigh) muscle with a 7/8 to 1 inch needle. For certain very small infants a 5/8 inch needle may be adequate.
  - For persons ≥3 years of age, administer IG into the ventrogluteal or dorsogluteal muscle with a 1-2 inch needle.
  - For adults with sufficient deltoid muscle mass, the deltoid muscle may be used.
- ☐ Do not administer more than 3 mL of IG per injection site in children or more than 5 mL of IG per injection site in adults; therefore, based on the weight of a person, multiple injections may be required.
- ☐ Receipt of MMR after IG or IG after MMR:

- **MMR after IG:** IG and measles vaccine should not be given at the same time. Any susceptible contacts exposed to measles who received IG should be given MMR vaccine provided the person is 12 months or older (and the vaccine is not contraindicated). MMR vaccine should be administered:
  - No earlier than 6 months after IGIM administration
  - No earlier than 8 months after IGIV administration
- **IG after MMR:** If IG is administered within 2 weeks following the administration of MMR or varicella vaccine, the individual should be revaccinated. MMR vaccine should be administered:
  - No earlier than 6 months after IGIM administration
  - No earlier than 8 months after IGIV administration
  - For more information: https://www.cdc.gov/mmwr/preview/mmwrhtml/rr6204a1.htm

- IG can be administered simultaneously with, or at any interval before or after, any inactivated vaccine.
- Anyone that receives IG should not receive a live virus vaccine (MMR or varicella vaccine) for at least 6 months.

Exclusion

According to the Texas Administrative Code (TAC), children in school and childcare settings shall be excluded for 4 days after rash onset or in the case of an outbreak, exclude unimmunized child for at least 21 days after the last date the unimmunized child was exposed.

(An unimmunized child would be a child that does not meet this definition entirely: Beginning SY 2016 - 2017, students enrolling in kindergarten through 12th grade are required to have two doses of MMR vaccine with the first dose received on or after the first birthday. Students vaccinated prior to 2009 with two doses of measles and one dose each of rubella and mumps satisfy this requirement.) Rule §97.63: Immunization Requirements in Child-care Facilities, Pre-Kindergarten, Early Childhood Programs, and Texas Elementary and Secondary Schools

Susceptible adults should be instructed to stay home from work and any other activities.

MANAGING SPECIAL SITUATIONS

Cases among Employees or Attendees at Schools

Exclude persons with suspected measles from school until 4 days have passed since rash onset if not immunocompromised, who should be excluded for the duration of their illness.

- All students and school staff born in or after 1957 who cannot provide adequate evidence of immunity should be vaccinated, regardless of exposure status. A first dose should be given to those who are unvaccinated. Recommend a second MMR to persons who have previously received only one MMR as long as 28 days have passed since the first dose.
- Identify all persons at the school who were potentially exposed to the case.
  - Recommend that susceptible, unimmunized persons receive the MMR vaccine within 72 hours of exposure (or if immunocompromised, pregnant or under one year of age, IGIV or IG within 6 days). Exclude

all exposed persons who were susceptible and unimmunized at the time of exposure unless they received PEP (see Table 3).
    - Exposed persons who had received one dose of measles-containing vaccine prior to the exposure can return to school after they receive their second dose of MMR but should be educated about symptoms of measles and told to stay home if symptoms develop.
    - Susceptible, unimmunized persons who continue to refuse the recommended measles vaccination(s) following exposure to measles should stay home from school or childcare until 21 days after the last date the unimmunized child was exposed.
- ☐ Maintain daily active surveillance of all school contacts to assess for prodromal signs and symptoms of rash illnesses compatible with measles for 21 days from the last possible exposure in the school.

Cases among Employees or Attendees at Childcare Facilities

Exclude persons with suspected measles from childcare until 4 days have passed since rash onset if not immunocompromised.

- ☐ All students and staff born in or after 1957 who cannot provide adequate evidence of immunity should be vaccinated, regardless of exposure status (assuming they are old enough for MMR). A first dose should be given to those who are unvaccinated. Recommend a second MMR to persons who have previously received only one MMR as long as 28 days have passed since the first dose.
- ☐ Identify all persons at the childcare facility who were potentially exposed to the case.
    - Recommend that susceptible, unimmunized persons receive the MMR vaccine within 72 hours of exposure (or if immunocompromised, pregnant or under one year of age, IGIV or IG within 6 days). Exclude all exposed persons who were susceptible and unimmunized at the time of exposure unless they received PEP (see Table 3).
    - Exposed persons who had received one dose of measles-containing vaccine prior to the exposure cannot return to childcare until after they receive their second dose of MMR.
    - Susceptible, unimmunized persons who continue to refuse the recommended measles vaccination(s) following exposure to measles should be asked to stay home from childcare until 21 days after the last date the unimmunized child was exposed.
- ☐ Maintain daily active surveillance of all childcare contacts to assess for prodromal signs and symptoms of rash illnesses compatible with measles for 21 days from the last possible exposure in the school.

Case(s) in a Medical Setting

- ☐ To prevent measles outbreaks in health care settings, health care workers (defined as anyone who works, studies or volunteers in a healthcare facility of any kind) should have documented immunity to measles *before* exposure, ideally as a condition of employment.
    - Health care facilities should maintain readily available documentation of immunity.
    - Acceptable evidence of immunity to measles in health care workers includes (MMWR 1998; 47[No. RR-8]:11):
        - Documented administration of 2 doses of live measles virus vaccine given on or after the first birthday (inactivated measles

vaccines were in use from 1963–1967), or
- Laboratory evidence of immunity, or
- Born before January 1, 1957 – Healthcare facilities should consider recommending measles, mumps, rubella (MMR) vaccination for unvaccinated workers born before 1957 without a history of measles disease or laboratory evidence of immunity, or
- Documentation of health care provider-diagnosed measles.

- ☐ If a person with measles is treated in a health care setting during the contagious period, identify all potentially exposed patients, visitors, health care workers, volunteers and other staff and assess status of their immunity to measles.
- ☐ If an exposed healthcare worker has had only one documented dose of measles-containing vaccine, give an additional dose of vaccine. If the second dose can be given with 72 hours of the exposure, consider the person immune with no work restrictions. If vaccine cannot be administered within 72 hours, the healthcare facility can test for measles IgG serology and consider the person immune if the test is positive for measles specific IgG. If the serology is not done or negative, the worker should be furloughed for an incubation period.
- ☐ If the exposed healthcare worker has had two documented doses of measles vaccine given on or after the first birthday and at least 28 days apart, consider the person immune with no work restrictions.
- ☐ If the exposed healthcare worker was born on or after January 1, 1957, and has no documented evidence of immunity, a dose of measles-containing vaccine should be given immediately and no more than 72 hours after exposure. At the same time, a serologic test for measles IgG should be done to verify immunity. If immunity to measles is not serologically confirmed, the person must be furloughed from day 5 after the first exposure to day 21 after the last exposure.
- ☐ If the exposed healthcare worker was born before January 1, 1957, and has no documented evidence of immunity, a serologic test for measles IgG should be considered to verify immunity. If immunity is not confirmed, the person must be furloughed from day 5 after the first exposure to day 21 after the last exposure.
- ☐ <u>In summary, exposed susceptible health care workers should be immunized immediately and no more than 72 hours after exposure, and furloughed from day 5 after the first exposure to day 21 after their last exposure, regardless of receipt of postexposure prophylaxis.</u> This includes healthcare workers born at any time who have no documented evidence of immunity, and workers born in 1957 or later with only one previous dose of measles-containing vaccine documented who did not receive a second dose within 72 hours of exposure. (If furloughing of this second group is not possible due to large numbers exposed, these staff should have their temperatures taken and be assessed for prodromal symptoms when they come to work on the 5th through 21st day after the exposure. Anyone with a fever, cough, coryza, or conjunctivitis should be furloughed for the duration of symptoms and assessed for measles if a rash develops. This screening procedure must be followed rigorously to prevent staff members with prodromal measles from infecting others.)
- ☐ Healthcare workers who develop measles must avoid patient contact until 4 days have passed since the rash onset.

- Only health care workers with documented immunity to measles should enter the room of a suspected measles patient.
  - For pregnant healthcare workers, see Table 3.
- Exposed patients should likewise have their immune status assessed and be given vaccine if they are not immune; school and work restrictions of unimmunized contacts apply.

Activities that a health department may want to do prior to identification of any measles case or outbreak:

- Review measles investigation guidance (this document. Good job!).
- Have a supply of MMR vaccine on hand for outbreak response (check with your department's immunizations staff).
- Have a supply of viral transport media (e.g., Remel) and shipping containers on hand. (See Appendix C Laboratory Resources.)
- Have a DSHS laboratory submitter ID and G2A and G2V forms on hand. (See Appendix C Laboratory Resources.)
- Have draft exposure letters on hand (See Measles Toolkit at https://www.dshs.texas.gov/vaccine-preventable-diseases/measles-rubeola/measles-communication-toolkit)
- Ensure epidemiology, surveillance, preparedness, and field staffs are all immune to measles and that such immunity is documented.

Airline Exposures

Occasionally, Texas residents are exposed to measles in other states, often on airplanes. Typically, those notifications will come from the CDC to the Central Office. Central Office will notify each jurisdiction of any residents that have potentially been exposed to measles. Each jurisdiction is expected to make contact with all exposed individuals to verify vaccination history, ascertain or monitor symptoms, provide education on measles, and provide prophylaxis if warranted.

Alternately, Texas measles cases may have exposed people from other states while in transit. All information about the patient's travel (obtain the boarding documents, if possible) should be collected as soon as possible and forwarded to Central Office. Central Office staff will share the information with CDC so exposed passengers can be identified and shared with other states.
For more information on these types of situations, please see Appendix B.

Outbreaks

A measles outbreak is defined as a chain of transmission including 3 or more cases linked in time and space.

If an outbreak of measles is suspected, within 24 hours of identification, notify the regional DSHS office or EAIDU at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed and clinically suspected cases are required to be reported **immediately** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** cases to DSHS within 30 days of receiving a report of confirmed case.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation.

- **In the event of a death, copies of the hospital discharge summary, death certificate, autopsy report and death investigation form should also be sent to DSHS EAIDU.**
  - Investigation forms may be faxed to **512-776-7616,** securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Infectious Disease Control Unit
Texas Department of State Health Services
Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

LABORATORY PROCEDURES

Laboratory confirmation is essential because in a setting of measles elimination, as most cases that meet the clinical case definition are not measles. Additionally, because measles IgM assays may be falsely positive, collection of respiratory and/or urine specimens for PCR are encouraged. Testing at a public health laboratory is preferred over commercial labs. **If a private provider/hospital cannot or will not collect specimens, public health staff should make every arrangement to collect specimens instead.** Collect both virology specimens as well as serology specimens. To obtain testing kits, contact the DSHS Laboratory at **(512) 776-7661**. Before shipping specimens, be sure to notify DSHS EAIDU VPD staff at VPDTexas@dshs.texas.gov or **(512) 776-7676.** The specimen tracking number (e.g., FedEx or LSO number) should be provided to the DSHS EAIDU VPD staff. This helps to ensure that specimens are received in satisfactory condition and tested as soon as possible.

PCR Assay Specimen Collection and Submission* ***(preferred test)***

PCR can confirm the diagnosis of measles, especially in vaccinated persons. The DSHS Lab performs measles PCR. Additionally, when sent to the DSHS lab, molecular epidemiologic techniques are used to genetically type measles viruses and identify the source of wild viruses and establish chains of transmission (important during an outbreak). Positive PCR specimens will be forwarded to CDC or other designated public health lab for molecular testing. Viral isolation (i.e. culture) is not needed to perform strain typing. Acceptable mediums: VTM (preferred) and UTM. Note: AMIES is not acceptable.

Serology Specimen Collection and Submission

IgM Serology: A single specimen should be collected as soon as possible. A negative IgM result from a specimen collected before the fifth day of rash onset may not, however, rule out the diagnosis of measles (false negative results). While we encourage early testing of patients with a rash-fever illness, testing may need to be repeated if specimen was collected before the fifth day of rash onset.

IgG Serology: Acute AND convalescent samples are needed. Collect acute sample early in the course of illness and convalescent sample 10-14 days later. DSHS Laboratory can only conduct acute/convalescent testing if the first sample is negative (usually an unvaccinated individual). Otherwise, the acute/convalescent testing will need to be conducted through laboratory commercial or hospital laboratory or referred to the CDC.

Frequent Causes for Rejection:

- Discrepancy between patient name on tube and name on submission form
  - Include two patient identifiers on the specimen media such as patient first and last name AND date of birth.
- Expired media used

	Measles VIRAL Specimen Collection
Specimen Type	**PCR TESTING *(PREFERRED)*** ** Measles Specimens **
Materials 	• Viral transport media (VTM) (preferred) or UTM and tubes • Specimen submission forms (G2V) • Personal protective equipment • Tongue depressors • Polyester fiber tipped swabs - either Dacron or Rayon • NO cotton-tipped or wooden shaft swabs or any that contain calcium alginate
Proper Specimen Collection	• Do not use expired media – be sure to check the expiration date • With mouth open, depress tongue • Swab both tonsillar pillars and posterior oropharynx and avoid touching the tongue, teeth, and gums • Put tip of swab in the VTM, breaking applicator stick • Seal properly • Freeze or refrigerate • Prepare for shipment • Throat swabs are the preferred specimens for DSHS testing • Nasopharyngeal swabs and urine are also acceptable specimens for measles testing Note: urine specimens are sent to the CDC for testing
Specimen Handling	• Transport specimens to the laboratory as soon as possible • Specimens should be placed in a biohazard bag and stored at 4°C (cold) or -70° C (frozen) • Store cold (2°C to 8°C) if they will arrive at the Lab <48 hours after day of collection (DOC). • Store specimens frozen if they will arrive at the Lab >48 hours after DOC. • DO NOT store samples in a standard freezer–this inactivates the virus • DO NOT have repeated freeze thaw cycles–this inactivates the virus
Specimen Shipping	• Do not ship on Fridays or before federal holidays • Specimens stored at 4°C are shipped using cold packs • Specimens stored at -70°C are shipped on dry ice • Complete the G2V form for each specimen with as much information as possible about the patient. All specimens must be labeled with at least two patient specific identifiers; both a primary and a secondary identifier. The identifiers must appear on both the specimen tube and the associated specimen submission form. Specimens that do not meet this criteria will be considered unsatisfactory for testing. https://www.dshs.texas.gov/sites/default/files/LIDS-LAB-Microbio/SpecimenCollectionandShippingGuidance_Measles.pdf • Check the "Measles PCR" box in Section 4 of the G2V • The name on the tube should match the name on the form exactly. • Payor source can be the patient's insurance or Immunizations. • Ship to the physical address ATTN: Lab Services • Record the shipping tracking number and notify EAIDU that a specimen is being shipped
Additional Information	• Collect as soon as possible after rash onset, preferably within 3 days • Not more than 10-14 days after onset • CDC– Measles PCR Laboratory Testing for Measles

	Measles SERUM Specimen Collection
Specimen Type	**IgM and IgG Antibody Testing** ** Measles Specimens **
Materials	• Red top tubes and serum separator tubes OR gold top OR tiger top tubes • Specimen Submission forms (G2A) • Personal Protective Equipment • Centrifuge

Proper Specimen Collection	• Do not use expired tubes – be sure to check the expiration date
	• RED TOP TUBE
	  ○ Collect at least 5mL of blood in red top tube
	  ○ Centrifuge the red top tube
	  ○ Transfer the serum into a serum transport tube
	• GOLD/TIGER TOP TUBE
	  ○ Collect at least 5mL of blood in gold/tiger top tube
	  ○ Centrifuge the gold/tiger top tube
	• Seal properly
	• Refrigerate or freeze (do not freeze serum separator tubes, gold top tubes or whole blood)
	• Prepare for shipment

Specimen Handling	• Transport specimens to the laboratory as soon as possible • Specimens should be placed in a biohazard bag and stored at 4°C or -20° C (if using a courier instead of shipping, secure an ice pack to the tube to maintain proper temperature until arriving at Lab) • If specimens are shipped the same day of collection, ship cold at 4°C • If specimens will be stored and shipped after the date of collection, freeze at -20° C • Do not freeze whole blood in red top tube for shipping • Do not freeze serum in gold top or serum separator tube for shipping
Specimen Shipping	• Do not ship on Fridays or before federal holidays • Do not ship whole blood • Specimens that will arrive at the lab within 48 hours of collection can be stored at 4°C and should be shipped using cold packs • Specimens that will arrive at the lab more than 48 hours after collection should be stored at -20° C and shipped on dry ice • Complete the G2A form for each specimen with as much information as possible about the patient • Check "Rubeola screen" & "Rubeola IgM" in Section 7 of the G2A • The name on the tube should match the name on the form exactly • Payor source can be the patient's insurance or Immunizations. • Ship to the physical address ATTN: Lab Services • Record the shipping tracking number and notify EAIDU that a specimen is being shipped
Additional Information	• Collect as soon as possible after rash onset, up to 30 days • Patients with an MMR vaccine in the past 6-45 days are not recommended for serology testing. Centers for Disease Control and Prevention– Measles serology Laboratory Testing for Measles

REVISION HISTORY

January 2021
- Updates made throughout for clarity

December 2022
- Laboratory Procedures

September 2024
- Clarified lab criteria regarding multiple test results
- Updated laboratory testing options
- Updated procedure for vaccine-strain measles cases
- Clarified evidence of immunity for those foreign-born
- Updated Control Measures
- Updated Prophylaxis Guidelines for IG use
- Updated post-exposure prophylaxis and quarantine protocols table

TABLES

Table 2: Measles Serology Results and Interpretation

IgM Result	IgG Result	Previous infection history	Current infection/ vaccination Status	Comments
+	+ or -	Not vaccinated, no history of measles	Wild-type measles	Seroconversion†, classic Measles
+	+ or -	Previously vaccinated, primary vaccine failure	Recent 2nd MMR	Seroconversion†
-	+	Previously vaccinated, IgG+	Recent 2nd MMR	IgG level may stay same or boost
+	+	Previously vaccinated, IgG+	Wild-type measles	May have few or no symptoms‡
+	+	Recently vaccinated	Exposed to wild-type measles	Cannot distinguish if vaccine or wild-type, evaluate on epidemiologic grounds§

† IgG response depends on timing of specimen collection.
‡ If so, do not consider contagious unless clinical presentation is consistent with measles.
§ If IgM negative, helpful to rule out wild-type measles infection.

Table 3: Post-exposure Prophylaxis (PEP) and Quarantine Protocol for Measles Exposures Based on Pregnancy and Immunocompromised Status

Age Range	Measles Immune Status	PEP Type & Quarantine Protocol Based on Time After Initial Exposure		
		≤3 days (≤72 hours)	4-6 days	>6 days
Post-exposure Prophylaxis (PEP) and Quarantine Protocol for Measles Exposures Who Are NOT Pregnant or Immunocompromised				
<6 months old	Non-immune[1]	IGIM[2] PEP + home quarantine[3]		No PEP (too late) + home quarantine[3]
6-11 months old	Non-immune[1]	1 MMR dose[4] + no quarantine	IGIM PEP[2] + home quarantine[3]	No PEP (too late) + home quarantine[3]
>12 months old	Born before 1957[5]	No further action		
	2 MMR doses or has measles infection documentation[6]	No further action		
	1 MMR dose	1 MMR dose[7] + no quarantine[8]	No PEP + home quarantine	
	No evidence of immunity	1 MMR dose + no quarantine[8]	IGIM PEP[2,9] + home quarantine[3]	No PEP (too late) + home quarantine[3]
Post-exposure Prophylaxis (PEP) and Quarantine Protocol for Measles Exposures Who Are Pregnant or Immunocompromised[9]				
6-11 months old	Non-immune	IGIV PEP[10] + home quarantine[3]		No PEP (too late) + home quarantine[3]
>12 months old & immunocompromised[11]	Born before 1957	IGIV PEP[11] + home quarantine[3]		No PEP (too late) + home quarantine[3]
	Any immune status	IGIV PEP[11] + home quarantine[3]		No PEP (too late) + home quarantine[3]
>12 months old & pregnant	2 MMR doses or has measles infection documentation	No further action		
	1 MMR dose[12]	IGIV PEP[11] + home quarantine[3]		No PEP (too late) + home quarantine[3]
	No evidence of immunity	IGIV PEP[11] + home quarantine[3]		No PEP (too late) + home quarantine[3]

Sources: CDC's Manual for the Surveillance of Vaccine-Preventable Diseases: Measles chapter; Red Book: 2024 Report of the Committee on Infectious Diseases, 33rd Edition;

[1] MMR vaccine is not indicated in this age-group.

[2] The recommended dose of IG administered intramuscularly (IGIM) is 0.5 mL/kg of body weight (maximum dose = 15 mL)

[3] Home quarantine is 21 days after the last exposure; health departments should extend the quarantine period to 28 days if IG is administered, as IG can prolong the incubation period. When implementing home quarantine, ensure that all household members of the exposed individual are immune to measles.

[4] This dose will not be considered valid, and two valid doses will still be required as eligible by age. MMR(V) should not be administered to children <12 months of age.

[5] Birth before 1957 is an acceptable evidence of measles immunity.

[6] Acceptable evidence of immunity (for purposes of PEP decision making) including, written documentation of age-appropriate vaccination, laboratory evidence of immunity, or laboratory confirmation of disease. Verbal reports of vaccination without written documentation should not be accepted.

[7] Administer second MMR dose if ≥28 days has passed from the first dose or ≥90 days for MMRV, even if waiting ≥28 days would result in no PEP and home quarantine.

[8] While no quarantine is recommended, these persons should be excluded from healthcare settings for 21 days.

[9] The degree of altered immunocompetence in a patient should be determined by a physician.

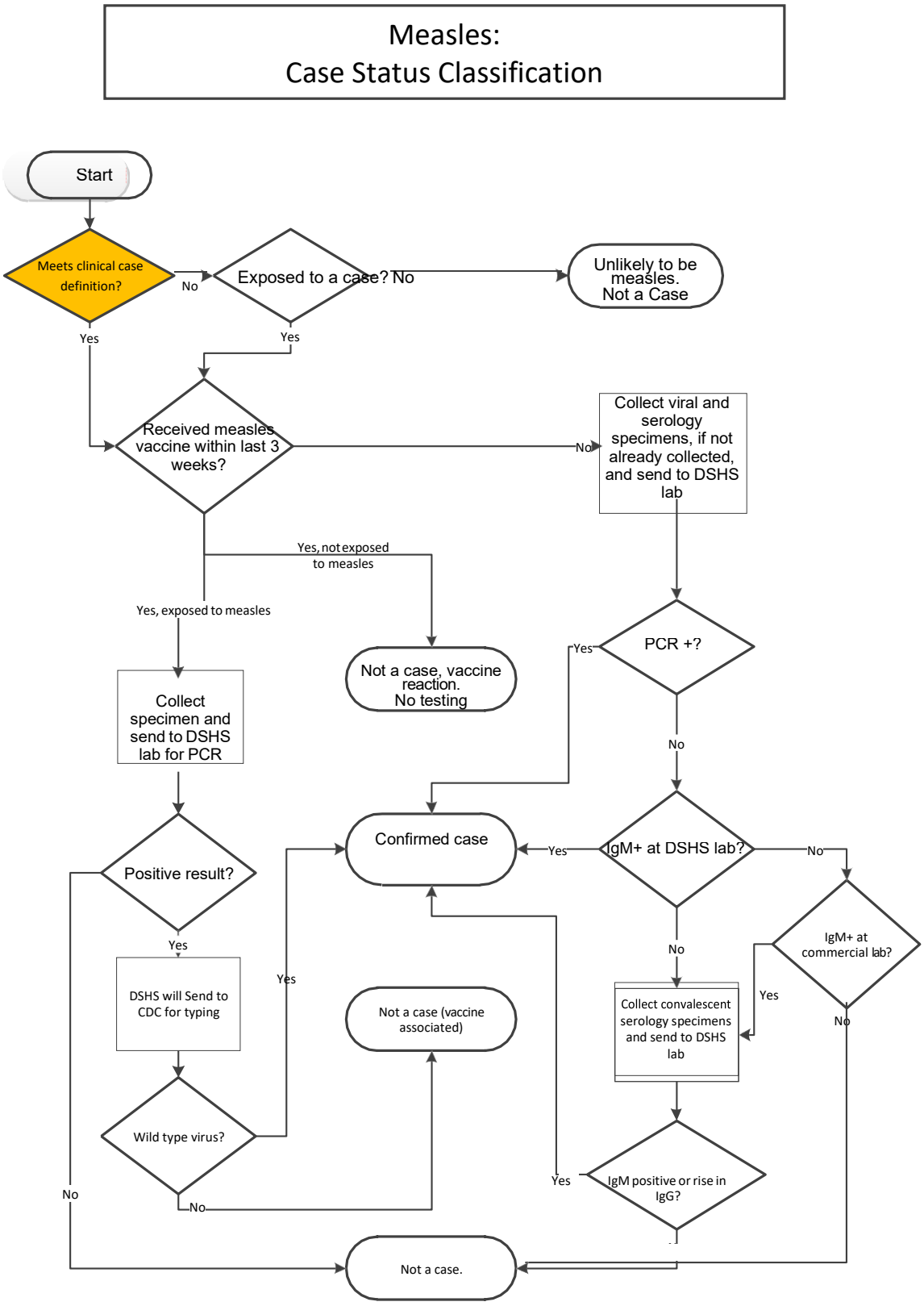
[10] IGIV is administered at a dose of 400 mg/kg. EX: if someone weighs 130 pounds = 59 kg = 23,600 mg dose

[11] Management of immunocompromised persons can be challenging and may require individualized decisions with provider based on immunocompromising condition or medications.

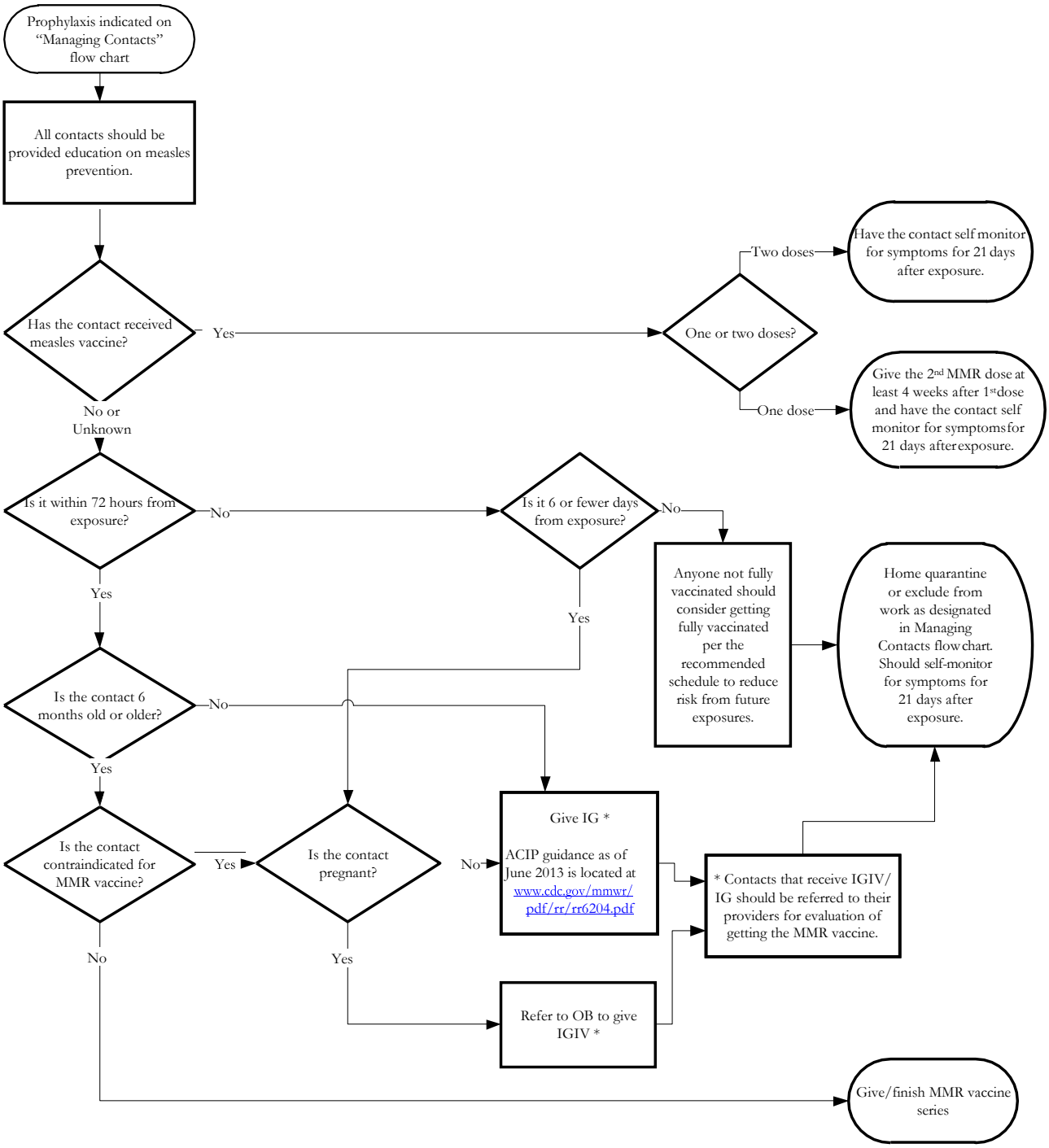
[12] Pregnant persons are considered high-risk contacts and may require individualized decisions with their provider based on their previous vaccine history and current situation.

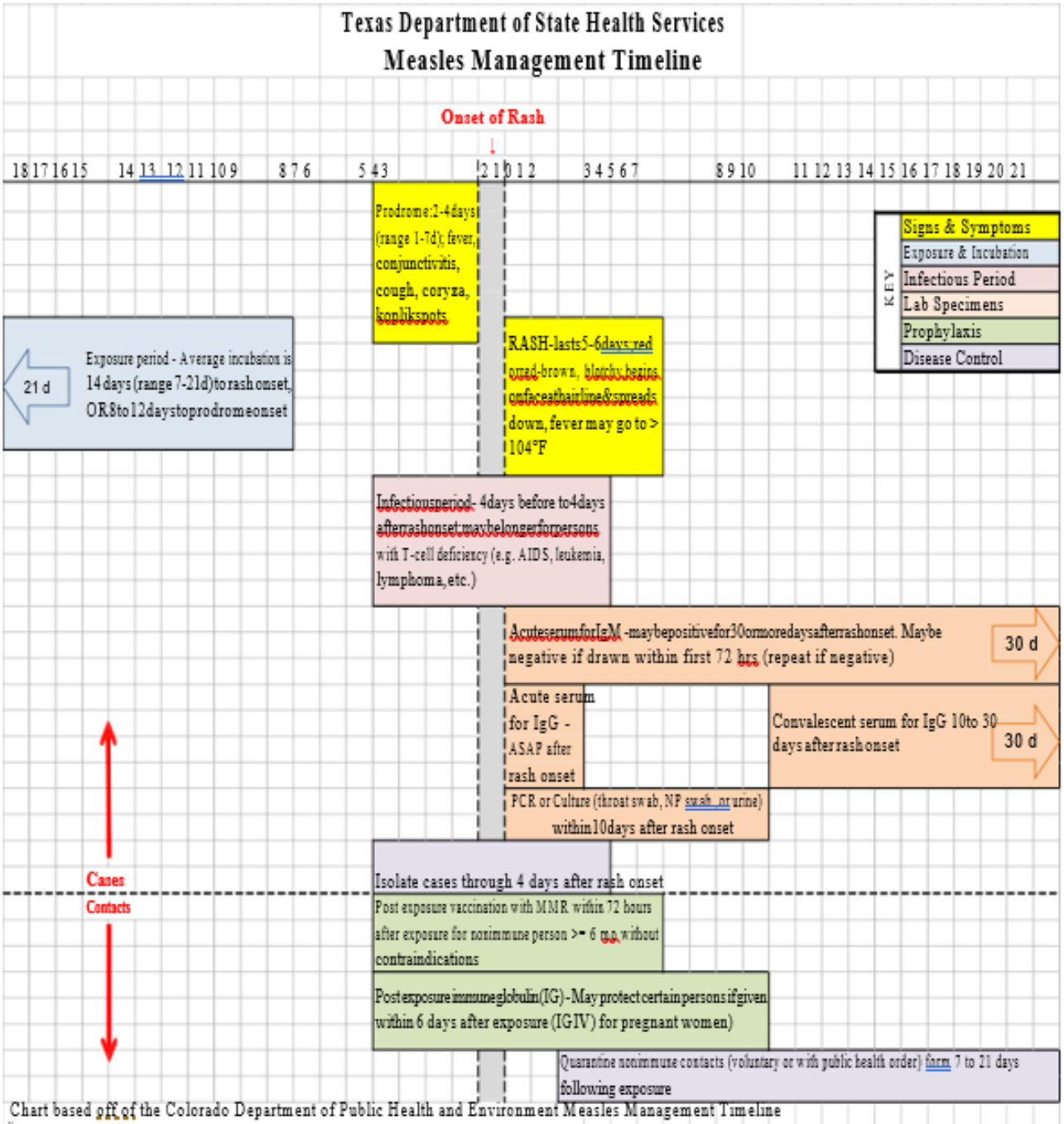
Prevention of Measles, Rubella, Congenital Rubella Syndrome, and Mumps, 2013: Summary Recommendations of the Advisory Committee on Immunization Practices (ACIP)

FLOW CHARTS


Measles:
Case Status Classification
Start
Meets clinical case definition?
No
Exposed to a case? No
Unlikely to be measles. Not a Case
Yes
Yes
Received measles vaccine within last 3 weeks?
No
Collect viral and serology specimens, if not already collected, and send to DSHS lab
Yes, not exposed to measles
Yes, exposed to measles
Not a case, vaccine reaction. No testing
PCR +?
Yes
No
Collect specimen and send to DSHS lab for PCR
Confirmed case
IgM+ at DSHS lab?
Yes
No
Positive result?
Yes
DSHS will Send to CDC for typing
Yes
Not a case (vaccine associated)
IgM+ at commercial lab?
No
Yes
Collect convalescent serology specimens and send to DSHS lab
No
Wild type virus?
Yes
IgM positive or rise in IgG?
No
No
Not a case.

Prophylaxis for Contacts of Confirmed or Highly Suspicious Measles Cases




Texas Department of State Health Services
Measles Management Timeline
Onset of Rash
18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21
Prodrome: 2-4 days (range 1-7d): fever, conjunctivitis, cough, coryza, Koplik spots
RASH - lasts 5-6 days: red raised brown, blotchy; begins on face at hairline & spreads down, fever may go to > 104°F
KEY
Signs & Symptoms
Exposure & Incubation
Infectious Period
Lab Specimens
Prophylaxis
Disease Control
21 d
Exposure period - Average incubation is 14 days (range 7-21d) to rash onset, OR 8 to 12 days to prodrome onset
Infectious period - 4 days before to 4 days after rash onset; may be longer for persons with T-cell deficiency (e.g. AIDS, leukemia, lymphoma, etc.)
Acute serum for IgM - may be positive for 30 or more days after rash onset. Maybe negative if drawn within first 72 hrs (repeat if negative)
30 d
Acute serum for IgG - ASAP after rash onset
Convalescent serum for IgG 10 to 30 days after rash onset
30 d
PCR or Culture (throat swab, NP swab, or urine) within 10 days after rash onset
Cases
Contacts
Isolate cases through 4 days after rash onset
Post exposure vaccination with MMR within 72 hours after exposure for nonimmune person >= 6 mo without contraindications
Post exposure immune globulin (IG) - May protect certain persons if given within 6 days after exposure (IGIV) for pregnant women)
Quarantine nonimmune contacts (voluntary or with public health order) form 7 to 21 days following exposure
Chart based off of the Colorado Department of Public Health and Environment Measles Management Timeline
Serologic tests may be false positive, so positive commercial IgM tests should be confirmed at the DSHS lab. PCR is only available at the DSHS lab.
For best results with viral culture, collect specimens <= 3 days after rash onset. Diagnostic yield is low for specimens collected > 10 days after rash onset.
Especially indicated for susceptible household or other close contacts, particularly contacts < 1 year of age, pregnant women, & immunocompromised persons.

CASE INVESTIGATION CHECKLIST

- ☐ **Immediately isolate anyone with suspected measles**
  - If at home: isolate in a room
  - If in the hospital: ensure airborne precautions (respiratory isolation in negative air pressure room, if possible)
- ☐ **Contact the provider (speak to an infection preventionist or physician) and confirm that clinical presentation and laboratory results meet the case definition and to request medical records**
  - Clinical presentation notes
    - ☐ If the suspect case was reported ≤3 days of rash onset, follow-up to establish a rash duration of ≥3 days
    - ☐ Someone with known exposure and prodromal symptoms without a rash should be considered a measles suspect
  - Laboratory notes
    - ☐ Collection of throat (preferred), NP, and/or urine specimens for PCR are strongly encouraged ASAP
    - ☐ Serum tested at commercial labs should be forwarded to the DSHS Lab for confirmatory testing – notify EAIDU to facilitate this process
    - ☐ If laboratory specimens have not been collected, make arrangements to have them collected ASAP
    - ☐ If a private provider/hospital cannot or will not collect specimens, public health staff should make every arrangement to collect specimens instead
  - Medical records
    - ☐ Verify case exposure, underlying health conditions, course of illness, vaccination status, and travel history
    - ☐ Request copies of admission and discharge summaries and laboratory results
- ☐ **Notify DSHS EAIDU and/or your regional office immediately**
- ☐ **Contact the case patient (or proxy) the same day the report is received for an interview:**
  - Determine vaccination status of the case
  - Determine possible risk factors and timeframes (within 3 weeks prior to rash onset):
    - ☐ Exposure to a confirmed measles case
    - ☐ Travel to a measles endemic/outbreak area or contact with a traveler from a measles endemic/outbreak area
    - ☐ Transit through an international airport
    - ☐ Exposure to international visitors or venues that may attract international visitors (tourist venues, international sports competitions, conference, etc.)
    - ☐ Use of public transit in a major U.S. city
- ☐ **Alert other health departments of exposures that may have occurred in their jurisdictions ASAP (CC: VPDTexas@dshs.texas.gov)**
  - Notify EAIDU if other states need to be notified
- ☐ **Distribute communications to healthcare providers (health alerts, etc.) and the public (press releases, etc.)**

- ☐ **Identify possible all close contacts and prioritize based on risk level and susceptibility**
- ☐ **Provide post exposure prophylaxis for susceptible contacts**
- ☐ **Monitor measles contacts**
- ☐ **If more than one case is identified or an outbreak occurs, see Managing Special Situations**
- ☐ **Enter all confirmed and suspect case investigations in NEDSS**

Suspect cases should be updated to "not a case" or "confirmed" once status is determined

Meningococcal Infection, Invasive

BASIC EPIDEMIOLOGY

Infectious Agent

Neisseria meningitidis is a Gram-negative, aerobic diplococcus with at least 13 serogroups. Serogroups A, B, C, Y, W-135 and X are all capable of causing outbreaks**.** In the United States and in Texas, B, C and Y are the most common serogroups.

Transmission

N. meningitidis spreads from person to person either by direct contact with respiratory secretions (e.g., kissing), indirect contact (e.g., sharing of eating utensils), or by aerosol droplets (e.g., coughing and sneezing). Up to 10% - 20% of people can be asymptomatic nasopharyngeal carriers of *N. meningitidis.* Less than 1% of those will progress to invasive disease.

Incubation Period

The incubation period is usually 3–4 days, but it can range from 1–10 days.

Communicability

A person can pass the infection to others for as long as the bacteria are present in discharges from the nose and mouth. A person is no longer infectious after 24 hours of appropriate antimicrobial treatment. (Antimicrobial treatment should be continued for the full duration that it is prescribed.)

Clinical Illness

- **Meningitis** is the most common presentation of invasive meningococcal disease. Meningococcal infection is similar to other forms of meningitis, with sudden onset of fever, headache and stiff neck, often accompanied by nausea, vomiting, photophobia (sensitivity to light) or altered mental status.
- **Meningococcal sepsis (meningococcemia or bacteremia)** is the most severe form and can occur without meningitis in 5%-20% of invasive infections. Sepsis is characterized by abrupt onset of fever and a petechial or purpuric (red or purplish spots caused by bleeding under the skin) rash, and is often associated with hypotension, shock, acute adrenal hemorrhage and multiple organ failure.
- Less common presentations of meningococcal disease include pneumonia, arthritis, otitis media and epiglottitis.
- Texas invasive meningococcal disease cases from 2010-2020 reported the following clinical illness manifestations: meningococcal meningitis (43%), meningococcal sepsis (34%), multiple manifestations (13%), pneumonia (2%), septic arthritis (1%), unknown manifestation (5%).

Severity

The case fatality rate is 8%-15% even with appropriate antibiotic treatment. Sequelae occur in 11%- 19% of people and may include hearing loss, neurologic disability, amputation or loss of limb use.

DEFINITIONS

Clinical Case Definition

Invasive meningococcal disease manifests most commonly as meningitis and/or

meningococcemia that may progress rapidly to purpura fulminans, shock and death. However, other manifestations might be observed.

Laboratory Criteria for Diagnosis

- **Confirmed:**
  - Isolation of *Neisseria meningitidis* from a normally sterile site
  - Isolation of *Neisseria meningitidis* from purpuric lesions
  - Detection of *Neisseria meningitidis*- specific nucleic acid in a specimen obtained from a normally sterile site, using a validated polymerase chain reaction (PCR) assay
- **Probable:**
  - *Neisseria meningitidis* antigen detection by immunohistochemistry (IHC) on formalin-fixed tissue
  - *Neisseria meningitidis* antigen detection by latex agglutination of CSF
- **Suspect:**
  - Gram negative diplococci, not yet identified, isolated from a normally sterile site (e.g., blood or CSF)

Case Classification

- **Confirmed**: A case that meets at least one of the confirmed laboratory criteria
- **Probable**: A case that meets at least one of the probable laboratory criteria
- **Suspect**: A case that meets the suspect laboratory criteria, or a case with clinical purpura fulminans in the absence of a positive blood culture

Note: All *Neisseria meningitidis* isolates from normally sterile sites and/or purpuric lesions must be submitted to the DSHS laboratory for typing and molecular analysis, regardless of typing at other facilities.

See the Sterile Site and Invasive Disease Determination Flowchart in Appendix A for confirming that a specimen meets the criteria for sterile site.

See the Meningococcal Infection: Case Status Classification Flowchart at the end of this section for assistance with case classification.

Specimen Collection After Death

Specimens collected during an autopsy must be normally sterile sites and collected within 24 hours of death to be considered confirmatory. If the specimen is collected more than 24 hours after death, even if from a normally sterile site, it is now considered not sterile and will not be considered confirmatory.

Other Definitions

For a definition of "close contacts" see the Case Investigation section (subsection: Control
Measures). For cluster and outbreak definitions see the Managing Special Situations section.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of invasive

meningococcal infections. Investigations should include an interview of the case or a surrogate to obtain a detailed exposure history. Please use the Meningococcal Infection Investigation Form available on the DSHS website: http://www.dshs.texas.gov/eaidu/investigation.aspx.

Case Investigation Checklist

- ☐ An investigation should begin immediately for any person, living or deceased, who is suspected of having invasive meningococcal disease.
  - Immediately inform the Regional Health Department and DSHS EAIDU when an investigation is being done or considered.
- ☐ Confirm that laboratory results indicate invasive disease.
  - See the Sterile Site and Invasive Disease Determination Flowchart in Appendix A.
- ☐ Review medical records or speak to an infection preventionist or physician to obtain demographics and case-patient symptoms.
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
  - Case (or parent), ImmTrac2, school nurse records, primary care provider, etc.
- ☐ Ensure that appropriate control measures are implemented (see Control Measures below).
- ☐ Interview the case (or surrogate) to identify close contacts (see "close contacts" definition in Control Measures section, below).
  - Obtain detailed information on close contacts including address, place of work, occupation, and daycare or school information.
  - If needed, the Respiratory Contact Tracking Form may be used to document contacts (available at Investigation Forms | Texas DSHS.
- ☐ Ensure that close contacts are offered and receive appropriate chemoprophylaxis.
- ☐ Ensure that all other appropriate control measures are implemented (see Control Measures).
- ☐ Within 24 hours of starting the investigation, contact the testing laboratory to ensure that the isolate has been forwarded to the DSHS laboratory (see Laboratory Procedures).
  - If an isolate (culture) is not available but invasive meningococcal disease is suspected, forward any specimen from a sterile site that is available.
  - If an isolate is available but no longer viable, please contact EAIDU at 512-776- 7676 to discuss testing options.
- ☐ Complete the Meningococcal Infection Investigation Form using all of the following sources:
  - Medical records
    - Alternate or supplemental source: infection preventionist or physician responsible for the patient's care during the meningococcal illness
  - Patient (or surrogate) interview
  - All possible sources of vaccination status including patient, parent/guardian, school, hospital records, primary care provider, and ImmTrac
- ☐ If applicable, complete steps in the Managing Special Situations section.
- ☐ **Fax or securely email the completed investigation form and lab results**

to EAIDU.

- ☐ Enter and submit for notification all suspect, probable, and confirmed invasive meningococcal cases in the NEDSS Base System (NBS).

Control Measures

Cases

- Investigate reports of suspected invasive meningococcal disease promptly to identify at- risk contacts.
- Isolate suspected and confirmed cases with droplet precautions until a suspected case is no longer suspected or a confirmed case has completed at least 24 hours of antimicrobial therapy.
- Start appropriate antibiotic treatment immediately upon diagnosis.
- Ensure that patients remain in respiratory isolation for 24 hours after the start of appropriate antibiotic therapy.
- Verify that school/daycare exclusion criteria are followed (see below).
- Disinfect any clothing or bedding that is soiled from nose or throat discharges. A patient's hospital room should be terminally cleaned upon discharge.

Contacts

- Advise contacts of signs and symptoms of illness, and refer them to their healthcare providers if they experience any symptoms compatible with invasive meningococcal disease.
- Recommend antibiotic postexposure prophylaxis for close contacts (regardless of meningococcal immunization status) who were exposed to the case in the 7 days before onset of disease in the case and until the case has had 24 hours of effective antibiotic therapy. Postexposure prophylaxis for close contacts should be initiated as soon as possible, ideally within 24 hours of identification of the index case and up to 14 days from the last exposure (see below for close contacts definition and prophylaxis recommendations).

Managing Close Contacts

- ☐ Close contacts include people in the same household, child-care center contacts, roommates, or anyone with direct contact with the patient's saliva. See table below for classifying contacts.
- ☐ Provide close contacts with chemoprophylaxis as needed (see Prophylaxis Guidelines).
- ☐ Monitor close contacts for signs of illness, especially fever, for up to 10 days.
- ☐ Provide close contacts with meningococcal disease fact sheets and other information.
    - A fact sheet for meningococcal meningitis is available on the EAIDU (Infectious Disease Control Unit) web site: Meningococcal Invasive Disease | Texas DSHS and Meningitis | Texas DSHS
    - Information is also available on all types of meningococcal disease: http://www.cdc.gov/meningococcal/about/.

High risk: chemoprophylaxis recommended (close contacts)
• Household contacts, especially children younger than 2 years of age • Childcare or preschool contact at any time during 7 days before onset of illness • Direct exposure to the index patient's secretions through kissing or through sharing toothbrushes or eating utensils—markers of close social contact—at any time during 7 days before onset of illness • Mouth-to-mouth resuscitation, unprotected contact during endotracheal intubation at any time 7 days before onset of illness • Frequently slept in same dwelling as index patient during 7 days before onset of illness • Passengers seated directly next to the index case during airline flights lasting more than 8 hours (gate to gate)
Low risk: chemoprophylaxis not recommended
• Casual contact: no history of direct exposure to index patient's oral secretions (e.g., school or work) • Indirect contact: only contact is with a high-risk contact, no direct contact with the index patient • Health care personnel without direct exposure to patient's oral secretions o Note: Hospital personnel should receive prophylaxis only if they were directly exposed to the patient's nasal or throat secretions and failed to correctly use appropriate personal protective equipment (PPE).
In outbreak or cluster
• Chemoprophylaxis for people other than people at high risk should be administered only after consultation with local public health authorities.

- The Texas Medical Board recently changed its rules (Texas Administrati Code, Title 22, Part 9, Chapter 190, Subchapter B, §190.8) regarding tl prescribing of prophylaxis for close contacts of patients with certain infectious diseases.
  Physicians can now prescribe antibiotics to contacts of invasive meningococcal disease cases without first medically evaluating the cont

Prophylaxis Guidelines

- Antimicrobial chemoprophylaxis should be administered as soon as possible (ideally <24 hours after identification of the index patient).
- Chemoprophylaxis administered >14 days after exposure to the index patient is probably of limited or no value.

Recommended chemoprophylaxis regimens for high risk contacts and people with invasive meningococcal disease				
Drug	Age Group	Dosage	Duration and route of administration *	Cautions
Rifampin[a]	<1 mo	5 mg/kg every 12 hrs	2 days	Discussion with an expert for infants <1mo
	≥ 1 mo	15-20 mg/kg (maximum 600 mg) every 12 hrs	2 days	Can interfere with efficacy of oral contraceptives and some seizure and anticoagulant medications; can stain soft contact lenses
Ceftriaxone	< 15 y	125 mg, IM	Single dose	To decrease pain at injection site, dilute with 1% lidocaine
	≥ 15 y	250 mg, IM		
Ciprofloxacin[b]	≥ 1 mo	20 mg/kg (maximum 500 kg)	Single dose	
Azithromycin		10 mg/kg (maximum 500 mg)	Single dose	Not recommended routinely; equivalent to rifampin for eradication of *Neisseria meningitidis* from nasopharynx in one study of young adults

IM= intramuscularly

*Oral administration unless indicated otherwise

[a]Rifampin is not recommended for pregnant women because the drug is teratogenic in laboratory animals. Because the reliability of oral contraceptives might be affected by rifampin therapy, consideration should be given to using alternative contraceptive measures while rifampin is being administered. [b]Ciprofloxacin is not generally recommended for persons aged <18 years or for pregnant and lactating women because the drug causes cartilage damage for immature laboratory animals. However, ciprofloxacin may be used for chemoprophylaxis of children when no acceptable alternative therapy is available. A recent review identified no reports of irreversible cartilage toxicity or age-associated adverse events in children and adolescents (Source: Burstein GR, Berman SM, Blumer JL, Moran JS. Ciprofloxacin for the treatment of uncomplicated gonorrhea infection in adolescents: does the benefit outweigh the risk? Clin Infect Dis 2002;35:S191–9).

Above information taken from *Red Book: 2018-2021 Report of the Committee on Infectious Diseases*

Activities by Setting
Schools or Institutions

- When a case of invasive meningococcal disease is identified in a school or other institution, public health should immediately contact facility administrators to recommend that the institution rapidly communicate with its population, and to help guide messaging.
    - Information communicated should include:
        - Notification about the case (obtain consent if the name of the case is to be released)
        - Reassurance that the chance of another case is remote
        - Signs and symptoms of invasive meningococcal disease and instructions to seek care promptly if they occur
        - Chemoprophylaxis is not needed unless individuals have been contacted by public health authorities.
- Vaccination with available meningococcal vaccines offers longer-term protection and is routinely recommended for adolescents and others at increased risk.
    - Meningococcal conjugate vaccines (Menactra® and Menveo®) available in the US provide protection against 4 of the 5 most common serogroups of *N. meningitidis* (serogroups A, C, W, and Y).
    - Serogroup B vaccines (Trumenba® and Bexsero®) provides protection for the other most common serogroup, serogroup B.
    - Approximately 2 weeks are required following vaccination for the development of protective antibody levels.
        - For more information about these vaccines call the DSHS Immunization Division at 512-776-7284.

General Public

- Provide education, when needed:
    - There are 2 vaccines available in the US that provide protection against the 5most common serogroups of *N. meningitidis* (serogroups A,B, C, W, and Y). These are meningococcal conjugate and serogroup B vaccines. For more information about these vaccines call the DSHS Immunization Division at 512-776-7284.
    - Routine hand washing and practicing respiratory etiquette (e.g., covering mouth and nose while sneezing or coughing) are essential to prevent the spread of bacteria.
    - Limit sharing food, eating utensils and other personal belongings.

Exclusion

Children with meningitis and bloodstream infections caused by *N. meningitidis* should be excluded from school and daycare until written permission is provided by their healthcare provider. According to the Texas Administrative Code (TAC), children in school and childcare settings shall be excluded until 24 hours after start of effective treatment and approval by health care provider.

Children with a fever from any infectious cause should be excluded from school and daycare for at least 24 hours after fever has subsided without the use of fever suppressing medications.

MANAGING SPECIAL SITUATIONS

If there are ≥2 suspected cases in the same institution or social group, an area or organization has met the outbreak threshold, and for guidance about other unusual situations, immediately notify EAIDU at **(800) 252-8239 or (512) 776-7676**.

Attack Rate Calculations

Attack rates are calculated to determine the risk for disease among the general population and to determine whether overall rates have increased.

1. Determine if any cases are secondary or co-primary cases. If the two cases are determined not to be co-primary or secondary, evaluation should continue to see if the cases represent an organizational outbreak.
    a. Primary case: A primary a case of invasive meningococcal disease is one that occurs in the absence of previous known close contact with another patient with invasive meningococcal disease.
    b. Secondary case: A secondary case of invasive meningococcal disease is one that occurs among close contacts of a primary case-patient 24 hours or more after onset of illness in the primary patient. (Note: Occurrence of secondary cases will be rare if chemoprophylaxis is administered as recommended.)
    c. Co-primary case: Co-primary cases are two or more cases that occur among a group of close contacts with onset of illness separated by less than 24 hours.
    d. Close contacts: Close contacts of a patient who has invasive meningococcal disease include household members (including dormitory room, barracks), childcare center contacts, and persons directly exposed to the patient's oral/nasal secretions (e.g., by kissing, mouth-to-mouth resuscitation, unprotected endotracheal intubation, or unprotected endotracheal tube management).
2. To calculate a primary attack rate all confirmed cases of the same serogroup should be summed, secondary cases should be excluded, and each set of co-primary cases should be counted as one case.

$$\text{Attack rate/100,000} = \frac{\text{Number of primary confirmed or probable cases occurring during a 3-month period}}{\text{Number of population at risk during the same time period}} \times 100{,}000$$

Population at risk: Persons who are considered to be at increased risk for invasive meningococcal disease compared with historical rates of disease in the same group of the general US population. Population at risk is usually defined on the basis of community of residence or organizational affiliation. In organization-based outbreaks, the population at risk can be defined as the group of persons that best represent the affiliation. In community- based outbreaks, patients do not share any common affiliation besides an area of residence.

Two or More Cases with the Same or Similar PFGE Patterns

DSHS EAIDU monitors molecular laboratory data for invasive meningococcal disease cases whose isolates have indistinguishable (matching) or similar pulsed-field gel electrophoresis (PFGE) patterns. EAIDU defines a PFGE cluster as one of the following:

- At least 2 cases with matching pulsed-field gel electrophoresis (PFGE) patterns in a county in a 1-year period
- At least 2 cases with matching PFGE patterns anywhere in Texas in a 3-

monthperiod When a PFGE cluster is identified:

- EAIDU will inform the Health Service Region (HSR); the HSR should inform the local health department(s) (LHDs) with jurisdiction over the cases (if applicable).
- If not already submitted, completed case investigation forms will be requested on cases that are part of the cluster.
- Case investigation forms for the clustered cases should be reviewed for common exposures.
- The investigating jurisdiction(s) may be asked to re-interview the cases or complete a supplemental case form.
- Threshold calculations may be conducted.
- Enhanced surveillance may be considered if cases are sufficiently temporally and/or geographically clustered or if they occur in a defined population and outbreak thresholds are not met.

Two or More Cases Associated with a School, Daycare, Nursing Home, Correctional Facility or Closed Setting

When ≥2 invasive meningococcal disease cases are associated with an organization, the
local/regional health department:

- Should thoroughly investigate links between the cases
  - LHDs should work closely with HSRs and EAIDU to coordinate information on invasive meningococcal disease cases from different jurisdictions.
- Should recommend basic control measures including hand hygiene, and respiratory etiquette education for residents/patients and staff
- Should conduct active surveillance for new cases of disease for a minimum of 2 weeks after the onset of the last case
- Should take steps to reduce overcrowding (if applicable)
- Should determine the population of the organization or affiliation and calculate attack rates for the organization by classroom, grade, unit or other grouping.
  - Organization-based outbreak: The occurrence of 2-3 confirmed or probable cases of invasive meningococcal disease of the same serogroup in a period of ≤3 months among persons who have a common affiliation but no close contact with each other, resulting in a primary disease attack rate of >10 cases per 100,000 persons.
  - Organization-based outbreaks may occur among children, students, residents and/or staff at a university, school, daycare, nursing home, correctional facility, church, employer, club, sports team or other organizational or closed setting.
- May consider mass antibiotic chemoprophylaxis for limited or closed populations (e.g., a single school or residential facility)
  - If mass chemoprophylaxis is undertaken, it should be administered to all targeted persons at the same time.
  - It is possible that even in a vaccine-preventable, organization-based outbreak, antibiotic distribution may be a more timely intervention since preventive antibodies take 7-10 days to develop after vaccination.
- Should vaccinate the population at risk if the attack rate is >10 cases per 100,000 population

- In some instances, the attack rate will be >10 cases per 100,000 populations with only 2-3 cases. In these situations, vaccination may be considered after only 2 primary cases are identified.
- The actual attack rate at which the decision to vaccinate is made may vary and the following factors should be considered:
  - Completeness of case reporting and number of possible cases of invasive meningococcal disease for which bacteriologic confirmation or serogroup data are not available
  - Occurrence of additional cases of invasive meningococcal disease after recognition of a suspected outbreak
  - Logistic and financial considerations
- Consult with EAIDU and the DSHS Immunization Branch to determine the need for and availability of vaccine.

Note: In the United States, measures that have not been recommended for control of invasive meningococcal disease outbreaks include restricting travel to areas with an outbreak, closing schools or universities, or canceling sporting or social events.

Multiple Cases Located within a Community

When multiple cases occur in a community, the local/regional health department should:

- ☐ Thoroughly investigate links between the cases
  - LHDs should work closely with HSRs and EAIDU to coordinate information on meningococcal disease cases from different jurisdictions.
- ☐ Consider enhanced surveillance to detect additional cases in the community
- ☐ Determine the population of the community and calculate attack rates with the outbreak strain among the population at risk, as described in the *Control of Communicable Diseases Manual, Epidemiology and Prevention of Vaccine-Preventable Diseases* ("Pink book") and *Manual for the Surveillance of Vaccine-Preventable Diseases*.
  - Community-based outbreak**:** Multiple outbreak-associated cases with an incidence of meningococcal disease that is above the expected incidence in a community during a 3-month period. Cases have no common affiliations to an organization but are instead linked by a shared, geographically defined community with a primary attack rate of >10 cases per 100,000 population.
  - Examples of settings for a community-based outbreak include neighborhood, zip code, school district, city or county, and may include populations with shared characteristics, such as men who have sex with men, as long as no affiliation to a specific organization is identified.
  - Note: For outbreak threshold calculations, population-based rates are used, and not age-specific attack rates, as have been calculated for college students.

When a community-based outbreak (based on calculations) is occurring:

- ☐ Conduct active surveillance to detect other cases in the population.
- ☐ Conduct a public education campaign.
- ☐ Immunize unvaccinated members of the at-risk population.
  - The actual attack rate at which the decision to vaccinate is made may

vary and the following factors should be considered:
    - Completeness of case reporting and number of possible cases of invasive meningococcal disease for which bacteriologic confirmation or serogroup data are not available
    - Occurrence of additional cases of invasive meningococcal disease after recognition of a suspected outbreak
    - Logistic and financial considerations
- Consult with EAIDU and the DSHS Immunization Branch to determine the need for and availability of vaccine.

Note: Mass chemoprophylaxis (with antibiotics) is not usually effective for widespread communities but may be considered for small sub-populations (e.g., schools) that are directly experiencing cases. If mass chemoprophylaxis is undertaken, it should be administered to all targeted persons at the same time.

Outbreaks
If an outbreak of meningococcal disease is suspected, notify the regional DSHS office or EAIDU at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Laboratory confirmed and clinically suspected cases are required to be reported **immediately** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- ☐ Call DSHS EAIDU immediately when an investigation is being done or considered.
- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed**, **probable, and suspect** cases to DSHS within 30 days of receiving a report of a confirmed, probable, or suspect case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules (for link to NBS guidelines see Appendix D).
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completion of the investigation.
- ☐ Fax, send a secure email, or mail a completed investigation form when the NBS notification is submitted.
    - **In the event of a death, copies of the hospital discharge summary, death certificate and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616**, securely emailed to VPDTexas@dshs.texas.gov or mailed to:

      Emerging and Acute Infectious Disease Unit Texas
      Department of State Health Services Mail Code: 1960
      PO Box 149347
      Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **(800) 252-8239 or 512-776-7676.**
- ☐ Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.
    - Send a copy to the DSHS regional office and/or to EAIDU see above methods for sending.
    - The Respiratory Disease Outbreak Summary Form is available at https://www.dshs.texas.gov/eaidu/investigation.aspx

LABORATORY PROCEDURES

Neisseria meningitidis isolates from normally sterile sites and/or purpuric lesions are required to be submitted to the DSHS Laboratory for typing and molecular analysis. Before shipping specimens, be sure to notify DSHS EAIDU staff at **(512) 776-7676**.

Specimen Collection

- ☐ Submit isolates of *N. meningitidis* (preferred specimen) on blood or chocolate agar at ambient temperature.
    - Note: Isolates that are no longer viable can still be tested. Please contact EAIDU to discuss testing options. If an isolate/culture is not available, EAIDU recommends sending blood, CSF, or any other available specimen from a sterile site or purpuric lesions (for PCR testing at CDC).
- ☐ Submit blood in a red or tiger-top vacutainer. Transport at ambient temperature.
- ☐ Submit spinal fluid. Transport at room temperature. DO NOT REFRIGERATE.

Laboratory Submission Form

- ☐ Use the DSHS Laboratory G-2B Specimen Submission Form.
- ☐ For isolates of *N. meningitidis*:
    - On the G-2B Form in "Section 9. Required/Requested Submissions" check "Neisseria meningitidis". Also select the appropriate box in "Section. 5 Bacteriology."

☐ Malaria/Blood Parasite Exam @ ☐ Worm Identification @
☐ Schistosoma/Urine Parasite Exam @ ☐ Other:

Section 5. BACTERIOLOGY

Clinical specimen:	*Definitive Identification:*
☐ Aerobic isolation	☐ Bacillus ☐ Campylobacter
☐ Anaerobic isolation	☐ Enteric Bacteria
☐ Culture, stool	☐ Gram Negative Rod
☐ Diphtheria Screen	☐ Gram Positive Rod
☐ GC/CT, amplified RNA probe	☐ Group B Streptococcus (Beta Strep)
☐ Haemophilus, isolation	☐ Haemophilus
☐ Toxic shock syndrome toxin I *assay (TSST 1)*	☐ Legionella
	☐ Neisseria
Pure culture:	☐ Pertussis / Bordetella
☐ Anaerobic identification	☐ Staphylococcus
☐ Organism suspected: _____	☐ Streptococcus ☐ Other

☐ Norovirus

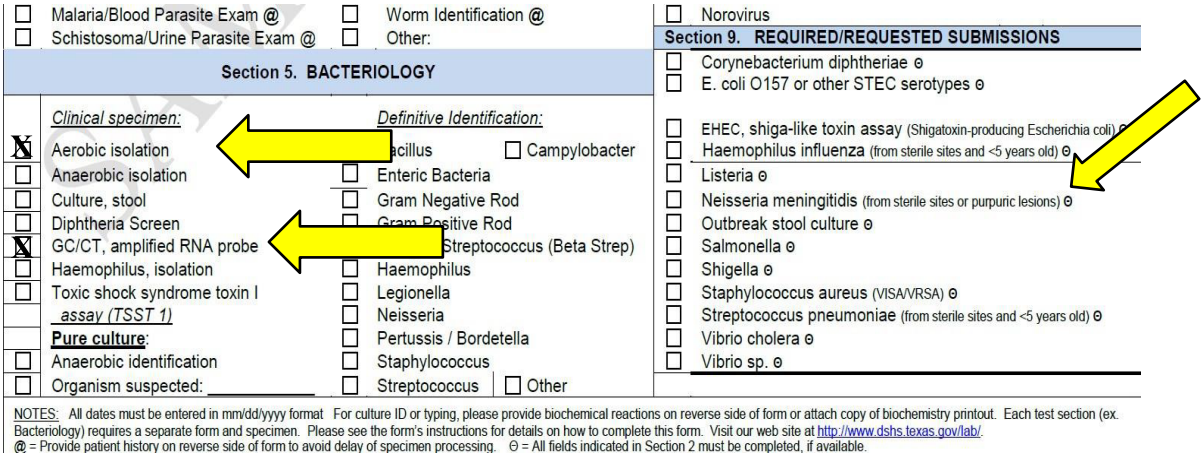
Section 9. REQUIRED/REQUESTED SUBMISSIONS

☐ Corynebacterium diphtheriae ⊖
☐ E. coli O157 or other STEC serotypes ⊖
☐ EHEC, shiga-like toxin assay (Shigatoxin-producing Escher coli) ⊖
☐ Haemophilus influenza (from sterile sites and <5 years
☐ Listeria ⊖
☐ Neisseria meningitidis (from sterile sites or purpuric lesions) ⊖
☐ Outbreak stool culture ⊖
☐ Salmonella ⊖
☐ Shigella ⊖
☐ Staphylococcus aureus (VISA/VRSA) ⊖
☐ Streptococcus pneumoniae (from sterile sites and <5 years old) ⊖
☐ Vibrio cholera ⊖
☐ Vibrio sp. ⊖

NOTES: All dates must be entered in mm/dd/yyyy format For culture ID or typing, please provide biochemical reactions on reverse side of form or attach copy of biochemistry printout. Each test section (ex. Bacteriology) requires a separate form and specimen. Please see the form's instructions for details on how to complete this form. Visit our web site at http://www.dshs.texas.gov/lab/.
@ = Provide patient history on reverse side of form to avoid delay of specimen processing. ⊖ = All fields indicated in Section 2 must be completed, if available.

- ☐ For blood or spinal fluid specimens:
    On the G-2B Form in "Section 5. BACTERIOLOGY," check "Aerobic isolation" under "*Clinical specimen*". Please write "*N. meningitidis*"

in the white space next to "Aerobic isolation" (see below). Also, please check the box for *Neisseria meningitidis* in the required/ requested submission.



☐ Malaria/Blood Parasite Exam @ ☐ Worm Identification @
☐ Schistosoma/Urine Parasite Exam @ ☐ Other:

Section 5. BACTERIOLOGY

Clinical specimen:
☒ Aerobic isolation
☐ Anaerobic isolation
☐ Culture, stool
☐ Diphtheria Screen
☒ GC/CT, amplified RNA probe
☐ Haemophilus, isolation
☐ Toxic shock syndrome toxin I *assay (TSST 1)*

Pure culture:
☐ Anaerobic identification
☐ Organism suspected: _____

Definitive Identification:
☐ acillus ☐ Campylobacter
☐ Enteric Bacteria
☐ Gram Negative Rod
☐ Gram Positive Rod
☐ Streptococcus (Beta Strep)
☐ Haemophilus
☐ Legionella
☐ Neisseria
☐ Pertussis / Bordetella
☐ Staphylococcus
☐ Streptococcus ☐ Other

☐ Norovirus

Section 9. REQUIRED/REQUESTED SUBMISSIONS

☐ Corynebacterium diphtheriae Θ
☐ E. coli O157 or other STEC serotypes Θ
☐ EHEC, shiga-like toxin assay (Shigatoxin-producing Escherichia coli) Θ
☐ Haemophilus influenza (from sterile sites and <5 years old) Θ
☐ Listeria Θ
☐ Neisseria meningitidis (from sterile sites or purpuric lesions) Θ
☐ Outbreak stool culture Θ
☐ Salmonella Θ
☐ Shigella Θ
☐ Staphylococcus aureus (VISA/VRSA) Θ
☐ Streptococcus pneumoniae (from sterile sites and <5 years old) Θ
☐ Vibrio cholera Θ
☐ Vibrio sp. Θ

NOTES: All dates must be entered in mm/dd/yyyy format For culture ID or typing, please provide biochemical reactions on reverse side of form or attach copy of biochemistry printout. Each test section (ex. Bacteriology) requires a separate form and specimen. Please see the form's instructions for details on how to complete this form. Visit our web site at http://www.dshs.texas.gov/lab/.
@ = Provide patient history on reverse side of form to avoid delay of specimen processing. Θ = All fields indicated in Section 2 must be completed, if available.

Specimen Shipping

- Provide a shipment tracking number to DSHS if possible.
- DO NOT ship specimens on a Friday or the day before a state holiday unless special arrangements have been made with the DSHS Laboratory.
- *N. meningitidis* is considered an infectious agent, biosafety level 2. The isolate should be triple- contained in accordance with federal regulations.
- Ship specimens to:

  Laboratory Services Section, MC-1947
  Texas Department of State Health Services
  Attn. Walter Douglass (512) 776-7569
  1100 West 49th Street
  Austin, TX 78756-3199

Frequent Causes for Rejection:

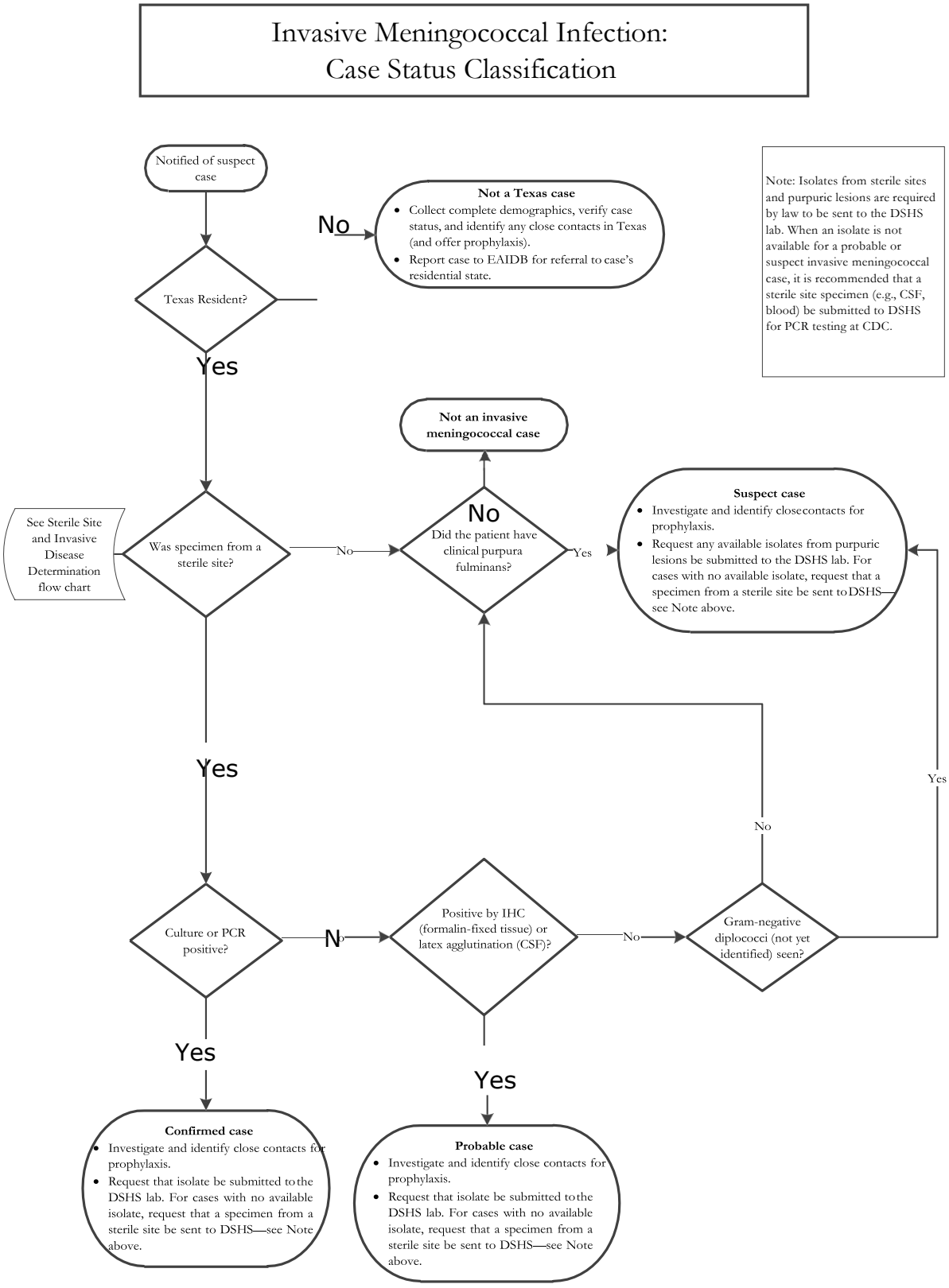
- Discrepancy between patient name on tube and name on submission form
  - Include two patient identifiers on the specimen media such as patient first and last name AND date of birth.
- Expired media used

REVISION HISTORY

March 2021
- Added Prophylaxis Guidelines Section
- Added prophylaxis table based on the Red Book.

December 2022
- Updated Clinical Illness
- Updated Control Measures

FLOW CHART


Invasive Meningococcal Infection:
Case Status Classification
Notified of suspect case
Texas Resident?
No
Not a Texas case
Collect complete demographics, verify case status, and identify any close contacts in Texas (and offer prophylaxis).
Report case to EAIDB for referral to case's residential state.
Yes
Note: Isolates from sterile sites and purpuric lesions are required by law to be sent to the DSHS lab. When an isolate is not available for a probable or suspect invasive meningococcal case, it is recommended that a sterile site specimen (e.g., CSF, blood) be submitted to DSHS for PCR testing at CDC.
Not an invasive meningococcal case
See Sterile Site and Invasive Disease Determination flow chart
Was specimen from a sterile site?
No
Did the patient have clinical purpura fulminans?
No
Yes
Suspect case
Investigate and identify close contacts for prophylaxis.
Request any available isolates from purpuric lesions be submitted to the DSHS lab. For cases with no available isolate, request that a specimen from a sterile site be sent to DSHS—see Note above.
Yes
Yes
No
Culture or PCR positive?
No
Positive by IHC (formalin-fixed tissue) or latex agglutination (CSF)?
No
Gram-negative diplococci (not yet identified) seen?
Yes
Yes
Yes
Confirmed case
Investigate and identify close contacts for prophylaxis.
Request that isolate be submitted to the DSHS lab. For cases with no available isolate, request that a specimen from a sterile site be sent to DSHS—see Note above.
Probable case
Investigate and identify close contacts for prophylaxis.
Request that isolate be submitted to the DSHS lab. For cases with no available isolate, request that a specimen from a sterile site be sent to DSHS—see Note above.

Mpox

BASIC EPIDEMIOLOGY

Infectious Agent

The infectious agent of mpox (formerly referred to as monkeypox) is the monkeypox virus (MPXV), which is a member of the *Orthopoxvirus* genus in the family *Poxviridae*. There are two distinct genetic clades of the monkeypox virus: clade I, formerly the Central African (Congo Basin) clade, and clade II, formerly the West African clade. The group of variants mainly circulating in the 2022 global outbreak is subclade IIb. The geographical division between the two clades has so far been in Cameroon, the only country where both virus clades have been found.

Transmission

Monkeypox virus can spread when a person comes into contact with the virus from an infected person, infected animal, or materials contaminated with the virus. The virus can also cross the placenta from the mother to the fetus.

Person-to-person transmission of MPXV is primarily through direct contact with infectious lesions, scabs, or body fluids. However, prolonged exposure to an infected person's respiratory secretions can also transmit the virus. At this time, it is not known if MPXV can spread through semen or vaginal fluids, but viral DNA has been detected in semen.

Examples of activities that may spread mpox from one person to another are wrestling, cuddling, kissing, or intimate sexual contact, including oral, anal, and vaginal sex, massage, mutual masturbation, or touching fabrics and objects that a person with mpox used during sex.

Although the risk of transmission in well-resourced healthcare settings is low, healthcare personnel (HCP) can become exposed to monkeypox virus while caring for infected patients. Unprotected contact with a patient's skin, lesions, or body fluids (e.g., ungloved contact; splashing of patient's saliva into eyes or mouth) could expose a person to monkeypox virus. Being in a patient's room or within six feet of a patient during aerosolizing procedures (e.g., shaking used linens; intubation or extubation; contact with oral secretions or skin lesions) without the use of eye protection, a respirator or other personal protective equipment (PPE) can lead to exposure. Correct and consistent use of PPE when caring for a patient with mpox infection is highly protective and prevents transmission to healthcare workers. However, unrecognized errors during the use of PPE (e.g., self-contaminating when removing contaminated PPE) may create opportunities for transmission.

Prior to the 2022 outbreak, mpox had been reported in people in several central and western African countries. Previously, almost all mpox cases in people outside of Africa were linked to international travel to countries where the disease commonly occurs or through imported animals.

Animal-to-human (zoonotic) transmission can occur from direct contact with the blood, bodily fluids, or cutaneous or mucosal lesions of infected animals. Monkeypox virus may spread from animals to people through the bite or scratch of an infected animal, preparing or eating undercooked meat, or using or consuming products made from

infected animals. It is unknown what animal maintains the virus in nature, although African rodents are suspected of being involved in mpox transmission to people. In Africa, evidence of MPXV infection has been found in many animals including rope squirrels, tree squirrels, Gambian pouched rats, dormice, different species of monkeys and others. A 2003 outbreak of mpox in the United States that caused 35 confirmed human cases in six states was associated with exposure to prairie dogs housed with small mammals imported from Africa by a Texas animal distributor. There has been some evidence of sick people infecting animals (e.g., dogs) with MPXV, and this is currently an area of study.

Incubation Period
The incubation period (time from infection to symptoms) for mpox is usually 3−17 days but can range from 2−21 days. Empirical data from the 2022 outbreak continues to refine our understanding of the incubation period.

Communicability
Within the context of the worldwide outbreak of clade II mpox, evidence has indicated the possibility of presymptomatic transmission of MPXV. Monkeypox virus DNA has been detected in various clinical samples in patients who, at the time of collection, were not symptomatic. Some of these specimens also yielded replication-competent virus. There is also epidemiological evidence of transmission from individuals that occurred 1-4 days prior to illness onset. There is also evidence of individuals that have been exposed to MPXV and were positive for MPXV DNA at low levels. However, there have been no definitively linked cases of transmission from infected individuals that never developed signs or symptoms of mpox to other individuals.

People are infectious for the duration of the illness, which is typically 2-4 weeks, and should avoid contact with other people and animals until all the scabs have fallen off and a fresh layer of intact skin has formed. At this time, it is not known if mpox can spread through semen or vaginal fluids, but viral DNA has been detected in semen.

Clinical Illness
Mpox is an acute illness, usually with sudden onset of initial symptoms of fever, headache, muscle aches, backache, swollen lymph nodes (lymphadenopathy), chills, and exhaustion. Clinically, the disease closely resembles smallpox, but lymphadenopathy is a more prominent feature in the early stage of mpox disease. It is important to note that these prodromal symptoms can also occur after the rash or not at all.

Shortly afterwards, usually within 1-4 days, a rash develops. Others may develop a rash as their first symptom, or rash may be the only symptom for others. Lesions typically begin to form simultaneously and evolve together on any given part of the body as they progress from macules → papules → vesicles → pustules → scabs or crusts. Characteristic lesions are deep-seated and well-circumscribed lesions and often have a central umbilication. Mpox may not always appear the same way; it could be clinically confused with chickenpox; shingles; molluscum contagiosum; hand, foot, and mouth disease; or a sexually transmitted infection (STI) like syphilis or herpes; as well as other infections. There have also been accounts of patients co-infected with monkeypox virus and other infectious agents (e.g., HIV or other STIs, or varicella-zoster virus). The illness typically lasts 2−4 weeks. If someone is immunocompromised, then the rash and illness could present differently.

Since the re-emergence of mpox in 2022, there have been some differences in clinical presentation of the disease. Some of these differences include: lesions often occur in the genital and anorectal areas or in the mouth, the rash is not always disseminated across many sites on the body, the rash may be confined to only a few lesions or even a single lesion, and the rash does not always appear on palms and soles. Lesions typically develop simultaneously and evolve together on any given part of the body. Rectal symptoms, such as purulent or bloody stools, rectal pain, or rectal bleeding, have been frequently reported in the current outbreak. Lesions are often described as painful until the healing phase when they become itchy (crusts). Fever and other prodromal symptoms, such as chills, lymphadenopathy, malaise, myalgias, or headache, can occur before rash but may occur after rash onset or not be present at all, and respiratory symptoms (e.g., sore throat, nasal congestion, or cough) have also been reported. The progression of lesions is still the same (macules → papules → vesicles → pustules → scabs or crusts).

Many people infected with MPXV have a mild, self-limiting disease course in the absence of specific therapy. However, the prognosis for mpox depends on multiple factors, such as previous vaccination status, initial health status, concurrent illnesses, and comorbidities, among others. People at high risk of severe disease are those that are immunocompromised, children (particularly less than 8 years of age), people with a presence or history of atopic dermatitis or persons with other active exfoliative skin conditions (e.g., eczema, burns, impetigo, varicella zoster virus infection, herpes simplex virus infection, severe acne, severe diaper dermatitis with extensive areas of denuded skin, psoriasis, or Darier disease [keratosis follicularis]), pregnant or breastfeeding women, and people with one or more complications (e.g., secondary bacterial skin infection; gastroenteritis with severe nausea/vomiting, diarrhea, or dehydration; bronchopneumonia; concurrent disease; or other comorbidities). Aberrant infections that include accidental implantation in eyes, mouth, or other anatomical areas where MPXV infection might constitute a special hazard (e.g., the genitals or anus). Mpox can also be painful and may require hospitalization for pain management. Clinicians should closely monitor those with severe mpox or those whose infection does not resolve within the normal 2-4 weeks. Severe mpox and death has also been closely associated with new or uncontrolled HIV infections (e.g., persons with high HIV viral load and CD4 counts <200 cells/μL); clinicians should closely monitor these individuals.

Clade II MPXV, which is the clade involved in the re-emergence of the virus in 2022, is associated with milder disease and fewer deaths than infections with clade I MPXV. These infections are rarely fatal (usually less than 1%). Clade I MPXV has historically caused more severe disease and was thought to be more transmissible. The fatality rate for clade I MPXV infections is estimated to be around 10%, although emerging evidence suggests that this may actually be lower. If clade I MPXV is suspected (due to travel history to an endemic region with circulating clade I MPXV or contact with a previous case of clade I mpox), testing should be conducted at the CDC. Arrange for testing at the CDC through the PHR and EAIDU (EAIDUMonitoring@dshs.texas.gov).

CASE DEFINITION

Laboratory Confirmation

- Confirmatory laboratory evidence:
  - Detection of MPXV nucleic acid by molecular testing in a clinical specimen; **OR**
    - **Monkeypox virus DNA [Presence] in Specimen by NAA with probe detection:**
    - **WA MVPX DNA Spec Ql NAA+probe:**
  - Detection of MPXV by genomic sequencing in a clinical specimen.
- Presumptive laboratory evidence:
  - Detection of orthopoxvirus nucleic acid by molecular testing in a clinical specimen AND no laboratory evidence of infection with another non-variola orthopox virus; **OR**
  - Detection of presence of orthopoxvirus by immunohistochemistry in tissue; **OR**
  - Detection of orthopoxvirus by genomic sequencing in a clinical specimen; **OR**
  - Detection of anti-orthopoxvirus IgM antibody using a validated assay on a serum sample drawn 4-56 days after rash onset, with no recent history (last 60 days) of vaccination*.
    - **Orthopoxvirus.non-variola DNA [Presence] in Specimen by NAA with probe detection:**
    - **ORTHOPOXVIRUS.NON-VARIOLA DNA:**
    - **NONVAR ORTHPX DNA SPEC QL NAA+PROBE:**
- Supportive laboratory evidence:
  - N/A

**Recent administration of ACAM2000 and Jynneos needs to be considered when interpreting an antibody titer. RABORAL V-RG is an oral rabies vaccine product for wildlife, is a recombinant vaccinia virus, and could lead to an antibody response in an individual exposed to the liquid vaccine; this is expected to be an extremely rare occurrence.*

Note: The categorical labels used here to stratify laboratory evidence are intended to support the standardization of case classifications for public health surveillance. The categorical labels should not be used to interpret the utility or validity of any laboratory test methodology.

Clinical Criteria

A person presenting with new onset of:

- clinically compatible rash lesions**; **OR**
- lymphadenopathy or fever***

***The presence of clinically compatible rash lesions should be combined with either a higher or lower epidemiologic linkage criterion for case classification.*
****A person presenting with lymphadenopathy or fever without any clinically compatible rash lesions must meet a higher risk epidemiologic risk criterion for case classification.*

Epidemiologic Linkage (within 21 days of illness onset)

- Higher Risk Epidemiologic Linkages
    - Contact, without the use of appropriate PPE‡, with a person or animal with a known orthopoxvirus or MPXV infection; **OR**
    - Contact, without the use of appropriate PPE‡ or Biosafety Level protocols‡, with laboratory specimens or other items that could serve as fomites that have been in contact with a person or animal with a known orthopoxvirus or MPXV infection; **OR**
    - Member of an exposed cohort as defined by public health authorities experiencing an outbreak (e.g., participated in activities associated with risk of transmission in a setting where multiple cases occurred).
- Lower Risk Epidemiologic Linkages
    - Member of a cohort as defined by public health authorities experiencing monkeypox activity; **OR**
    - Contact with a dead or live wild or exotic pet animal of an African species, or used or consumed a product derived from such an animal (e.g., game meat, powders, etc.); OR
    - Residence in or travel to a country where mpox is endemic.

‡The language "without the use of appropriate PPE or Biosafety Level protocols" includes breaches in the recommended PPE and deviations from appropriate BSL protocols.

Case Classifications

- **Confirmed**: Meets confirmatory laboratory criteria
- **Probable:** Meets presumptive laboratory criteria
- **Suspect:** Meets clinical criteria **AND** epidemiologic criteria^ **AND** no evidence of a negative test for either non-variola orthopoxvirus or MPXV

^The presence of clinically compatible rash lesions should be combined with either a higher or lower epidemiologic linkage criterion for case classification. A person presenting with lymphadenopathy or fever without any clinically compatible rash lesions must meet a higher risk epidemiologic risk criterion for case classification.

Criteria to distinguish a new case of this disease or condition from reports or notifications which should not be enumerated as a new case for surveillance
For persons previously classified as a probable or confirmed mpox case, mpox reinfection should be considered should the recurrence of symptoms present after complete resolution (defined as the disappearance of all clinical symptoms and any other persistent symptoms caused by or associated with MPXV) of the initial MPXV infection.

Suspect Mpox Reinfection Case:

- A case that fits the clinical description of mpox reinfection and meets any of the following criteria:
    - New rash; **OR**
    - Meets one of the epidemiologic criteria and has a high clinical suspicion for mpox

Probable Mpox Reinfection Case:

- A case that meets the criteria for a suspect mpox reinfection case **AND** demonstrates one of the following from a patient specimen:

- Orthopoxvirus or MPXV DNA by NAA of a clinical specimen OR
- Orthopoxvirus using immunohistochemical or electron microscopy testing methods OR
- Demonstrable increase in anti-Orthopoxvirus IgG antibodies in paired serum samples collected within 3 days of symptom onset and 7-14 days after symptom onset, for patients with no prior mpox/smallpox vaccination or vaccinated ≥180 days prior to symptom onset

Confirmed Mpox Reinfection Case:

- A case that meets criteria for a probable mpox reinfection case **AND** has significant single nucleotide polymorphisms (SNPs) or genetic variation between MPXV genetic sequences from clinical specimens obtained from two or more episodes of MPXV infection separated by complete resolution of symptoms within the same individual.

Case Investigation

Local and regional health departments should **IMMEDIATELY** investigate all reports of mpox. Investigations should include an interview of the case, or a surrogate, to get a detailed clinical, exposure, travel, and vaccination history. Additional information from the CDC and DSHS websites can assist with mpox investigations.

The current investigation forms include the DSHS Patient Under Investigation Form and the CDC Mpox Case Investigation Form and can be found at https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health. All case investigations must be entered into the Texas NEDSS Base System (NBS).

Testing for MPXVor non-variola *Orthopoxvirus* by PCR should be performed for patients with a new characteristic rash, or patients that have an epidemiologic risk factor and there is a high clinical suspicion[1] for mpox or exposure that puts them at risk. Additionally, they should be evaluated for other possible febrile and rash illnesses. Historically, sporadic accounts of patients co-infected with MPXV and other infectious agents (e.g., varicella zoster virus or herpes simplex virus) have been reported, so patients with a characteristic rash should be considered for testing, even if other tests are positive.

Packing, Shipping and Transport

Laboratory testing has indicated that clade II MPXV (formerly the West African clade) is associated with the re-emergence of mpox in 2022. The U.S. government does not consider clade II MPXV as meeting the definition of Category A infectious substance under the Hazardous Materials Regulations (HMR). Therefore, specimens and material suspected or confirmed to contain clade II MPXV can be shipped as UN 3373 Biological Substance, Category B. See U.S. Department of Transportation's (DOT) Transporting Infectious Substances Safely and Managing Solid Waste Contaminated with a Category A Infectious Substance (pg. 94) for further guidance.

1A. Patient Under Investigation (PUI)/Suspect Case Investigation Checklist for Hospitalized Patient

- ☐ Patients that come into a healthcare facility with mpox-compatible symptoms should be isolated in a single patient room containing a private bathroom with the door closed (if safe to do so). Special air handling is not required. Intubation,

1 Clinical suspicion may exist if presentation is consistent with illnesses confused with mpox (e.g., secondary syphilis, herpes, and varicella zoster).

extubation, and any procedures likely to spread oral secretions should be performed in an airborne infection isolation room.

- HCP should utilize appropriate PPE and follow appropriate precautions, which includes Standard Precautions plus additional precautions, as required. HCP should also follow guidance for infection prevention and control of mpox in healthcare settings. See CDC's mpox infection control guidance: Mpox Infection Prevention and Control in Healthcare Settings | Mpox | CDC as well as general isolation precautions: (Isolation Precautions Guideline | Infection Control | CDC).
- Facility infection prevention and control personnel should be notified.
- Facility infection prevention and control personnel or occupational health services should keep a list of all persons who had contact with the patient, entered a contaminated room or patient care area, or had contact with contaminated materials; this list should also include time, location, and type of contact/exposure.
- Assess the PUI's epidemiologic risk factors and symptoms and determine if they meet the suspect case definition.
    - Interview the suspected-case patient, their surrogate and/or the patient's healthcare provider. Complete the DSHS PUI Form, and, if necessary, obtain medical records.
- If necessary, contact your regional health department for consultation on symptoms, epidemiologic risk factors, and preliminary lab findings.
- If appropriate, consider testing and treating for alternative diagnoses while waiting for monkeypox virus testing results.
- Arrange for testing of PUI at an LRN or commercial CLIA-approved testing facility. See DSHS Mpox Laboratory Testing Guidance for Human Clinical Specimens at https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health.
    - If Clade I monkeypox virus is suspected (due to travel history to an endemic region with circulating Clade I MPXV or contact with a previous mpox case caused by Clade I MPXV), testing should be conducted at the CDC. Arrange for testing at the CDC through the PHR and EAIDU.
- Identify all close contacts of PUI and events attended during infectious period. Assess risk levels of exposed individuals as soon as a person with epidemiologic risk factors and mpox symptoms presents for medical evaluation.
- Suspect case investigations may be entered into NBS.
- See Case Investigation Checklist for Hospitalized Patient if the patient is positive for *Orthopoxvirus* or monkeypox virus.

1B. PUI/Suspect Case Investigation Checklist for Non-hospitalized Patient

Public health may not be aware of all testing performed for *Orthopoxvirus* or monkeypox virus in a non-hospital setting. However, public health could be notified prior to testing if a clinician is requesting testing for *Orthopoxvirus* or monkeypox virus via a Texas LRN laboratory, or a clinician notified public health of their intention to test via a commercial or other CLIA-approved laboratory.

- Patients that come into a healthcare facility with mpox-compatible symptoms should be isolated in a single patient room with the door closed (if safe to do so). Special air handling is not required.
- HCP should utilize appropriate PPE and follow appropriate precautions, which includes Standard Precautions plus additional precautions, as required. HCP should also follow guidance for infection prevention and control of mpox in healthcare settings. See CDC's mpox infection control guidance: Mpox Infection Prevention

and Control in Healthcare Settings | Mpox | CDC as well as general isolation precautions (Isolation Precautions Guideline | Infection Control | CDC).
- If the facility has infection prevention and control personnel, they should be notified.
- Facility infection prevention and control personnel or occupational health services should keep a list of all persons who had contact with the patient, entered a contaminated room or patient care area, or had contact with contaminated materials, and the list should also include time, location, and type of contact/exposure.
- Assess PUI's epidemiologic risk factors and symptoms and determine if they meet the suspect case definition.
    - Interview the suspected-case patient, their surrogate and/or the patient's healthcare provider. Complete the DSHS PUI Form, and, if necessary, obtain medical records.
- If necessary, contact your regional health department for consultation on symptoms, epidemiologic risk factors, and preliminary lab findings.
- If appropriate, consider testing and treating for alternative diagnoses while waiting for monkeypox virus testing results.
- Arrange for testing of PUI at an LRN laboratory and, if needed, obtain patient ID number to send to the LRN, or if appropriate, arrange for testing via commercial laboratory testing or other CLIA-approved laboratory. See DSHS Mpox Laboratory Testing Guidance for Human Clinical Specimens at: https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health
    - If Clade I monkeypox virus is suspected (due to travel history to an endemic region with circulating Clade I MPXV or contact with a previous mpox case caused by Clade I MPXV), testing should be conducted at the CDC. Arrange for testing at the CDC through the PHR and EAIDU.
- Identify all close contacts of PUI and events attended during infectious period. Determination of exposed individuals should begin as soon as a person with epidemiologic risk factors and mpox symptoms presents for medical evaluation.
- Inform the clinician and/or patient that those with suspected mpox infection should have recommended isolation precautions for mpox maintained until test results are available.
- Suspect case investigations may be entered into NBS.
- See Case Investigation Checklist for Non-hospitalized Patient if the patient is positive for *Orthopoxvirus* or monkeypox virus.

2A. Case Investigation Checklist for Hospitalized Patient

- Any positive *Orthopoxvirus* or monkeypox virus laboratory reports should be investigated immediately. The case may have been tested while in the hospital or may have been tested in a non-hospital setting but came to the hospital for treatment of worsening disease prior to receiving laboratory results.
- Confirm that laboratory results meet the probable or confirmed case definition.
- Ensure appropriate control measures have been implemented for a hospital setting. See CDC's mpox infection control guidance: Mpox Infection Prevention and Control in Healthcare Settings | Mpox | CDC as well as general isolation precautions (Isolation Precautions Guideline | Infection Control | CDC).
- Notify DSHS immediately of probable or confirmed cases. Routes of notification can include entering the case investigation into NBS (preferred), emailing or faxing

case investigation forms to EAIDU, or submitting case documentation via GlobalScape.

- For probable cases performed by a laboratory that does not have a confirmatory test, a specimen may be forwarded to CDC for laboratory confirmation. Commercial laboratory testing for monkeypox virus is considered presumptive evidence for mpox infection and is adequate to start a case investigation. Samples from patients being treated with TPOXX, with a recent history of international travel, with an unusual clinical presentation, or unusual laboratory results (e.g., non-variola orthopoxvirus positive but West African MPXV negative) should be considered for forwarding for viral characterization at CDC. Specimen submission to the DSHS Laboratory or the CDC must be coordinated in advance with EAIDU (EAIDUMonitoring@dshs.texas.gov).
    - If Clade I monkeypox virus is suspected (due to travel history to an endemic region with circulating Clade I MPXV or contact with a previous mpox case caused by Clade I MPXV), testing should be conducted at the CDC. Arrange for testing at the CDC through the PHR and EAIDU.
- Complete the CDC Mpox Case Investigation Form (https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health) or complete the Mpox Case Investigation in NBS using medical records and by interviewing the case-patient or surrogate to identify close contacts, risk factors, and other pertinent information.
- Use the Mpox Exposure Risk Assessment Form to identify mpox contacts and the Texas Department of State Health Services Monitoring Guidance for Individuals Exposed to Monkeypox Virus (https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health) Arrange for symptom self-monitoring for 21 days for all contacts and possible additional control measures for higher risk contacts or exposed healthcare workers. Identify if any contacts have any mpox-compatible symptoms and refer them for testing where appropriate.
- If the case traveled while possibly infectious, collect information about travel. This information may need to be relayed to CDC by EAIDU. See below section on "*Travelers*" for more information on reporting to DGMQ.
- See "Duration of Isolation" below for how long the case must isolate.
- If the case is discharged from the hospital to convalesce at home, or another agreed upon non-healthcare location, see 2B. Case Investigation Checklist for Non-hospitalized Patient for additional guidance.

Confirmed and probable case investigations must be entered into NBS.

2B. Case Investigation Checklist for Non-hospitalized Patient

- A case may have been tested for *Orthopoxvirus* or monkeypox virus in a non-hospital setting. If a positive laboratory report was received for *Orthopoxvirus* or monkeypox virus testing, then it should be investigated immediately.
- Confirm that laboratory results meet the probable or confirmed case definition.
- Ensure appropriate control measures have been implemented if the patient is convalescing at home, or another agreed upon non-healthcare location. Follow CDC's guidance for Isolation and Infection Control At Home, and follow CDC's guidance for Cleaning and Disinfecting Your Home, Workplace , and Other community Settings.
- Notify DSHS immediately of probable or confirmed cases. Routes of notification can include entering the case investigation into NBS (preferred), emailing or faxing

case investigation forms to EAIDU, or submitting case documentation via GlobalScape.

- For probable cases performed by a laboratory that does not have a confirmatory test, the specimen will not be automatically forwarded to CDC for laboratory confirmation. Samples from patients being treated with TPOXX, with a recent history of international travel, with an unusual clinical presentation, or unusual laboratory results (e.g., non-variola orthopoxvirus positive but West African MPXV negative) should be considered for forwarding for viral characterization at the DSHS Laboratory or CDC. Specimen submission to the DSHS Laboratory or the CDC must be coordinated in advance with EAIDU (EAIDUMonitoring@dshs.texas.gov).
    - If Clade I monkeypox virus is suspected (due to travel history to an endemic region with circulating Clade I MPXV or contact with a previous Mpox case caused by Clade I MPXV), testing should be conducted at the CDC. Arrange for testing at the CDC through the PHR and EAIDU.
- Complete the CDC Mpox Case Investigation Form (https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health) or complete the Mpox Case Investigation in the NEDSS Base System (NBS) using medical records and by interviewing the case-patient or surrogate to identify close contacts, risk factors, and other pertinent information.
- Identify and prioritize Mpox contacts based on the Mpox Exposure Risk Assessment Form and utilize the Texas Department of State Health Services Monitoring Guidance for Individuals Exposed to Monkeypox Virus for monitoring guidance (https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health). Arrange for symptom self-monitoring for 21 days for all contacts and possible additional control measures for higher risk contacts or exposed healthcare workers. Identify if any contacts have any Mpox-compatible symptoms, and possibly refer them for testing.
- If the patient traveled while possibly infectious, collect information about travel. This information may need to be relayed to CDC by EAIDU. See below section on "*Travelers*" for more information on reporting to DGMQ.
- See Duration of Isolation below for how long the case must isolate.

Confirmed and probable case investigations must be entered into NBS.

Prevention and Control Measures

Prevention and control measure guidelines for Mpox are subject to change as knowledge of the disease evolves. Prevention and control measures for suspect, probable, and confirmed cases are dependent on locations visited, where the suspect case will isolate and convalesce (hospital vs. at home or another agreed upon non-healthcare location), individuals exposed to the case or Mpox contaminated areas or items, as well as other factors. Many of the prevention and control measures have been incorporated into the specific checklists above.

Healthcare Facilities and Healthcare Personnel

Please see Infection Prevention and Control of Mpox in Healthcare Settings at: Mpox Infection Prevention and Control in Healthcare Settings | Mpox | CDC. These recommendations are intended for healthcare settings and healthcare personnel. Healthcare settings refers to places where healthcare is delivered and includes, but is not limited to, acute care facilities, long-term acute-care facilities, inpatient rehabilitation

facilities, nursing homes, home healthcare, vehicles where healthcare is delivered (e.g., mobile clinics), and outpatient facilities, such as dialysis centers, physician offices, dental offices, and others. HCP refers to all paid and unpaid persons serving in healthcare settings who have the potential for direct or indirect exposure to patients or infectious materials, including body substances (e.g., blood, tissue, and specific body fluids); contaminated medical supplies, devices, and equipment; contaminated environmental surfaces; or contaminated air. These HCP include, but are not limited to, emergency medical service personnel, nurses, nursing assistants, physicians, technicians, therapists, laboratorians, phlebotomists, pharmacists, students and trainees, contractual staff not employed by the healthcare facility, and persons not directly involved in patient care, but who could be exposed to infectious agents that can be transmitted in the healthcare setting (e.g., clerical, dietary, environmental services, laundry, security, engineering and facilities management, administrative, billing, and volunteer personnel).

Cases Convalescing at Home
If a suspect case or case is isolating or convalescing at home or another approved location, they should follow the guidance below.

- Isolation and Infection Control at Home
  Isolation and Infection Control At Home | Mpox | CDC.
- What to Do If You Are Sick
  What to Do If You Are Sick | Mpox | CDC
- Cleaning and Disinfecting Your Home, Workplace, and Other Community Settings
  Mpox | Cleaning and Disinfecting | CDC

Congregate Living Settings
Congregate living settings are facilities or other housing where people who are not related reside in close proximity and share at least one common room (e.g., sleeping room, kitchen, bathroom, living room). Congregate living settings can include correctional and detention facilities, homeless shelters, group homes, dormitories at institutes of higher education, seasonal worker housing, residential substance use treatment facilities, and other similar settings. Strategies for congregate living settings can be found in Considerations for Reducing Mpox Transmission in Congregate Living Settings at: https://www.cdc.gov/poxvirus/monkeypox/specific-settings/congregate.htm. These settings may provide personal care services but are not traditional healthcare settings (e.g., hospitals). If healthcare services are provided on site, they are usually provided in specific healthcare areas or by outside healthcare personnel (e.g., home health care workers). In these circumstances, healthcare personnel should follow recommendations in Infection Prevention and Control of Mpox in Healthcare Settings at: Mpox Infection Prevention and Control in Healthcare Settings | Mpox | CDC.

Autopsy and Handling of Human Remains
Please see CDC's Autopsy and Handling of Human Remains of Patients with Mpox at: Autopsy and Handling of Human Remains of Patients with Mpox | Mpox | CDChttps://www.cdc.gov/poxvirus/monkeypox/clinicians/autopsy.html, for information concerning transfer, protective equipment and facility design, autopsy procedures, specimen collection, and other topics.

Laboratory Settings
Information can be found on CDC's Information for Laboratory Personnel website, available at: https://www.cdc.gov/poxvirus/monkeypox/lab-personnel/index.html.

Laboratory workers should follow the guidelines in the CDC's Biosafety Laboratory Guidance for Handling and Processing Mpox Specimens , available at: Biosafety Laboratory Guidance for Handling and Processing Mpox Specimens | Mpox | CDC. General guidance for PPE can be found in the NIOSH Directory of Personal Protective Equipment available at https://www.cdc.gov/niosh/ppe/. Additional information on standard and special practices for the laboratory can be found in *Biosafety in Microbiological and Biomedical Laboratories (BMBL)*, 6th edition, found at: Biosafety in Microbiological and Biomedical Laboratories (BMBL) 6th Edition | CDC Laboratories.

Caregivers and Household Members
Recommendations for caregivers and household members can be found on the same websites as information for cases that are convalescing at home.

- Isolation and Infection Control at Home
  Isolation and Infection Control At Home | Mpox | CDC
- What to Do If You Are Sick
  What to Do If You Are Sick | Mpox | CDC
- Cleaning and Disinfecting Your Home, Workplace, and Other Community Settings
- https://www.cdc.gov/poxvirus/monkeypox/specific-settings/home-disinfection.html

Close Contacts
See the Exposed Individuals section below.

Travelers
Mpox information for travelers can be found at:

- Travelers' Health – Mpox What to Do If You Are Sick | Mpox | CDC

If a case flew on a plane while infectious, gather the below information and send it to EAIDUMonitoring@dshs.texas.gov. This information can also be included in the NBS investigation.

CDC quarantine stations will use the following criteria to initiate an aircraft contact investigation.
Characteristics related to flight – both must be met:

- Occurred in previous 21 days, and
- Duration ≥3 hours.

Characteristics related to traveler – one must be met:

- Had a fever (100.4°F [38°C]) at the time of their flight, or
- Had respiratory symptom(s) at the time of their flight (including sore throat, nasal congestion, cough), regardless of mask use, or
- Did not wear a mask during their flight (even if no respiratory symptoms), or
- Did not cover all lesions during their flight.

In unique circumstances that suggest added risk of transmission in the aircraft cabin, DGMQ may pursue a contact investigation regardless of these criteria, if needed. This information will be provided to CDC DGMQ for flight exposure notifications:

- Name
- Date of birth
- Address
- Mpox State ID or NBS Patient ID
- Symptoms and onset date

- Test information
    - Copy of lab report that includes:
        - Date of collection
        - Test type
        - Specimen source
        - Type of lab
        - Date of result (if available)
- Flight history
    - Date of flight(s)
    - Airline
    - Flight number
    - Flight departure cities and arrival cities for all flights
    - Seat number (if available)
- Passenger or crew member?
- Imminent travel concerns

General Population
CDC has some general and more specific prevention guidance. This guidance includes prevention information such as vaccine information, safter sex and social gatherings, and others, and can be found at: cdc.gov/poxvirus/monkeypox/prevention.. Please see "How to Protect Yourself" for general monkeypox prevention, located at: Preventing Mpox | Mpox | CDC.

Duration of Isolation
Patients with mpox infection (probable or confirmed) should not be released from isolation until they are no longer considered infectious. This is when all lesions have crusted, those crusts have separated, and a fresh layer of healthy skin has formed underneath.

Patients with suspected mpox infection are recommended to isolate until mpox infection is ruled out.

Cases Lost to Follow-up
- Make at least 3 attempts to call the individual on both their primary and secondary telephone numbers (if available). Attempts should be made at different times of the day, with at least one attempt during the evening or weekend hours.
- Send a text and email (if email address is available) to the individual with instructions to contact you as soon as practical.
- Attempt to contact the individual's emergency contact(s), if available.
- If the individual cannot be reached by phone, text, or e-mail, an in-person visit should be made.
    - The individual should be located at the predetermined location of isolation, however, if the individual is not present, a notice of your visit (with your contact information) and education materials should be left at the residence.
- If an individual remains uncontactable, complete the NBS investigation as much as possible and note that the case was lost to follow up.

Exclusions
A case may be excluded as a suspect, probable or confirmed case if:
- An alternative diagnosis can fully explain the illness **OR**

- An individual with symptoms consistent with mpox does not develop a rash within 5 days of illness onset **OR**
- A case where high-quality specimens do not demonstrate the presence of *Orthopoxvirus* or monkeypox virus or antibodies to *Orthopoxvirus*

EXPOSED INDIVIDUALS

Managing Close Contacts
For detailed information on managing exposed individuals, see the Mpox Exposure Risk Assessment Form and the Updated Monitoring Guidance and Vaccine Eligibility for Individuals Exposed to Monkeypox Virus at https://www.dshs.texas.gov/monkeypox/monkeypox-information-public-health.

In general, children with a fever from any infectious disease should be excluded from school and daycare for at least 24 hours after fever subsides without the use of fever-suppressing medications. It is recommended that adults not return to work for at least 24 hours after fever has subsided without the use of fever suppressing medications. Do not exclude close contacts from daily activities such as work or school if they have no other reasons for exclusion.

PROPHYLAXIS

- Two vaccinations may be used for the prevention of Mpox disease: JYNNEOS or ACAM2000 vaccines.
    - JYNNEOS is a vaccine originally developed for prevention of smallpox, another virus closely related to Mpox. It is approved for the prevention of Mpox and smallpox disease. JYNNEOS is the preferred vaccine to protect against Mpox. JYNNEOS is given as a two-does series, with the second dose administered four weeks after the first. More information can be found on the CDC website.
    - ACAM2000 is a vaccine also originally developed for prevention of smallpox but has been made available for prevention of Mpox disease under an Expanded Access Investigational New Drug (EA-IND) protocol. ACAM2000 is given as a single dose. More information can be found on the CDC website.
- JYNNEOS is currently being used for vaccinating contacts of Mpox cases to prevent disease. Post-exposure prophylaxis (PEP) is recommended to occur within the first 4 days of exposure to potentially prevent disease. Vaccination given between 4 to 14 days after exposure may not prevent disease but may reduce the severity of symptoms.
    - PEP is recommended for all high-risk exposures. In these cases, the risk of exposure outweighs the risk of vaccination.
    - PEP may be recommended on a case-by-case basis for intermediate and low/uncertain-risk exposures.
    - Consult with DSHS on urgent questions or requests for vaccine (Imm.Epi@dshs.texas.gov).
- For information on pre-exposure prophylaxis for laboratorians, please email EAIDUMonitoring@dshs.texas.gov.

TREATMENT

Currently, there is no specific treatment approved for Mpox virus infections. However, treatment developed for use in patients with smallpox, complications from smallpox vaccination, or other viruses may prove beneficial, and several medical countermeasures are currently available from the Strategic National Stockpile (SNS) or enrollment in the Study of Tecovirimat for Mpox (STOMP) Trial.

One of these treatment options is Tecovirimat (TPOXX, ST-246), an antiviral medication that was developed for the treatment of smallpox in adults and children. Data are not available on the effectiveness of tecovirimat in treating Mpox infections in people, but Tecovirimat may be beneficial in the treatment of Mpox for those with severe disease, immunocompromising conditions, pediatric cases (particularly <8 years of age), and other possible risk factors.

Other available but less commonly used treatment options include Vaccinia Immune Globulin Intravenous (VIGIV), Cidofovir (also known as Vistide), and Brincidofovir (also known as CMX001 or Tembexa).

Medical countermeasures are currently available from the CDC in consultation with DSHS. Healthcare providers and regional and local health departments and request a clinical consult with the DSHS Clinical Consult Team (DSHSMPXConsult@dshs.texas.gov) as soon as Mpox and the possibility of severe illness is suspected to allow for timely release of treatment.

MPOX VIRUS AND ANIMALS

Monkeypox virus can infect a wide range of mammals, but it is unclear at this time which mammals can become infected. Information for veterinarians, public health, and animal health officials can be found on CDC's Mpox webpage for Veterinarians cdc.gov/poxvirus/monkeypox/veterinarian. General information concerning pets in the home is also available (Mpox | Mpox | CDC).

Please see the Laboratory Procedures section below for animal testing information.

COMMUNICATIONS

- For initial case(s), you may coordinate with DSHS and your PIO (Public Information Office) to issue a health alert to all area providers, hospitals, and urgent care clinics.
    - Describe situation.
    - Provide information on the use of PPE.
    - List symptoms and risk factors to look for.
    - Instruct on what to do if a PUI or case is identified.
- Contact all entities that have had or are likely to have an exposure (e.g., if patient attended an event, or if contacts all attend church, etc.).
    - Describe the situation.
    - Allay concerns.
    - List symptoms to look for and what to do if anyone with symptoms is identified.
    - Elicit additional contacts, if appropriate.
- Prepare media statements and FAQs.

- Inform the police department, EMS, 911, and anyone else who might be called upon to interact or care for PUIs.
    - Describe situation.
    - Provide instructions on PPE.
    - List symptoms and risk factors to look for.
    - Instruct on what to do if a PUI is identified.
- CDC has created a variety of communication resources that can be found at: cdc.gov/poxvirus/monkeypox/resources.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Any confirmed, probable, or clinically suspected cases of Mpox are required to be reported **immediately** to the local or regional health department.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases who meet case criteria as outlined in the Mpox case definition:
    - For probable and confirmed cases, enter an investigation in NBS and create a notification the same day.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
    - Please refer to the NBS Data Entry Guidelines for disease-specific entry requirements.

If an outbreak is investigated, local and regional health departments should:

- Report outbreaks to the regional DSHS office and to DSHS EAIDU at EAIDUMonitoring@dshs.texas.gov or 512-776-7676.
- Notify the regional DSHS office and DSHS EAIDU at the conclusion of the outbreak investigation.
    - Send an outbreak summary by secure email or fax to the DSHS regional office and to EAIDU at EAIDUMonitoring@dshs.texas.gov or 512-776-7676. The secure email should also be sent to the High Consequence Infectious Disease team lead at EAIDU.

Other notable cases, such as pediatric or adolescent cases, cases in incarcerated individuals, or other unique situations, should follow the notification requirements above.

LABORATORY PROCEDURES

- The testing landscape for Mpox is rapidly evolving. There are generally two types of real-time PCR assays readily available: Non-variola Orthopoxvirus Generic Test, Monkeypox virus Generic Test, and assays for the specific detection of monkeypox virus West African and Congo Basin strain DNA
- Several commercial, hospital, and LRN laboratories offer the *Orthopoxvirus* assay. Some commercial laboratories, as well as the CDC, can also perform monkeypox virus-specific assays.

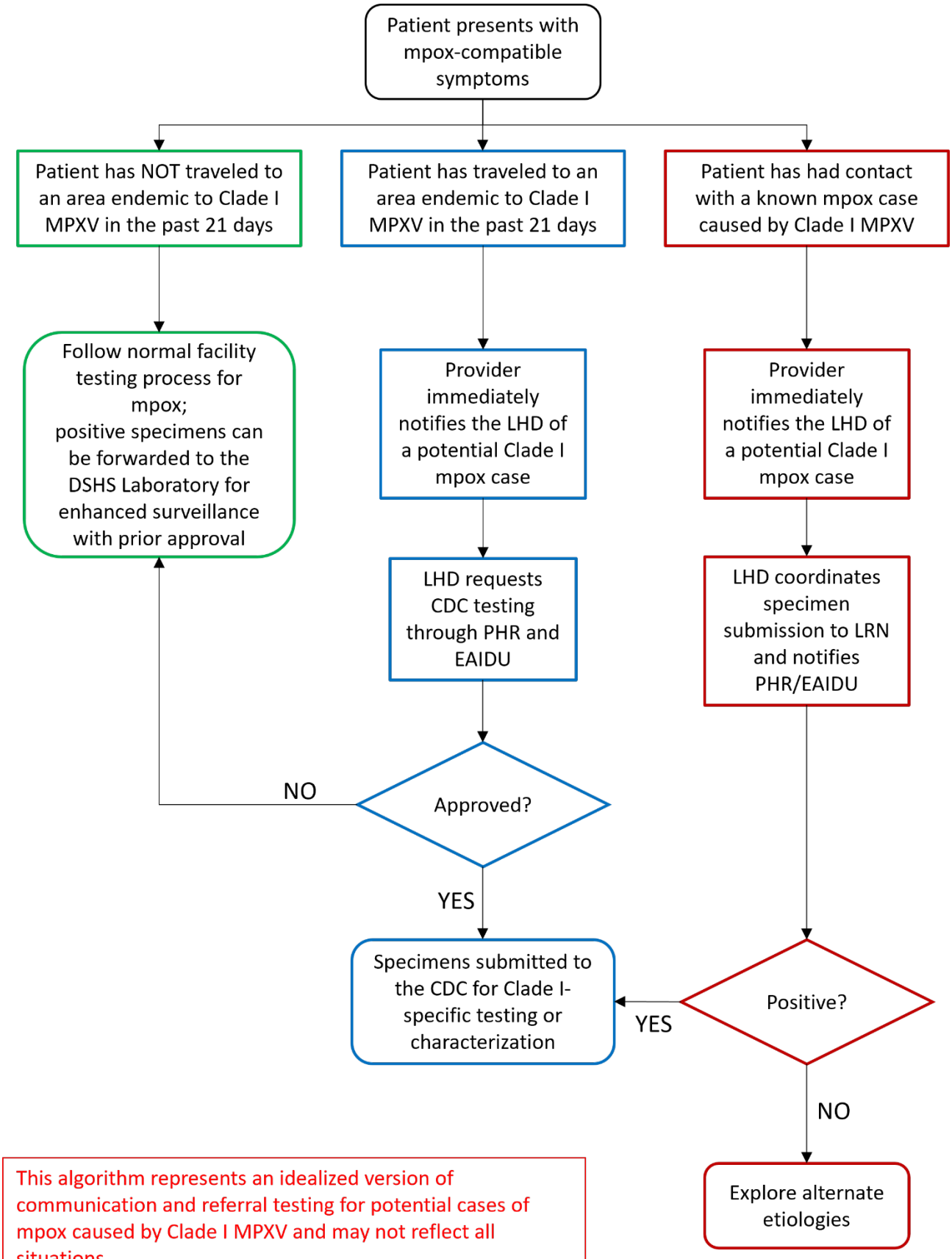
- The CDC can provide Clade I-specific monkeypox virus testing upon prior approval from EAIDU (EAIDUMonitoring@dshs.texas.gov).
- For testing potentially associated with Clade I MPXV (e.g., patients with a travel history to a Clade I MPXV endemic country or symptomatic contacts of a known Mpox case caused by Clade I MPXV), specimens should be sent to either the CDC or an LRN facility; these specimens should NOT be referred to a commercial or hospital laboratory.
    - For initial testing of a case with a pertinent travel history, specimens should be submitted to the CDC directly from the provider (where possible) following approval and coordination with the PHR and EAIDU. This will allow for the most rapid confirmation of Mpox caused by Clade I MPXV.
    - For subsequent testing of symptomatic individuals that were potentially exposed to a known Mpox case caused by Clade I MPXV, testing should be conducted by the appropriate LRN facility. Although this testing is typically not clade-specific, this will provide the most rapid result and allow public health follow-up sooner. Where a known exposure to Clade I MPXV occurred and a positive or detected Orthopoxvirus test result is available, the LHD or PHR should assume the case was caused by Clade I MPXV. Clade-specific testing can then be referred to the CDC with approval from EAIDU.
- Specimens that test positive for monkeypox virus can be submitted to the DSHS Laboratory for enhanced surveillance and further characterization with prior approval from EAIDU (EAIDUMonitoring@dshs.texas.gov).
    - Specimens associated with a known or suspected Mpox case caused by Clade I MPXV should NOT be routinely submitted to the DSHS Laboratory for characterization.
- Note that, for a case to be considered a confirmed case, it must have a detected/positive result with a monkeypox virus assay (or, alternatively, detection of monkeypox virus by genomic sequencing).

    Please, refer to the DSHS Mpox Laboratory Testing Guidance for Human Clinical Specimens Mpox Information For Public Health | Texas DSHS for detailed instructions on sample collection and submission for Mpox testing at a public health laboratory.

- Testing for animals is available at CDC but must meet testing criteria and requires coordination of multiple public health and animal health agencies prior to specimen submission.

    Please, refer to the DSHS Mpox Laboratory Testing Guidance for Animal Clinical Specimens Mpox Information For Public Health | Texas DSHS for detailed instructions on sample collection and submission for Mpox testing at a public health laboratory.

RECOMMENDED LABORATORY TESTING ALGORITHM



This algorithm represents an idealized version of communication and referral testing for potential cases of mpox caused by Clade I MPXV and may not reflect all situations.

UPDATES

July 2022

- Document created.

August 2022

- Document updated.

September 2022

- Document updated

January 2023

- Document updated

Mumps

BASIC EPIDEMIOLOGY

Infectious Agent
Mumps virus, a single-stranded RNA paramyxovirus

Transmission
Transmission occurs through respiratory droplets or through direct contact with nasopharyngeal secretions.

Incubation Period
Average of 16-18 days (range 12-25 days)

Communicability
The infectious period is 2 days before to 5 days after parotitis onset. Mumps virus has been found in respiratory secretions as early as 3 days before the start of symptoms and up to 11-14 days after onset. However, the patient is most infectious within the first 5 days after symptom onset. The highest percentage of positive isolations and virus loads occur closes to parotitis onset and decrease rapidly after. Transmission also likely occurs from persons with asymptomatic infections and from persons with prodromal symptoms.

Clinical Illness
Prodromal symptoms are nonspecific; they include myalgia (muscle pain), anorexia, malaise, headache, and low-grade fever, and may last 3–4 days. Parotitis (inflammation and swelling of the parotid glands) is the most common manifestation of clinical mumps, affecting 30–40% of infected persons. Parotitis can be unilateral (one side of cheek) or bilateral (both sides of cheek); other combinations of single or multiple salivary glands may be affected. Parotitis usually occurs within the first 2 days of symptom onset and may present as an earache or tenderness on palpation of the angle of the jaw. Symptoms usually decrease within 1 week and generally resolve within 10 days.

Up to 20% of infections are asymptomatic; an additional 40–50% may have only nonspecific or primarily respiratory symptoms.

The most common complication is orchitis (inflammation of the testicles), affecting up to 50% of infected males who have reached puberty. While painful, only rarely does this lead to infertility.
Other complications are rare but may include encephalitis (inflammation of the brain), meningitis, oophoritis (inflammation of an ovary), mastitis (inflammation of the breast), pancreatitis (inflammation of the pancreas), myocarditis (inflammation of heart muscle), arthritis (inflammation of joints), and nephritis (inflammation of the kidneys). Spontaneous abortion (miscarriage) can result if an infection occurs during pregnancy, particularly in the first trimester. Rarely (~1 in 20,000), mumps infection can cause deafness, which is usually permanent.

Not all cases of parotitis are caused by mumps virus. Parotitis can also occur as

a result of infection with other viruses such as cytomegalovirus, parainfluenza virus, influenza A, Coxsackie A, echovirus, lymphocytic choriomeningitis virus, and HIV as well as *Staphylococcus aureus*, and other bacteria. Non- infectious causes of parotitis include drugs, tumors, immunologic diseases, and obstruction of the
salivary duct. Mumps, however, is the only agent that causes outbreaks (i.e., multiple cases at once) of parotitis.

DEFINITIONS

Clinical Case Definition

In the absence of a more likely alternative diagnosis:

- ☐ An acute illness characterized by parotitis (i.e., acute onset of unilateral or bilateral tender, self-limited swelling of the parotid) or swelling of other (non-parotid) salivary gland(s), OR
- ☐ An acute illness characterized by at least one of the following mumps-associated complication(s): orchitis, oophoritis, aseptic meningitis, encephalitis, hearing loss, mastitis, or pancreatitis.

Laboratory Criteria for Diagnosis

- ☐ Confirmatory Laboratory Evidence:
  - Positive reverse-transcriptase polymerase chain reaction (RT-PCR) for mumps-specific nucleic acid[a], **OR**
  - Isolation of mumps virus, **OR**
  - Significant rise (i.e., at least a 4-fold rise in quantitative titer or seroconversion[b]) in paired acute and convalescent serum mumps immunoglobulin G (IgG) antibody[a], **OR**
- ☐ Supportive Laboratory Evidence:
  - Positive test for serum mumps immunoglobulin M (IgM) antibody[a,c].

[a]*Not explained by MMR vaccination during the previous 6-45 days.*
[b]*Seroconversion is defined as a negative serum mumps IgG followed by a positive serum mumps.*
[c]*May be ruled out by a negative convalescent mumps IgG antibody using any validated method.*
Note: A negative laboratory result in a person with clinically compatible mumps symptoms does not rule out mumps as a diagnosis.

Case Classification

- ☐ **Confirmed:** A case that meets confirmatory laboratory evidence
- ☐ **Probable:** A case that:
  - Meets clinical criteria AND epidemiologic linkage criteria, OR
  - Meets supportive laboratory evidence AND
    - Meets clinical criteria of:
      - ≥2-day duration of parotitis or other salivary gland swelling, OR
      - a mumps-related complication

    AND
    - Does NOT meet epidemiologic linkage criteria.
- ☐ **Suspect**: A case that meets the clinical criteria but does not meet

laboratory or epidemiologic linkage criteria OR meets supportive laboratory evidence but does not meet the clinical criteria AND has documentation that mumps was suspected.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of mumps. Local and regional health authorities should provide education to prevent further spread of disease, discuss exclusion criteria with reporters and encourage timely vaccinations.

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition.
- ☐ Request a buccal swab to be collected for mumps PCR testing.
  - If specimen sent to another lab, request that the laboratory forward viral specimens to the DSHS laboratory. If viral specimens are not available, consider serology specimens. See laboratory procedures.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition and vaccination status.
  - The Mumps Investigation Form should be used to record information collected during the investigation.
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
  - Case (or parent), ImmTrac, school nurse records, primary care provider, etc.
- ☐ Identify close contacts and ensure appropriate control measures are implemented (see control measures below).
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS EAIDU.
- ☐ Send the complete Mumps Investigation Form to DSHS.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- ☐ CDC recommends all children get two doses of MMR (measles-mumps-rubella) vaccine, starting with the first dose at 12 through 15 months of age, and the second dose at 4 through 6 years of age.
- ☐ Although vaccination after exposure to mumps may not prevent disease, the vaccine will protect persons from subsequent exposures. If ongoing exposure is expected, quarantine and/or vaccinating contacts may be of use.
- ☐ Persons who are unsure of their mumps disease history or mumps vaccination history should be vaccinated.
- ☐ Droplet precautions should be maintained for 5 days after the onset of parotitis, other salivary gland swelling, or other symptoms
- ☐ IG is not effective and not recommended.
- ☐ A 3rd dose of MMR should be considered in ongoing outbreaks of highly vaccinated persons in certain congregate settings. Please contact Central

Office if considering a 3rd dose. See below for more information. https://www.cdc.gov/mmwr/volumes/67/wr/mm6701a7.htm

Exclusion

- ☐ Children
  - Children should be excluded from school or daycare for 5 days after onset of swelling (25 Tex. Admin. Code § 97.7 (2016)
- ☐ Healthcare workers
  - Healthcare workers without evidence of immunity who have had an unprotected exposure to mumps (within 3 feet of a patient with mumps without wearing a surgical mask for at least 5 minutes) should be excluded from work from the 12th day after the first unprotected exposure to mumps through the 25th day after the last exposure. Even if the healthcare worker receives a dose of the MMR vaccine after the exposure, this is not evidence of immunity and the exclusionary precautions still apply.
  - Healthcare workers with one dose of MMR may continue working after an unprotected mumps exposure but should receive the second MMR dose at least 28 days after the first dose, and should be educated about and report any development of mumps symptoms to employee health
  - Healthcare workers with evidence of immunity do not need to be excluded from work following an unprotected mumps exposure and should be educated about and report any development of mumps symptoms to employee health
  - If any healthcare worker develops mumps symptoms, the worker should be excluded from work for 5 days after the onset of parotitis or other symptoms

MANAGING SPECIAL SITUATIONS

If there are 3 or more cases in the same institution or social group (3 or more household cases do not count as an outbreak), an area or organization has met the outbreak threshold, and for guidance about other unusual situations, immediately notify EAIDU at (800) 252-8239 or (512) 776-7676.

Outbreaks

While high vaccination coverage can reduce the number of infected person, duration, and spread of mumps, outbreaks can occur in communities and settings, even if people have had one or two doses of the MMR vaccine.

Outbreak Checklist:

- ☐ Create a line list of all suspected cases
- ☐ Identify the at-risk population, community, and/or setting affected by the outbreak
- ☐ Encourage isolation of suspected cases with droplet precautions for 5 days after the onset of parotitis, other salivary gland swelling, or other symptoms
- ☐ Obtain immunization histories on suspected cases
- ☐ Investigate all contacts to each case
- ☐ Encourage up-to-date with age appropriate MMR vaccination (1 or 2 doses) to suspected and potential cases or contacts without evidence of immunity or, if

vaccine is contraindicated or refused, encourage quarantine for 25 days
- ☐ Contact healthcare providers in the area to conduct active surveillance of mumps for at least two incubation cycles (50 days) following parotitis of the last known case
- ☐ Contact Central Office if considering a 3rd dose
- ☐ Complete the Mumps Outbreak Form and submit via secure email to VPDTexas@dshs.texas.gov

If an outbreak of mumps is suspected, notify the regional DSHS office or EAIDU at (800) 252-8239 or (512) 776-7676.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed and clinically suspected cases are required to be reported **within 1 work day** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:
- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS within 30 days of receiving a report of a confirmed or probable case.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- ☐ Fax, send a secure email, or email a completed investigation form within 30 days of completing the investigation.
  - **In the event of a death, copies of the hospital discharge summary, death certificate, autopsy report and death investigation form should also be sent to DSHS EAIDU.**
  - Investigation forms may be faxed to **512-776-7616,** securely emailed to VPDTexas@dshs.texas.gov, or mailed to:

Emerging and Acute Infectious Disease Unit
Texas Department of State Health Services
Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:
- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.

LABORATORY PROCEDURES

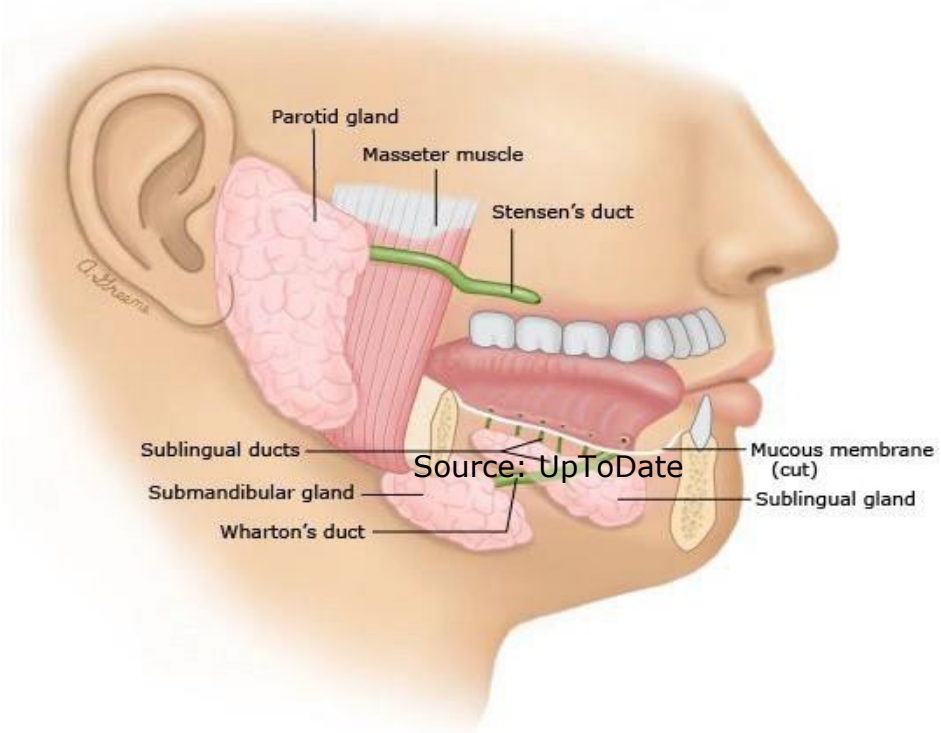
Diagnosing Mumps
Serologic tests should be interpreted with caution, as false-positive and false-negative results are possible with IgM tests for mumps. Mumps cases should not

be ruled out by negative serology results. With previous contact with mumps virus either through vaccination (particularly with two doses) or natural infection, serum mumps IgM test results may be negative; IgG test results may be positive at initial blood draw and viral detection in RT-PCR or culture may have low yield.

PCR Specimen Collection and Submission (preferred)
Specimens should be obtained early in the course of illness when the quantity of virus shed is highest. Collect buccal or oral swab samples as soon as mumps disease is suspected. Samples collected when the patient first presents with symptoms have the best chance of having a positive result by RT-PCR. This test is best completed by a certified public health laboratory, such as the DSHS State Lab in Austin, Texas.

Specimen Collection
Processing the swabs within 24 hours of collection will enhance the sensitivity of both the RT-PCR and virus isolation techniques.

- Using a buccal or oral swab, massage the parotid gland area for 30 seconds prior to swabbing the area around Stensen's duct.
  - A commercial product designed for the collection of throat specimens or a flocked polyester fiber swab can be used. Synthetic swabs are preferred. Do not use cotton swabs, which may contain substances that are inhibitory to enzymes used in RT- PCR. Flocked synthetic swabs appear to be more absorbent and elute samples more efficiently.
- Swabs should be placed in 2 ml of standard viral transport medium (DSHS uses Remel media)



Submission Form

- Use specimen submission form G-2V.
- If more than 1 swab is submitted, a G-2V must be provided for each swab.
- Check mumps PCR on the G2V form.

Specimen Shipping

- All clinical specimens for PCR should be kept at 2-8ºC during storage and shipment. Ship specimens on ice via overnight delivery.
- If there is a delay in shipment or the specimen will not be received at the laboratory within 48 hours of collection, the sample should be frozen at −70°C. Frozen samples should be shipped on dry ice.
- Notify EAID VPD staff about the specimens to ensure prompt testing and satisfactory receipt of the specimen.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

  Laboratory Services Section, MC-1947
  Texas Department of State Health Services
  Attn. Walter Douglass (512) 776-7569
  1100 West 49th Street
  Austin, TX 78756-3199

Causes for Rejection:

- Specimens submitted on a preservative, such as formalin
- Specimens received at room temperature or cold greater than 48 hours of collection

Serology Specimen Collection and Submission (If needed)

The first (acute-phase) serum sample should be collected as soon as possible upon suspicion of mumps disease. Convalescent-phase serum samples should be collected about 2-3 weeks after the acute-phase sample.

The DSHS Laboratory does not offer mumps IgM testing. Mumps PCR and IgG testing is available at the DSHS Laboratory.

Persons with a history of mumps vaccination may not have detectable mumps Ig M antibody regardless of timing of specimen collection.

Specimen Collection Option1:

- Collect at least 5 mL blood in red top tube.
- Label blood tubes with patient's first and last name, and we recommend a second identifier such as date of birth or medical record number or social security number. If the first and last name is not provided, the specimen will be rejected.
  - Centrifuge the **red top blood** collection tube within 2 hours from the time of collection to separate the serum from the red blood cells (clot).
  - Transfer the serum from the red top tube into a serum transport tube properly labeled with the patient's name and date of birth or social security number and ship cold with cool packs and must be

received within 48 hours.
- If the serum samples will not be delivered to the laboratory within 48 hours of collection, then the samples must be frozen at –20°C (frozen) or lower and shipped frozen with dry ice.
- Do not freeze whole blood in red top tube for shipping.

Option 2:

- Collect at least 5 mL blood in **gold top** or **tiger top** blood collection tube containing a gel serum separator (Gold top or tiger top tubes are types of serum separator tubes with the gel that keeps the serum separated from the clot after the centrifugation).
- Label blood tubes with patient's first and last name, and we recommend a second identifier such as date of birth or medical record number or social security number. If the first and last name is not provided, the specimen will be rejected.
  - Centrifuge the gold top blood collection tube within 2 hours from the time of collection to separate the serum from the red blood cells (clot) and ship cold with cool packs and must be received within 48 hours.
  - If more than 48 hours, transfer the serum into a serum transport tube properly labeled with the patient's name and date of birth or social security number and ship frozen with dry ice.
  - Do not freeze serum in serum separator tube (SST) for shipping. Freezing will cause hemolysis and hemolyzed specimens will be unsatisfactory for testing.

Submission Form

- Use the DSHS Laboratory current version of G-2A form for specimen submission.
- Make sure the patient’s first and last name and date of birth/social security number match exactly what is written on the tube.
- Mark the laboratory test requested, date of onset, and date of collection. Be certain that the names on acute and convalescent sera match exactly.
- Call DSHS Laboratory at 512-776-7138 if needing information for specimen submission.

Specimen Shipping

- Notify EAIDU VPD staff about the specimens to ensure prompt testing and satisfactory receipt of the specimen.
- To avoid specimen rejection, ship separated serum or centrifuged serum separator tubes Monday through Thursday to the DSHS laboratory via overnight delivery following the above guidelines.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
  - If the serum samples will not be delivered to the DSHS laboratory within 48 hours of collection, transfer into a serum transport tube and freeze on Fridays. Ship frozen specimens with dry ice on Monday. Lone Star service will not deliver specimen to the DSHS lab on Saturday.
- Ship specimens to:

Laboratory Services Section, MC-1947

Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Missing two patient identifiers on tube
- ☐ Discrepancy between name on tube and name on form
- ☐ Insufficient quantity of serum for testing
- ☐ Specimens received with extended transit time, received at incorrect temperature, or no date of collection

Mumps VIRAL Specimen Collection	
Specimen Type	PCR TESTING ** Mumps Specimens **
Materials 	• Viral transport media (VTM) and tubes • Specimen submission forms (G2V)-one form per specimen • Personal protective equipment • Tongue depressors • Polyester fiber tipped swabs - either Dacron or Rayon • NO cotton tipped or wooden shaft swabs or any that contain calcium alginate
Proper Specimen Collection	• Do not use expired media – be sure to check the expiration date • Massage the outside of the patient's parotid gland for 30 seconds • Swab the area around Stensen's duct • Put tip of swab in the VTM, breaking applicator stick if necessary • Seal properly • Freeze or refrigerate • Prepare for shipment • Cheek (buccal) swabs are the preferred specimens for DSHS testing
Specimen Handling	• Transport specimens to the laboratory as soon as possible • Specimens should be placed in a biohazard bag and stored at 4°C or -70° C • If specimens are shipped the same day of collection, ship at 4°C • If specimens will be stored and shipped after the date of collection, freeze at -70° C. Note: If shipped cold, specimens must be received by the laboratory within 48 hours from the time of collection, otherwise freeze and ship on dry ice. • DO NOT store samples in a standard freezer – this inactivates the virus • DO NOT have repeated freeze thaw cycles – this inactivates the virus
Specimen Shipping	• Do not ship on Fridays or before government holidays • Specimens stored at 4°C are shipped using cold packs • Specimens stored at -70° C are shipped on dry ice • Complete the G2V form for each specimen. All specimens must be labeled with at least two patient specific identifiers; both a primary and a secondary identifier. The identifiers must appear on both the specimen tube and the associated specimen submission form. Specimens that do not meet this criteria will be considered unsatisfactory for testing. https://dshs.texas.gov/lab/PDF/MRS/G-2V.pdf • Check "Mumps PCR" in Section 4 of the G2V • The name on the tube should match the name on the form exactly • Ship to the physical address ATTN: Lab Services • Record the shipping tracking number and notify EAIDU that a specimen is being shipped

Additional Information	• Collect as soon as possible after parotitis onset
	  • Preferably within three days
	  • Not more than eight days after onset

Mumps SERUM Specimen Collection	
Specimen Type	PCR TESTING ** Mumps Specimens **
Materials 	• Viral transport media (VTM) and tubes • Specimen submission forms (G2V)-one form per specimen • Personal protective equipment • Tongue depressors • Polyester fiber tipped swabs - either Dacron or Rayon • NO cotton tipped or wooden shaft swabs or any that contain calcium alginate
Proper Specimen Collection	• Do not use expired media – be sure to check the expiration date • Massage the outside of the patient's parotid gland for 30 seconds • Swab the area around Stensen's duct • Put tip of swab in the VTM, breaking applicator stick if necessary • Seal properly • Freeze or refrigerate • Prepare for shipment • Cheek (buccal) swabs are the preferred specimens for DSHS testing
Specimen Handling	• Transport specimens to the laboratory as soon as possible • Specimens should be placed in a biohazard bag and stored at 4°C or -70° C • If specimens are shipped the same day of collection, ship at 4°C • If specimens will be stored and shipped after the date of collection, freeze at -70° C. Note: If shipped cold, specimens must be received by the laboratory within 48 hours from the time of collection, otherwise freeze and ship on dry ice. • DO NOT store samples in a standard freezer – this inactivates the virus • DO NOT have repeated freeze thaw cycles – this inactivates the virus
Specimen Shipping	• Do not ship on Fridays or before government holidays • Specimens stored at 4°C are shipped using cold packs • Specimens stored at -70° C are shipped on dry ice • Complete the G2V form for each specimen. All specimens must be labeled with at least two patient specific identifiers; both a primary and a secondary identifier. The identifiers must appear on both the specimen tube and the associated specimen submission form. Specimens that do not meet this criteria will be considered unsatisfactory for testing. https://dshs.texas.gov/lab/PDF/MRS/G-2V.pdf • Check "Mumps PCR" in Section 4 of the G2V • The name on the tube should match the name on the form exactly • Ship to the physical address ATTN: Lab Services • Record the shipping tracking number and notify EAIDU that a specimen is being shipped

Additional Information	• Collect as soon as possible after parotitis onset
	  • Preferably within three days
	  • Not more than eight days after onset

REVISION HISTORY

January 2021

- Updated Communicability section
- Updated Case Investigation Checklist
- Added a suspect mumps case definition.
- Updated Control Measures
- Updated Exclusions
- Updated Outbreaks
- Added Mumps Viral Specimen Collection Table
- Updated Mumps Case Classification Flow Chart

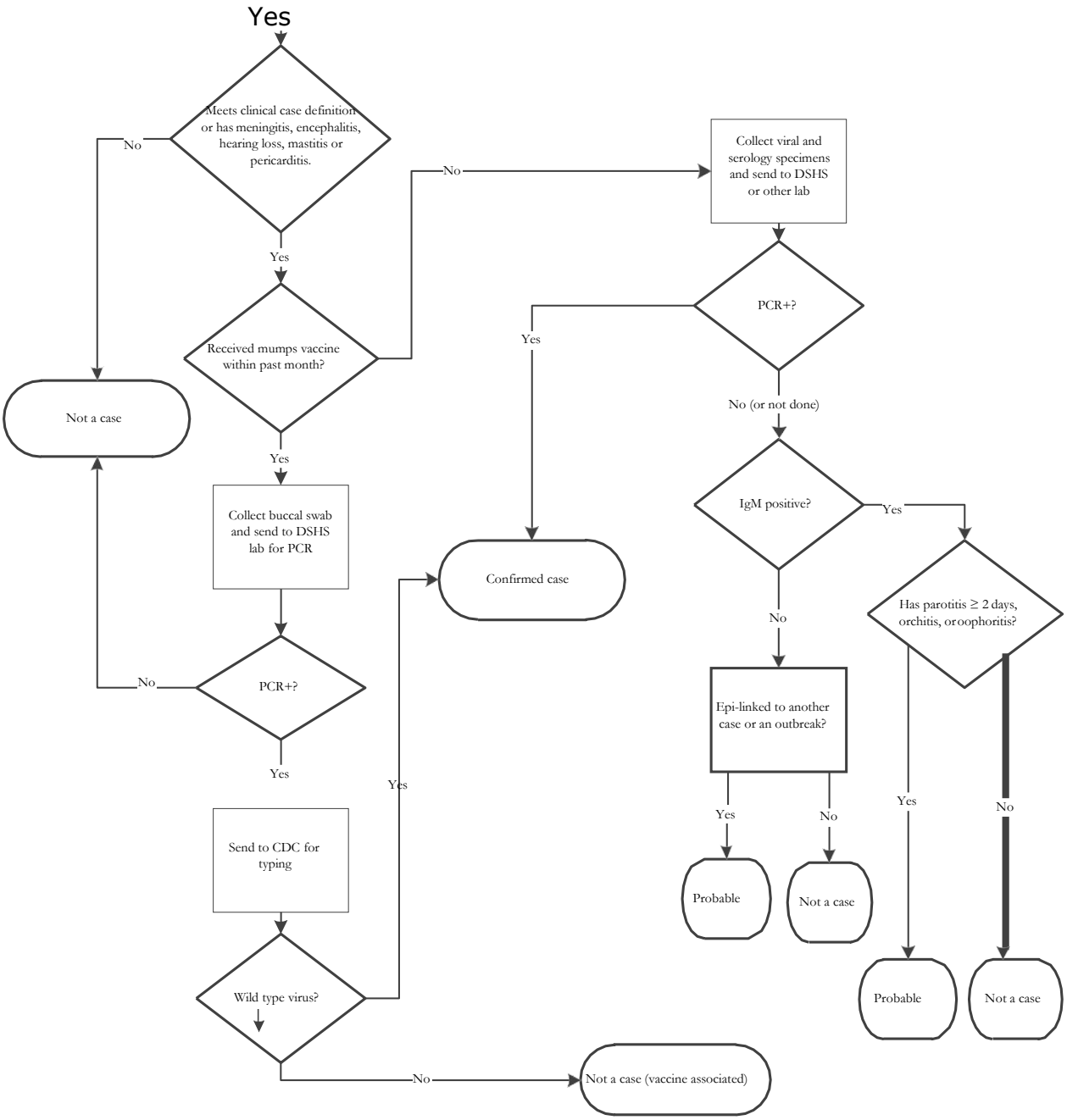
December 2022

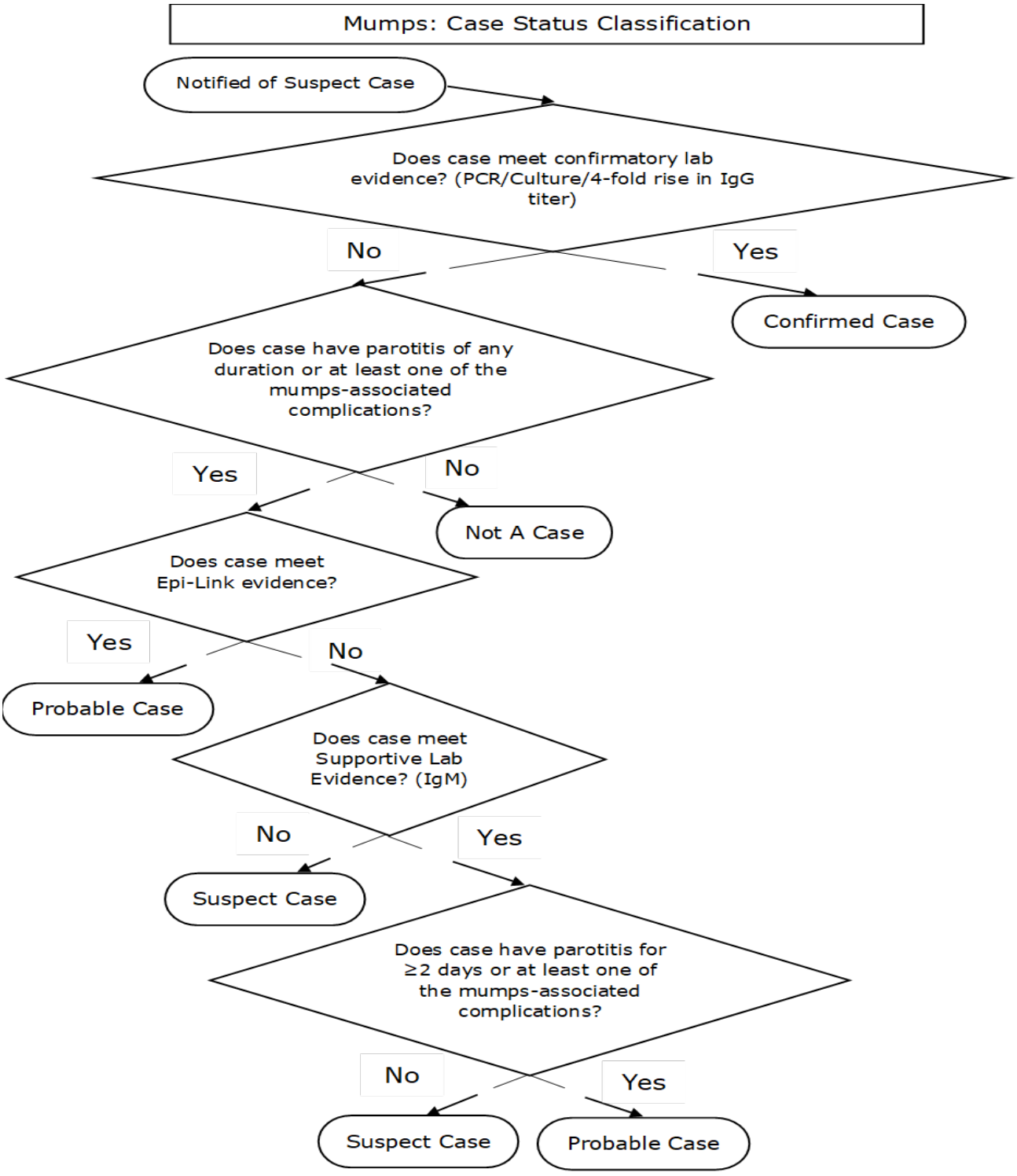
- Updated PCR testing section
- Updated Outbreak checklist

September 2024

- Updated Control Measures to include vaccine schedule
- Updated Mumps Case Classification Flow chart

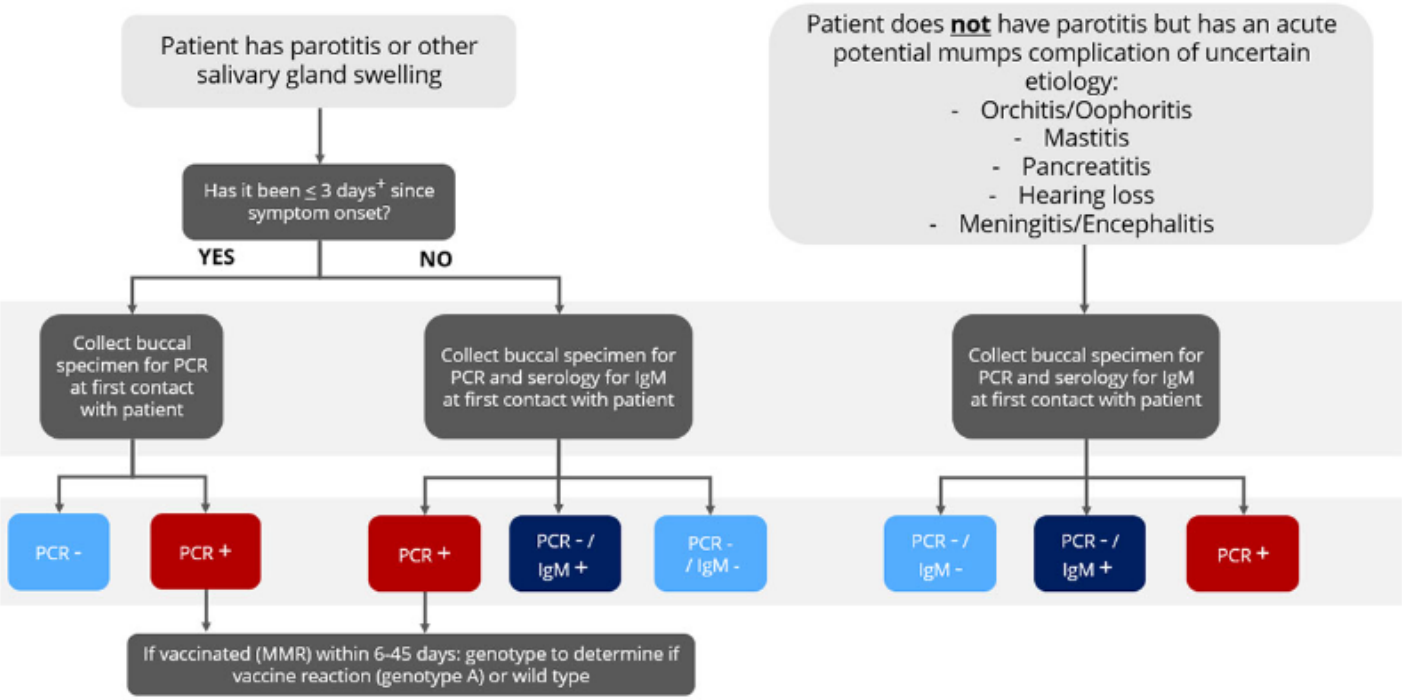
FLOW CHARTS


Yes
Meets clinical case definition or has meningitis, encephalitis, hearing loss, mastitis or pericarditis.
No
Yes
Received mumps vaccine within past month?
No
Yes
Not a case
Collect buccal swab and send to DSHS lab for PCR
PCR+?
No
Yes
Send to CDC for typing
Wild type virus?
Yes
No
Not a case (vaccine associated)
Confirmed case
Collect viral and serology specimens and send to DSHS or other lab
PCR+?
Yes
No (or not done)
IgM positive?
Yes
No
Has parotitis ≥ 2 days, orchitis, or oophoritis?
Epi-linked to another case or an outbreak?
Yes
No
Probable
Not a case
Yes
No
Probable
Not a case


Mumps: Case Status Classification
Notified of Suspect Case
Does case meet confirmatory lab evidence? (PCR/Culture/4-fold rise in IgG titer)
No
Yes
Confirmed Case
Does case have parotitis of any duration or at least one of the mumps-associated complications?
Yes
No
Not A Case
Does case meet Epi-Link evidence?
Yes
No
Probable Case
Does case meet Supportive Lab Evidence? (IgM)
No
Yes
Suspect Case
Does case have parotitis for ≥2 days or at least one of the mumps-associated complications?
No
Yes
Suspect Case
Probable Case

Sporadic (no epidemiologic-link, not outbreak-related) mumps testing flowchart (borrowed from CDC)

For persons presenting with symptoms of mumps without known epidemiologic-linkage, multiplex testing for other infectious etiologies* is recommended concurrent with mumps testing to better interpret the clinical picture alongside laboratory results.



Additional Considerations

1. A negative laboratory result in a person with clinically compatible mumps symptoms does not rule out mumps.
2. Persons tested for immunologic screening without symptoms would not be considered a case if IgM+ unless there is documentation that mumps was suspected.

*Consider testing for other infectious etiologies such as influenza, parainfluenza, EBV, & adenovirus that can cause parotitis. If mumps testing is negative and there is a more likely alternative diagnosis with a positive laboratory result, individuals can be classified as *not a mumps case*.

+For mumps PCR, specimen should be ideally collected 0-3 days after parotitis onset but can be collected up to 10 days. If >10 days since symptom onset, PCR testing no longer recommended. For mumps IgM, collecting specimens >3 days after parotitis onset improves the ability to detect IgM. Additional information: Laboratory Testing for Mumps Infection

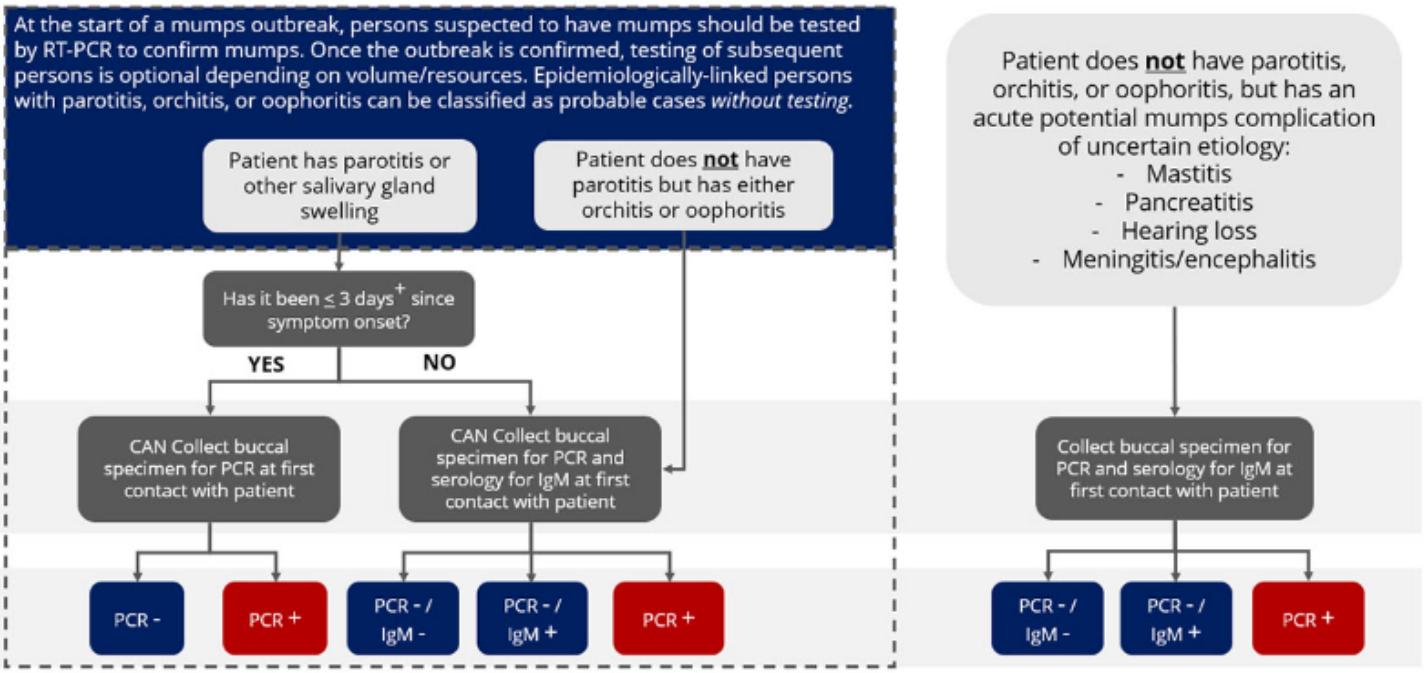
SUSPECT CASE

PROBABLE CASE

CONFIRMED CASE

Epidemiologic-link or outbreak-related mumps testing flowchart (borrowed from CDC)

Persons being tested have exposure to a confirmed case or linkage to a group/community defined by public health officials during an outbreak of mumps.



Additional Considerations

1. A negative laboratory result in a person with clinically compatible mumps symptoms does not rule out mumps.
2. Persons tested for immunologic screening without symptoms would not be considered a case if IgM+ unless there is documentation that mumps was suspected.
3. In an outbreak setting, occasionally asymptomatic or persons with atypical presentation may test PCR +, culture +, or show seroconversion, and would be classified as confirmed cases.
4. Parotitis after vaccination has been reported in <1% of vaccinees. If epidemiologically-linked/outbreak-associated cases recently received dose of MMR, genotyping can be done to confirm if vaccine strain

SUSPECT CASE

PROBABLE CASE

CONFIRMED CASE

+For mumps PCR, specimen should be ideally collected 0-3 days after parotitis onset but can be collected up to 10 days. If >10 days since symptom onset, PCR testing no longer recommended. For mumps IgM, collecting specimens >3 days after parotitis onset improves the ability to detect IgM.
Additional information: Laboratory Testing for Mumps Infection

Norovirus Outbreaks

Norovirus is the most common cause of viral gastrointestinal illness and is sometimes referred to as the 'stomach flu'. Outbreaks of norovirus are common as viral particles are readily transmitted person-to-person due to a low infectious dose required to cause illness. Outbreaks can happen anytime, but they occur most often from November to April. While sporadic cases are not reportable, norovirus outbreaks are reported to DSHS and to the CDC.

BASIC EPIDEMIOLOGY

Infectious Agent

Noroviruses are small, structured RNA viruses that belong to the Caliciviridae family. There are six genogroups (G) of norovirus, of which GI, GII, and GIV infect humans. Due to its genetic diversity, infection with one genogroup does not provide immunity against any other norovirus genogroup.
GII norovirus strains account for the majority of norovirus outbreaks in long-term care facilities, and the GII.4 Sydney strain has been predominant in recent years.

Transmission

Transmission occurs primarily through the fecal-oral route, either through direct person-to-person contact or indirectly via contaminated food or water. Norovirus is also spread through aerosols or vomitus and contaminated surfaces and objects.

Incubation Period

Norovirus symptoms typically present 12–48 hours after exposure to the virus.

Communicability

Norovirus is most communicable during the acute stage of disease, but the virus may be shed in stool for 2-3 weeks after symptom resolution.

Clinical Illness

Infected people usually have an acute onset of vomiting with non-bloody diarrhea. Other symptoms include abdominal cramps, nausea, and sometimes a low-grade fever. Norovirus illness is generally self-limited and full recovery can be expected in 1-3 days for most patients, and 4-6 days in the very young, elderly, and hospitalized. Additional symptoms include: nausea, low-grade fever, abdominal cramps, and malaise. Deaths can occur, especially in the elderly in long-term care facilities.

DEFINITIONS

Outbreak Definition

An outbreak is defined as two or more cases with symptoms clustered in time and space.

Laboratory Criteria for Diagnosis

- Detection of norovirus DNA (PCR) in stool or vomitus, **OR**
- Detection of norovirus antigen in stool, OR

Note: The etiology of GI outbreaks should be confirmed by submitting specimens to the DSHS Laboratory. Sequencing of norovirus strains found in clinical and

environmental samples has greatly helped in conducting epidemiologic investigations.

Case Classification
- □ **Confirmed:** A clinically compatible case that is laboratory confirmed
- □ **Probable:** A clinically compatible case that is epidemiologically linked to a confirmed case

OUTBREAK INVESTIGATION

If an outbreak is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676,** or email an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

Outbreak Investigation
Suspect norovirus outbreaks should be investigated in order to determine the agent, characterize the scope, and prevent additional cases.

Outbreak Investigation Checklist
- Prepare a line list of all cases. Minimal information needed for the line list might include patient name or other identifier; age and sex; category or group (e.g., patient, preschooler, resident, staff, or student), room number, if applicable; onset of symptoms (date & time), signs & symptoms, duration of illness; lab specimen collected, lab results; treatments and outcome of case; and foods eaten or other risky exposures leading up to illness reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Category	Room #	Onset	Symptoms	Hospitalized	Lab specimen
1	NT	34	F	resident	4c	2/4/23	Bl. D, F	Yes	stool
2	PR	2	M	staff	Wing A	1/30/23	V, D, F	None	none

- Systematically collect information from cases to characterize the outbreak**.**
  - Interview ill persons (as many as possible).
  - Use a questionnaire based on the Hypothesis Generating Questionnaire https://www.dshs.texas.gov/sites/default/files/EAIDU/investigation/forms/hypgen.pdf. If a common event or other possible common exposure has already been identified, then you should administer a questionnaire that is based on those exposures.
- Characterize the outbreak: Compile all of the available information on all cases in the outbreak. See Characterize the Outbreak below.
- Arrange for appropriate laboratory testing.
  - Coordinate specimen submission and testing with EAIDU and DSHS or local laboratory. See Laboratory Procedures.
  - Ensure that specimens negative for norovirus are tested for bacterial pathogens.

- Work with regulatory staff to conduct an environmental assessment, if needed.
  - Collect information on the implicated facility including:
    - Food safety practices, operations, anything that was unusual about the time period in question such as ill patrons or ill workers Identify and correct items that may have contributed to the outbreak.
  - Obtain names and contact information of those present at facility during outbreak timeframe, e.g., employees, food workers, customers, residents, students, etc.
- Implement facility control measures. See Control Measures Section.
- Communicate regularly with all parties involved in outbreak investigation
  - Provide situation reports through email.
  - Hold conference calls to discuss the outbreak investigation.
- Monitor the outbreak until the last case has been symptom free for 48 hours
- Report findings at conclusion of investigation:
  - Create Outbreak Summary Report.
  - Enter outbreak into National Outbreak Reporting System (NORS) at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Characterize the outbreak

- Provide descriptive information, in narrative, tabular, and graphic form, for the outbreak:
  - Calculate or estimate the number of persons at risk.
  - Calculate or estimate the number of ill persons.
  - Calculate or estimate the attack rate.
  - Calculate or estimate the mean, median, and range for the illness incubation period.
  - Calculate the number and frequency of symptoms expressed by ill persons.
  - Calculate the number and percentage of ill persons who sought medical care.
  - Calculate the number and percentage of ill persons hospitalized overnight.
  - Calculate the number and percentage of ill persons who died.
  - Calculate the percentage of total cases in the age groups <1y, 1-4y, 5-19y, 20-24y,
  - >50y.
  - Calculate the gender distribution of illness (% female, % male).
  - Document the number of persons who provided stool specimens and the number of these that tested positive for norovirus.
  - Document the strain of norovirus, if determined.
- Characterize the outbreak setting:
  - Document any ill health care, food, or other workers at the facility or other setting.
  - Document the percentage of ill staff who had illness onset >24 hours before residents/others.
  - Document any suspected source of the outbreak (Note: More than one suspect source can be entered into the National Outbreak Reporting System or NORS).
  - Document characteristics of the setting that might have contributed to the outbreak (crowding, construction, water issues, recent movement of people into setting, etc.).

  - Document any food or environmental specimens that tested positive for noroviruses and the viral strain identified, if known.
- Characterize the time frame of the outbreak.
- Document the illness onset dates for the first and last ill persons in the outbreak, and the peak date of illness.
- Prepare an epi-curve for the outbreak.

Exclusions

School/child-care: No exclusion specified for norovirus but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications

Food Employees: Symptomatic food employees infected with Norovirus are to be excluded from work. Asymptomatic food employees diagnosed with an infection from Norovirus are to be excluded from working in a food establishment serving a highly susceptible population or restricted if they do not serve a highly susceptible population.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from Norovirus, OR
- More than 48 hours have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications), OR
- The food employee did not develop symptoms and more 48 hours have passed since being diagnosed.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

CONTROL MEASURES

Control measures should be implemented as soon as a potential outbreak is recognized. Specific recommendations for the prevention of additional cases should be based on the findings of the epidemiologic investigation**.**

General Control Measures include:

- **Hand Hygiene**
  - Hands should be washed with warm water and soap for 15-20 seconds, especially:
    - Before preparing, handling or eating any food.
    - After going to the bathroom.
    - After changing a diaper.
    - After caring for someone with diarrhea.
  - No bare-hand contact with ready-to-eat foods is also helpful.
  - Alcohol-based and other sanitizers are of questionable efficacy and should not be a substitute for hand washing when soap and water are

available.

- **Environmental Disinfection**
  - If the facility does not have an Environmental Protection Agency-registered commercial virucide, use bleach. The CDC recommends the use of a chlorine bleach solution with a concentration of 1000–5000 ppm (5–25 tablespoons of household bleach (5.25%) per gallon of water) on all surfaces. Leave the surface wet for ≥5 minutes or follow the directions on the commercial cleaner to allow sufficient time for the bleach to kill the pathogen.
  - Bathrooms and "high-touch" surfaces (door knobs, hand rails, etc.) should be targeted.
  - Refer to bleach cleaning recommendations: NorovirusIncident_8.5x11_Eng_Clr_Concentrated_v4, Clean-up-of-Bodily-Fluids.pdf and How to Prevent Norovirus | Norovirus | CDCHow to Prevent Norovirus | Norovirus | CDC
- **Exclusion and Isolation**
  - Recommend segregation of ill persons, perhaps also with exposed persons, if appropriate.
  - Recommend restriction of movement and visitors if a group setting and if appropriate.
  - Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care until they are free from symptoms for at least 24-48 hours without the use of symptom suppressing medications.

For more information on norovirus prevention, please see: Norovirus | Norovirus | CDC

Recommended Control Measures for Schools and Child-Care Centers:

- **Hand Washing**
  - Encourage children and adults to wash their hands frequently, especially before handling or preparing foods and after wiping noses, diapering, using toilets, or handling animals.
  - Wash hands with soap and water long enough to sing the "Happy Birthday" song twice.
  - Sinks, soap, and disposable towels should be easy for children to use.
  - If soap and water are not available, clean hands with gels or wipes with alcohol in them.

- **Diapering**
  - Keep diapering areas near hand washing areas.
  - Keep diapering and food preparation areas physically separate. Keep both areas clean, uncluttered, and dry.
  - The same staff member should not change diapers and prepare food.
  - Cover diapering surfaces with intact (not cracked or torn) plastic pads.
  - If the diapering surface cannot be easily cleaned after each use, use a disposable material such as paper on the changing area and discard the paper after each diaper change.

- Sanitize the diapering surface after each use and at the end of the day.
- Wash hands with soap and water or clean with alcohol-based hand cleaner after diapering.

Environmental Surfaces and Personal Items

- Regularly clean and sanitize all food service utensils, toys, and other items used by children.
- Discourage the use of stuffed toys or other toys that cannot be easily sanitized.
- Discourage children and adults from sharing items such as combs, brushes, jackets, and hats.
- Maintain a separate container to store clothing and other personal items.
- Keep changes of clothing on hand and store soiled items in a nonabsorbent container that can be sanitized or discarded after use.
- Provide a separate sleeping area and bedding for each child, and wash bedding frequently.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Cases or suspected cases of illness considered being **public health emergencies, outbreaks, exotic diseases**, and unusual group expressions of disease must be reported to the local health department or DSHS **immediately**. Other diseases for which there must be a quick public health response must be reported **within one working day**.

Local and Regional Reporting and Follow-up Responsibilities

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at 512-776-7676
- Enter outbreak information into the National Outbreak Reporting System (NORS)at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
  - Please put in Subject Line: NORS User Account

Request.
- Information needed from requestor: name, email address, and agency name.
- After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

Real time RT-PCR for norovirus is available at the DSHS laboratory for clinical specimen testing. Coordinate shipping, specimen submission, and testing of specimens with EAIDU and the DSHS laboratory staff. Specimens should not be submitted to the DSHS laboratory unless approved by EAIDU. Contact an EAIDU foodborne epidemiologist to discuss further.

CLINICAL SPECIMENS

Specimen Collection
- Only raw stool is accepted for norovirus testing.
- Transport temperature: 2-8ºC (ice pack).
- Transport time: as soon as possible.

Submission Form
- Use the DSHS Laboratory G-2B form for specimen submission.
  - Select appropriate test:
    - Molecular Studies
      - Check "PCR" and "Norovirus".
  - Check "Outbreak association" and write in name of outbreak, (bottom of Section 2).
  - Payor source
    - Check "IDEAS" to avoid bill for submitter.

Specimen Shipping
- Transport temperature: 2-8ºC (ice pack)
- Transport time: as soon as possible.
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday, state or federal holiday unless special arrangements have been pre-arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- Ship specimens to:

  Laboratory Services Section, MC-1947 Texas Department of State Health Services Attn. Walter Douglass (512) 776-7569 1100 West 49th Street Austin, TX 78756-3199

ENVIRONMENTAL AND FOOD SAMPLES

- Testing of food or other environmental specimens is generally NOT done for norovirus outbreaks, because appropriate

laboratory protocols are not available.

- Food testing is not routine, except for shellfish (by FDA).
- Detection in water and other food items requires special protocols; if indicated, EAIDU will call CDC or FDA to discuss further.

REVISION HISTORY

December 2021

- Updated Definitions and Outbreak Investigations section

March 2021

- Entire section updated

Novel Coronavirus, Other (MERS, SARS, CoV-1, etc.)

For information on COVID-19, please see
Novel Coronavirus 2019

BASIC EPIDEMIOLOGY

Infectious Agent

Coronaviruses are named for the crown-like spikes on their surface. There are four main sub-groupings of coronaviruses - alpha, beta, gamma and delta. Human coronaviruses were first identified in the mid-1960s. The six coronaviruses that can infect people are alpha coronaviruses 229E and NL63, and beta coronaviruses OC43, HKU1, severe acute respiratory syndrome coronavirus (SARS-CoV) and Middle East Respiratory Syndrome coronavirus (MERS-CoV). SARS-CoV, MERS-CoV and SARS- CoV-2 (COVID-19) are considered new coronaviruses: the first known SARS-CoV illness occurred in 2002, MERS-CoV was identified in 2012 and SARS-CoV-2 was identified in 2019. These novel coronaviruses cause acute severe respiratory illness.

Information about infections caused by SARS-CoV-2 can be found in the section titled COVID-19 of this document and are not discussed in detail in this section. For more information on COVID-19, please visit COVID-19 (Coronavirus Disease 2019) | Texas DSHS. This section will focus on infections caused by novel coronaviruses SARS-CoV-1 and MERS-CoV.

Transmission

Studies have been conducted to determine the transmission of SARS-CoV-1. The studies suggest that the most likely modes of transmission for SARS-CoV-1 are droplet and direct person-to-person contact. However, there is evidence that indirect contact and aerosol spread also exist. MERS-CoV has been spread from ill people to others through close contact, such as caring for or living with an infected person. Infected people have spread MERS-CoV to others in healthcare settings, such as hospitals. There has been limited spread of MERS-CoV from person to person.

Incubation Period

The incubation period of a novel coronavirus causing severe acute respiratory disease depends on the type of novel coronavirus. The incubation period for SARS is estimated to be 1 to 14 days with a median of 4 to 5 days. The incubation period for MERS is usually 5 or 6 days, but it can range from 2 to 14 days.

Communicability

The period of communicability for the novel coronaviruses causing severe respiratory disease, SARS- CoV-1 and MERS-CoV, is not completely understood. For SARS-CoV, epidemiologic and virologic studies and clinical follow-up during the 2003 epidemic indicated that transmission does not occur before the onset of clinical signs and symptoms and the maximum period of communicability is less than 21 days. The period of communicability of MERS-CoV is unknown.

Clinical Illness

The two novel coronaviruses, SARS-CoV-1 and MERS-CoV, can cause acute respiratory illness. SARS-CoV caused severe acute respiratory syndrome or SARS, a respiratory illness that mostly affected adults. Typical symptoms included fever, myalgia, headache, malaise and chills followed by a nonproductive cough and dyspnea generally 5 to 7 days later. It also caused diarrhea in approximately 10%-20% of the cases. SARS had a mortality rate of 10% with a case fatality rate approaching 50% in people who were 60 years of age and older.
MERS-CoV causes Middle East Respiratory Syndrome or MERS, a severe acute respiratory illness. Typical symptoms include fever, cough and shortness of breath. Some people may develop gastrointestinal symptoms including diarrhea or nausea/vomiting. For many people with MERS, more severe complications follow, such as pneumonia and kidney failure. About 3-4 out of every 10 people reported with MERS have died. Most MERS-related deaths have been in persons with underlying health conditions such as diabetes or cancer.

DEFINITIONS

Case definitions for novel coronaviruses evolve as clinical and epidemiologic information on these viruses changes. Please refer to the novel coronavirus information on CDC's website for the most recent definitions. The CDC MERS-CoV case definitions may be found here: About Middle East Respiratory Syndrome (MERS) | MERS | CDC.

Clinical Case Definition

Limited data on the clinical presentation of MERS are available; most published clinical information to date is from critically ill patients. At hospital admission, common signs and symptoms include fever, chills/rigors, headache, non-productive cough, dyspnea and myalgia. Other symptoms can include sore throat, coryza, sputum production, dizziness, nausea and vomiting, diarrhea and abdominal pain. Atypical presentations including mild respiratory illness without fever and diarrheal illness preceding development of pneumonia have been reported. Clinical judgment should be used to guide testing of patients for MERS-CoV infection. Healthcare providers should maintain awareness of the need to detect patients who should be evaluated for Middle East Respiratory Syndrome Coronavirus (MERS-CoV) infection; this requires clinical judgment as information on modes of transmission of MERS-CoV, and clinical presentation of MERS, is limited and continues to evolve.

Laboratory Confirmation

- Identification of a novel coronavirus that is different from currently circulating human coronaviruses as confirmed by CDC's laboratory, by public health laboratories using CDC- approved protocols for a specific novel strain or by labs using an FDA-approved test for a specific novel strain
- Confirmatory laboratory testing requires a positive PCR on at least two specific genomic targets or a single positive target with sequencing on a second.
- Other laboratory confirmation criteria may be defined by CDC for the specific novel coronavirus.

Case Classifications

- **Confirmed:** A confirmed case is a person with laboratory confirmation of MERS-CoV infection.
- **Probable:** A probable case is a Patient Under Investigation (PUI) with absent or inconclusive laboratory results for MERS-CoV infection who is a close contact1 of a laboratory-confirmed MERS-CoV case. Examples of laboratory results that may be considered inconclusive include a positive test on a single PCR target, a positive test with an assay that has limited performance data available, or a negative test on an inadequate specimen.
- **Suspect** (Patient Under Investigation [PUI]): A person who has both clinical features and an epidemiologic risk should be considered a Patient Under Investigation (PUI) based on one of the following scenarios:
    - Fever[2] AND pneumonia or acute respiratory distress syndrome (based on clinical or radiological evidence) AND EITHER:
        - A history of travel from countries in or near the Arabian Peninsula**3** within 14 days before symptom onset, **OR**
        - Close contact with a symptomatic traveler who developed fever**2** and acute respiratory illness (not necessarily pneumonia) within 14 days after traveling from countries in or near the Arabian Peninsula[3] **OR**
        - A member of a cluster of patients with severe acute respiratory illness (e.g., fever**2** and pneumonia requiring hospitalization) of unknown etiology in which MERS-CoV is being evaluated, in consultation with state and local health departments.

    OR

    - Fever[2] AND symptoms of respiratory illness (not necessarily pneumonia; e.g., cough, shortness of breath) AND a history of being in a healthcare facility (as a patient, worker or visitor) within 14 days before symptom onset in a country or territory in or near the Arabian Peninsula[3] in which recent healthcare-associated cases of MERS have been identified.

    OR

    - Fever[2] OR symptoms of respiratory illness (not necessarily pneumonia; e.g., cough, shortness of breath) AND close contact with a confirmed MERS case while the case was ill.

The above criteria serve as guidance for testing; however, patients should be evaluated and discussed with public health departments on a case-by-case basis if their clinical presentation or exposure history is equivocal (e.g., uncertain history of health care exposure).

Footnotes:

[1] Close contact is defined as a) being within approximately 6 feet (2 meters), or within the room or care area, of a confirmed MERS case for a prolonged period of time (such as caring for, living with, visiting, or sharing a healthcare waiting area or room with, a confirmed MERS case) while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves,

NIOSH-certified disposable N95 respirator, eye protection); or b) having direct contact with infectious secretions of a confirmed MERS case (e.g., being coughed on) while not wearing recommended personal protective equipment. Data to inform the definition of close contact are limited; considerations when assessing close contact include the duration of exposure (e.g., longer exposure time likely increases exposure risk) and the clinical symptoms of the person with MERS (e.g., coughing likely increases exposure risk). Transient interactions, such as walking by a person with MERS, are not thought to constitute an exposure; however, final determination should be made in consultation with public health authorities. For guidance on recommended PPE please see: Prevention and Control for Hospitalized MERS Patients | MERS | CDC.

2 Fever may not be present in some patients, such as those who are very young, elderly, immunosuppressed, or taking certain medications. Clinical judgement should be used to guide testing of patients in such situations.

3Countries considered in the Arabian Peninsula and neighboring include: Bahrain; Iraq; Iran; Israel, the West Bank, and Gaza; Jordan; Kuwait; Lebanon; Oman; Qatar; Saudi Arabia; Syria; the United Arab Emirates (UAE); and Yemen.

Note: CDC may require that patients undergo testing for alternate causes of infection including all clinically indicated tests for community acquired pneumonia, before being considered a probable or suspect case.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of novel coronavirus including SARS and MERS. Investigations should include an interview of the case or surrogate to obtain a detailed exposure history. The current investigation form is the Middle East Respiratory Syndrome (MERS) Patient Under Investigation (PUI) Short Form available at http://www.dshs.texas.gov/eaidu/investigation/. Completion of a more detailed investigation form may be required for probable or confirmed cases or in the event of an outbreak or other special situation. This more detailed investigation form will be provided by DSHS, if needed.

Suspect (Patient Under Investigation [PUI]) Case Investigation Checklist

- ☐ Any suspected novel coronavirus case, in absence of a more likely etiology, should be investigated immediately.
- ☐ Ensure that appropriate control measures have been implemented (see Prevention and Control Measures, below). If the patient is under evaluation for MERS-CoV (e.g., differential diagnosis includes MERS-CoV, healthcare provider is requesting testing for MERS-CoV, etc.), then MERS-CoV control measures should be implemented.
- ☐ Determine whether the patient meets the case definition.
    - Obtain medical records, interview the suspected case-patient or surrogate and
      interview the patient's healthcare provider.
- ☐ Notify DSHS immediately of suspect (PUI) cases of novel coronavirus.

- ☐ Collect and ship specimens to the DSHS laboratory or another public health laboratory qualified to perform novel coronavirus testing using CDC-approved protocols for a specific novel strain.
    - Inform the testing laboratory (i.e., DSHS or a qualified Laboratory Response Network [LRN] lab) when specimens have been shipped and provide a shipment tracking number.
    - Note: Only persons who meet case definition or have been approved by the local health department epidemiologist or DSHS EAIDU will be tested for novel coronavirus.
    - If novel coronavirus testing is performed at a laboratory other than DSHS Austin, inform the Regional Health Department and DSHS EAIDU within 24 hours of initiating testing.
- ☐ For any patient who is tested for MERS-CoV, complete the novel coronavirus-specific PUI Short Form.
- ☐ Fax or send by secure email the completed PUI form to DSHS within 48 hours of testing.
- ☐ Suspect case investigations may be entered in the NEDSS Base System (NBS).

Confirmed/Probable Case Investigation Checklist

- ☐ Any confirmed or probable novel coronavirus cases should be investigated immediately.
- ☐ Ensure that appropriate control measures have been implemented (see Prevention and Control Measures, below).
- ☐ Confirm that laboratory results (if available) meet the case definition.
    - For confirmed cases, verify that the laboratory that performed the confirmatory testing is a public health laboratory using CDC-approved protocols for a specific novel strain.
- ☐ For probable cases, verify that epidemiologic linkages meet the case definition.
- ☐ Notify DSHS immediately of probable or confirmed cases of novel coronavirus.
- ☐ For probable cases, collect and ship specimens to the DSHS laboratory or another public health laboratory qualified to perform novel coronavirus testing using CDC-approved protocols for a specific novel strain.
    - Inform the testing laboratory (i.e., DSHS or a qualified LRN lab) when specimens have been shipped and provide a shipment tracking number.
    - Note: Only persons who meet case definition or have been approved by the local health department epidemiologist or DSHS EAIDU will be tested for novel coronavirus.
    - If novel coronavirus testing is performed at a laboratory other than DSHS Austin, inform the Regional Health Department and DSHS EAIDU within 24 hours of initiating testing.
- ☐ Complete the novel coronavirus-specific PUI Form using medical records and by interviewing the case-patient or surrogate to identify close contacts, risk factors, and other pertinent information.
    - Completion of a more detailed investigation form may be required and will be provided by DSHS, if needed.
- ☐ Identify close contacts and determine if secondary cases have occurred.
    - See the Contact Tracing section below.

- Inform DSHS EAIDU immediately if the case-patient used public transportation (bus, train, airplane, ship, etc.) while symptomatic.

- ☐ Be prepared to enhance surveillance in the local area for respiratory illnesses and respiratory viruses, if requested by DSHS.
  - Refer to the *Public Health Preparedness, Surveillance, and Response Plan for Texas: Respiratory Viruses Having Pandemic Potential* for a list of responsibilities by department and program area, and for action triggers.
- ☐ If applicable, complete the steps in the Managing Special Situations section.
- ☐ Fax or send by secure email the novel coronavirus-specific PUI Form and other investigation forms (if provided) to DSHS. The PUI form must be faxed or securely emailed to DSHS within 48 hours of testing.

Confirmed and probable case investigations must be entered in the NEDSS Base System (NBS).

Prevention and Control Measures

Prevention and control guidelines for MERS are subject to change as disease knowledge evolves. Please refer to the CDC websites provided below for the most recent recommendations.

Healthcare Facilities and Healthcare Personnel
Please see "Interim Infection Prevention and Control Recommendations for Hospitalized Patients with Middle East Respiratory Syndrome Coronavirus (MERS-CoV)" available at Prevention and Control for Hospitalized MERS Patients | MERS | CDC. These recommendations are intended for healthcare settings (excluding air or ground medical transport, and laboratory settings) and for healthcare personnel (HCP) who may come into contact with people confirmed to have, or being evaluated for, a novel coronavirus illness such as MERS. HCP refers to all persons, paid and unpaid, working in healthcare settings whose activities potentially place them at risk for exposures to a patient with MERS-CoV. Examples of such activities include those that require direct contact with patients and exposure to the patient-care environment.

To complement the guidance below, CDC has developed two checklists that identify key actions that can be taken to enhance preparedness for MERS-CoV infection control:

- Healthcare Provider Preparedness Checklist: Healthcare Provider Preparedness Checklist for MERS-CoV | CDC Archive
- Healthcare Facility Preparedness Checklist: Healthcare Facility Preparedness Checklist | CDC Archive

Infection Control Recommendations

- Minimize Chance for Exposures
  - Ensure facility policies and practices are in place to minimize exposures to respiratory pathogens including MERS-CoV. Measures should be implemented before patient arrival, upon arrival, and throughout the duration

of the affected patient's presence in the healthcare setting.

- Before Arrival
  - When scheduling appointments, instruct patients and persons who accompany them to call ahead or inform HCP upon arrival if they have symptoms of any respiratory infection (e.g., cough, runny nose, fever) and to take appropriate preventive actions (e.g., wear a facemask upon entry to contain cough, follow triage procedure).
- Upon Arrival and During the Visit
  - Take steps to ensure all persons with symptoms of a respiratory infection adhere to respiratory hygiene and cough etiquette, hand hygiene, and triage procedures throughout the duration of the visit. Consider posting visual alerts (e.g., signs, posters) at the entrance and in strategic places (e.g., waiting areas, elevators, cafeterias) to provide patients and HCP with instructions (in appropriate languages) about hand hygiene, respiratory hygiene, and cough etiquette. Instructions should include how to use facemasks or tissues to cover nose and mouth when coughing or sneezing, to dispose of tissues and contaminated items in waste receptacles, and how and when to perform hand hygiene.
  - Provide space and encourage persons with symptoms of respiratory infections to sit as far away from others as possible. If available, facilities may wish to place these patients in a separate area while waiting for care
  - Ensure rapid triage and isolation of patients who might have MERS-CoV infection
    - Identify patients at risk for having MERS-CoV infection before or immediately upon arrival to the hospital
  - Implement triage procedures to detect patients at risk for having MERS-CoV infections during or before patient triage or registration (e.g., at the time of patient check-in) and ensure that all patients are asked about the presence of symptoms of a respiratory infection and history of travel to areas experiencing transmission of MERS-CoV or contact with possible MERS-CoV patients. See the "Interim Guidance for Healthcare Professionals" (Redirect for Interim Guidance for Healthcare Professionals | CDC Archive) for which patients to evaluate for MERS-CoV.
    - Immediately isolate those identified as at risk for having MERS-CoV infection
  - Implement Respiratory Hygiene and Cough Etiquette (i.e., placing a facemask over the patient's nose and mouth) and isolate those at risk for MERS-CoV infection in an Airborne Infection Isolation Room (AIIR). See recommendations for "Patient Placement" below.

Additional guidance for evaluating patients in U.S. for MERS-CoV infection can be found at the CDC Middle East Respiratory Syndrome (MERS) website.

- Provide supplies to perform hand hygiene to all patients upon arrival to facility (e.g., at entrances of facility, waiting rooms, at patient check-in) and throughout the entire duration of the visit to the healthcare setting.

- Ensure Adherence to Standard, Contact and Airborne Precautions

Standard precautions assume that every person is potentially infected or colonized with a pathogen that could be transmitted in the healthcare setting. Elements of standard precautions that apply to patients with respiratory infections, including those caused by MERS-CoV, are summarized below. Attention should be paid to training and proper donning, doffing and disposal of any personal protective equipment. All aspects of standard precautions (e.g., injection safety) are not emphasized in this document but can be found in the guideline titled Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. All HCP who enter the room of a patient with suspected or confirmed MERS-CoV should adhere to Standard, Contact, and Airborne precautions, including the following:

- Hand Hygiene
  - HCP should perform hand hygiene before and after all patient contact, contact with potentially infectious material, and before putting on and upon removal of PPE, including gloves. Hand hygiene in healthcare settings can be performed by washing with soap and water or using alcohol-based hand rubs. If hands are visibly soiled, use soap and water, not alcohol-based hand rubs.
  - Healthcare facilities should ensure that facilities and supplies for performing hand hygiene are readily available to all personnel.
- Personal Protective Equipment
  - Employers should select appropriate PPE and provide it to workers in accordance with OSHA's PPE standards (29 CFR 1910 Subpart I). Workers must receive training on and demonstrate an understanding of when to use PPE; what PPE is necessary; how to properly don (put on), use, doff (take off) PPE; how to properly dispose of or disinfect and maintain PPE; and the limitations of PPE. Any reusable PPE must be properly cleaned, decontaminated, and maintained after and between uses.
    - Gloves
      - Put on clean, non-sterile gloves upon entry into the patient room or care area. Change gloves if they become torn or heavily contaminated.

        - Remove and discard gloves immediately upon leaving the patient room or care area. Please see section below on "Using More than one Kind of Personal Protective Equipment (PPE)" for recommended sequence of PPE removal.
    - Gowns
        - Put on a clean disposable gown upon entry into the patient room or area. Change the gown if it becomes soiled. Remove and discard the gown immediately upon leaving the patient room or care area.
    - Respiratory Protection
        - Use respiratory protection (i.e., a respirator) that is at least as protective as a fit-tested NIOSH-certified disposable N95 filtering facepiece respirator upon entry to the patient room or care area.
        - The respirator should be the last part of the PPE ensemble to be removed. If reusable respirators are used, they must be cleaned and disinfected according to manufacturer's reprocessing instructions prior to re-use. If disposable respirators are used, they should be removed and discarded after leaving the patient room or care area and closing the door.
        - Respirator use must be in the context of a complete respiratory protection program in accordance with Occupational Safety and Health Administration (OSHA) Respiratory Protection standard (29 CFR 1910.134). Staff should be medically cleared and fit-tested if using respirators with tight-fitting facepieces (e.g., a NIOSH-certified disposable N95) and trained in the proper use of respirators, safe removal and disposal, and medical contraindications to respirator use.
        - More information on respirators and facemasks is available in Appendix A of CDC's Interim Infection Prevention guidance for MERS-CoV: Prevention and Control for Hospitalized MERS Patients | MERS | CDC
    - Eye Protection
        - Put on eye protection (e.g., a disposable face shield) upon entry to the patient room or care area. Remove and discard eye protection immediately upon leaving the patient room or care area. Reusable eye protection (e.g., goggles) must be cleaned

and disinfected according to manufacturer's reprocessing instructions prior to re-use.

- Using More than one Kind of Personal Protective Equipment (PPE)
  - Different types of PPE are used together to prevent multiple routes of transmission.
  - The following sequence is a general approach to putting on this PPE combination for respiratory pathogens: first gown; then respirator; then goggles or face shield; then gloves.
  - The following sequence is a general approach to removing PPE for respiratory pathogens: first gloves; then goggles or face shield; then gown; then respirator.
  - Except for respirator, remove PPE at doorway or in anteroom. Remove respirator after leaving patient room and closing door.
  - Careful attention should be given to prevent contamination of clothing and skin during the process of removing PPE.
  - Perform hand hygiene as described above immediately before putting on and after removing all PPE.
- Patient Placement
  - Place a patient who might be infected with MERS-CoV in an Airborne Infection Isolation Room (AIIR) that has been constructed and maintained in accordance with current guidelines.
  - AIIRs are single patient rooms at negative pressure relative to the surrounding areas, and with a minimum of 6 air changes per hour (12 air changes per hour are recommended for new construction or renovation). Air from these rooms should be exhausted directly to the outside or be filtered through a high-efficiency particulate air (HEPA) filter before recirculation. Room doors should be kept closed except when entering or leaving the room, and entry and exit should be minimized. Facilities should monitor and document the proper negative-pressure function of these rooms.
  - If an AIIR is not available, the patient should be transferred as soon as is feasible to a facility where an AIIR is available. Pending transfer, place a facemask on the patient and isolate him/her in an examination room with the door closed. The patient should not be placed in any room

where room exhaust is recirculated without high-efficiency particulate air (HEPA) filtration.
    - Once in an AIIR, the patient's facemask may be removed; the facemask should remain on if the patient is not in an AIIR. Limit transport and movement of the patient outside of the AIIR to medically-essential purposes. When outside of the AIIR, patients should wear a facemask to contain secretions.
    - Only essential personnel should enter the AIIR. Implement staffing policies to minimize the number of HCP who enter the room.
        - Facilities should consider caring for these patients with dedicated HCP to minimize risk of transmission and exposure to other patients and other HCP.
- Facilities should keep a log of all persons who care for OR enter the rooms or care area of these patients.
- Once the patient vacates a room, unprotected individuals, including HCP, should not be allowed in that room until sufficient time has elapsed for enough air changes to remove potentially infectious particles. More information on clearance rates under differing ventilation conditions is available here: http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5417a1.htm?s_cid=rr5417a1_e%20-%20tab1. In addition, the room should undergo appropriate cleaning and surface disinfection before unprotected individuals are allowed to reenter it.
- Use Caution When Performing Aerosol-Generating Procedures
    - Some procedures performed on MERS-CoV patients may be more likely to generate higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking, or breathing. These procedures potentially put HCP and others at an increased risk for MERS-CoV exposure. Although not quantified, procedures that might post such a risk include: cough-generating procedures, bronchoscopy, sputum induction, intubation and extubation cardiopulmonary resuscitation, and open suctioning of airways.
    - Ideally, a combination of measures should be used to reduce exposures from these aerosol-generating procedures when performed on patients with suspected or confirmed MERS-CoV. Precautions for aerosol-generating procedures include:
        - Only performing these procedures if they are medically necessary and cannot be postponed.
        - Limiting the number of HCP present during the procedure to only those essential for patient care and support.
        - Conducting the procedures in an AIIR when feasible. Such rooms are designed to reduce the

concentration of infectious aerosols and prevent their escape into adjacent areas using controlled air exchanges and directional airflow.

- HCP should wear gloves, a gown, and either a face shield that fully covers the front and sides of the face or goggles, and respiratory protection at least as protective as an N95 filtering face piece respirator during aerosol-generating procedures.
    - Unprotected HCP should not be allowed in a room where an aerosol- generating procedure has been conducted until sufficient time has elapsed to remove potentially infectious particles. More information on clearance rates under differing ventilation conditions is available.
    - Conduct environmental surface cleaning following procedures described in the section on environmental infection control below.

- Duration of Infection Control Precautions
    - At this time, information is lacking to definitively determine a recommended duration for keeping patients in isolation precautions.
    - Duration of precautions should be determined on a case-by-case basis, in conjunction with local, state, and federal health authorities.
    - Factors that should be considered include: presence of symptoms related to MERS- CoV, date symptoms resolved, other conditions that would require specific precautions (e.g., tuberculosis, *Clostridium difficile*) and available laboratory information.
- Manage Visitor Access and Movement Within the Facility
- Establish procedures for monitoring, managing and training visitors.
- All visitors should follow respiratory hygiene and cough etiquette precautions while in the common areas of the facility.

- Restrict visitors from entering the MERS-CoV patient's room. Facilities can consider exceptions based on end-of-life situations or when a visitor is essential for the patient's emotional well-being and care.
- Visitors who have been in contact with the patient before and during hospitalization are a possible source of MERS-CoV for other patients, visitors, and staff.
    - Visitors to MERS-CoV patients should be scheduled and controlled to allow for:
        - Screening visitors for symptoms of acute respiratory illness before entering the hospital.
        - Facilities should evaluate risk to the health of the visitor (e.g., visitor might have underlying illness putting them at higher risk for MERS-CoV) and ability to comply with precautions.
        - Facilities should provide instruction, before visitors enter patients' rooms, on hand hygiene, limiting surfaces touched, and use of PPE according to current facility

policy while in the patient's room.
        - Facilities should maintain a record (e.g., log book) of all visitors who enter patient rooms.
        - Visitors should not be present during aerosol-generating procedures.
    - Visitors should be instructed to limit their movement within the facility.
    - Exposed visitors (e.g., contact with symptomatic MERS-CoV patient prior to admission) should be advised to report any signs and symptoms of acute illness to their health care provider for a period of at least 14 days after the last known exposure to the sick patient.
- Implement Engineering Controls
- Consider designing and installing engineering controls to reduce or eliminate exposures by shielding HCP and other patients from infected individuals. Examples of engineering controls include physical barriers or partitions to guide patients through triage areas, curtains between patients in shared areas, closed suctioning systems for airway suctioning for intubated patients, as well as appropriate air-handling systems (with appropriate directionality, filtration, exchange rate, etc.) that are installed and properly maintained.
- Monitor and Manage Ill and Exposed Healthcare Personnel
- HCP who care for patients with MERS-CoV should be monitored. They should immediately report any signs (e.g., fever) or symptoms (e.g., cough, shortness of breath) of acute illness to their supervisor or a facility designated person (e.g., occupational health services) for a period of 14 days after the last known contact with a MERS CoV patient, regardless of their use of PPE.
- HCP who develop any respiratory symptoms after an unprotected exposure (i.e., not wearing recommended PPE at the time of contact) to a patient with MERS-CoV should not report for work or should immediately stop working. These HCP should notify their supervisor, implement respiratory hygiene and cough etiquette, seek prompt medical evaluation, and comply with work exclusion until they are no longer deemed infectious to others.
- For asymptomatic HCP who have had an unprotected exposure (i.e., not wearing recommended PPE at the time of contact) to a patient with MERS-CoV, exclude from work for 14 days to monitor for signs and symptoms of respiratory illness and fever[1].
    - If necessary to ensure adequate staffing of the facility, the asymptomatic provider could be considered for continuing patient care duties after discussion with local, state, and federal public health authorities.
    - Facilities and organizations providing healthcare should:
        - Implement sick leave policies for HCP, including contract staff and part-time personnel, which are non-punitive, flexible and consistent with public health guidance (e.g., policies should ensure ill HCP who may have MERS-CoV infection stay home, unless hospital admission for isolation and treatment is recommended).
        - Ensure that all HCP are aware of the sick leave policies.

- Provide employee health services that:
    - Ensure that HCP have ready access, including via telephone, to medical consultation and, if needed, prompt treatment.
- Train and Educate Healthcare Personnel
- Provide all HCP with job- or task-specific education and training on preventing transmission of infectious agents, including refresher training.
- HCP must be medically cleared, trained, and fit tested for respiratory protection device use (e.g., N95 filtering facepiece respirators), or medically cleared and trained in the use of an alternative respiratory protection device (e.g., Powered Air-Purifying Respirator, PAPR) whenever respirators are required. OSHA has a number of respiratory training videos (https://www.osha.gov/SLTC/respiratoryprotection/training_videos.html).
- Ensure that HCP are educated, trained, and have practiced the appropriate use of PPE prior to caring for a patient, including attention to correct use of PPE and prevention of contamination of clothing, skin, and environment during the process of removing such equipment.
- Implement Environmental Infection Control
- Ensure that cleaning and disinfection procedures are followed consistently and correctly.
- Standard cleaning and disinfection procedures (e.g., using cleaners and water to pre-clean surfaces prior to applying an EPA-registered disinfectant to frequently touched surfaces or objects for appropriate contact times as indicated on the product's label) are appropriate for MERS-CoV in healthcare settings, including those patient-care areas in which aerosol- generating procedures are performed. If there are no available EPA-registered products that have a label claim for MERS-CoV, products with label claims against human coronaviruses should be used according to label instructions. Management of laundry, food service utensils, and medical waste should also be performed in accordance with routine procedures.
    - Detailed information on environmental infection control in healthcare settings can be found in CDC's "Guidelines for Environmental Infection Control in Health- Care Facilities" (http://www.cdc.gov/mmwr/preview/mmwrhtml/rr5210a1.htm) and "Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings" [section IV.F. Care of the environment] (http://www.cdc.gov/hicpac/2007IP/2007ip_part4.html)

- Establish Reporting within Hospitals and to Public Health Authorities
    - Implement mechanisms and policies that promptly alert key facility staff including infection control, healthcare epidemiology, hospital leadership, occupational health, clinical laboratory, and frontline staff about suspected or known MERS-CoV patients.
    - Communicate and collaborate with public health authorities.
    - Promptly notify public health authorities of suspected or known patients with MERS-CoV.
    - Facilities should designate specific persons within the healthcare facility who are responsible for communication with public health officials and dissemination of information to HCP.

Laboratory Settings

Laboratory workers should follow the guidelines in the CDC's "Interim Laboratory Biosafety Guidelines for Handling and Processing Specimens Associated with Middle East Respiratory Syndrome Coronavirus (MERS-CoV) – Version 2", available at: cdc.gov/coronavirus/mers/guidelines-lab-biosafety.

General Guidelines (for working with potentially infectious materials)

- Laboratory workers should wear personal protective equipment (PPE) which includes disposable gloves, laboratory coat/gown, respirator, and eye protection when handling potentially infectious specimens.
- Acceptable respiratory protection devices include: a properly fit-tested, NIOSH-approved filtering facepiece respirator (N-95 or higher level) or a powered air-purifying respirator (PAPR) equipped with high-efficiency particulate air (HEPA) filters. Accurate fit-testing is a key component of a respiratory protection program (RPP) and will assist with effective respirator use. An RPP includes medical clearance, training, fit-testing, and fit-checking to ensure appropriate respiratory selection and use. To be effective, respirators must provide a proper sealing surface on the wearer's face. Personnel who cannot wear fitted respirators because of facial hair or other fit limitations should wear loose-fitting hooded or helmeted PAPRs. See detailed information on a respiratory protection program here https://www.osha.gov/SLTC/etools/respiratory/.
- Any procedure with the potential to generate fine-particulate aerosols (e.g., vortexing or sonication of specimens in an open tube) should be performed in a Class II Biological Safety Cabinet (BSC). Appropriate physical containment devices (e.g., centrifuge safety buckets; sealed rotors) should be used for centrifugation. Ideally, rotors and buckets should be loaded and unloaded in a BSC. Perform any procedures outside a BSC in a manner that minimizes the risk of exposure to an inadvertent sample release.
- After specimens are processed, decontaminate work surfaces and equipment with appropriate disinfectants. Use any EPA-registered hospital disinfectant. Follow manufacturer's recommendations for use-dilution (i.e., concentration), contact time, and care in handling.
- Autoclave all disposable waste.

Specific Guidelines

- The following activities may be performed in BSL-2 facilities using standard BSL-2work practices:
  - Pathologic examination and processing of formalin-fixed or otherwise inactivated tissues
  - Molecular analysis of extracted nucleic acid preparations
  - Electron microscopic studies with glutaraldehyde-fixed grids
  - Routine examination of bacterial and mycotic cultures
  - Routine staining and microscopic analysis of fixed smears
  - Final packaging of specimens for transport to diagnostic laboratories for additional testing. Specimens should already be in a sealed, decontaminated primary container.
  - Inactivated specimens (e.g., specimens in nucleic acid extraction buffer)
- The following activities involving manipulation of potentially infected specimens should be performed as above and in a Class II BSC:
  - Aliquoting and/or diluting specimens
  - Inoculating bacterial or mycological culture media
  - Performing diagnostic tests that do not involve propagation of viral agents in vitro or in vivo
  - Nucleic acid extraction procedures involving potentially infected specimens
  - Preparation and chemical- or heat-fixing of smears for microscopic analysis
- The following activities must be performed in a BSL-3 facility using BSL-3 work practices:
  - MERS-CoV propagation in cell culture
  - Initial characterization of viral agents recovered in cultures of MERS-CoV specimens
- The following activities must be performed in Animal BSL-3 facilities using Animal BSL-3 work practices:
  - Inoculation of animals for potential recovery of virus from MERS-CoV samples
  - Protocols involving animal inoculation for characterization of putative MERS-CoV agents

Clinical Laboratory Testing

- Clinical laboratories performing routine hematology, urinalysis, and clinical chemistry studies, and microbiology laboratories performing diagnostic tests on serum, blood, or urine specimens should follow standard laboratory practices, including Standard Precautions, when handling potential MERS-CoV specimens. For additional information, see: Biosafety in Microbiological and Biomedical Laboratories (BMBL) 5th Edition - CDC (page 225).

Packing, Shipping and Transport

- Follow IATA Dangerous Goods Regulations for packaging, shipping and transport of specimens from suspect cases of MERS-CoV infection.
- Follow shipping regulations for UN 3373 Biological Substance, Category B when sending potential MERS-CoV specimens.
  - More packaging resources (checklist, packing instructions,

labels, and packaging schematic) can be found at: cdc.gov/coronavirus/mers/guidelines-lab-biosafety.

Air or Ground Medical Transport

Air medical transport (AMT) service providers transporting MERS patients should follow the guidance at: Guidance on Air Medical Transport for Middle East Respiratory Syndrome (MERS) Patients | CDC Archive.

CDC has not written emergency medical services (EMS) or first responder ground transport guidelines specifically for MERS; however, the guidance in CDC's "Infection Control for Prehospital Emergency Medical Services (EMS)" guidance for Severe Acute Respiratory Syndrome (SARS) (IV. Infection Control for Prehospital Emergency Medical Services (EMS) | CDC Archive) can be adapted for MERS, with the **addition of airborne precautions**. See AMT guidance above for more information on cleaning and disinfection.

Confirmed, Probable or Suspected (PUI) Case-Patients

People who are confirmed to have, or being evaluated for, MERS-CoV infection and do not require hospitalization for medical reasons may be cared for and isolated in a residential setting after a healthcare professional determines that the setting is suitable.

- To assess the suitability of the home setting, see: About Middle East Respiratory Syndrome (MERS) | MERS | CDC
- Providers should contact their state or local health department to discuss home isolation, home quarantine, or other measures for close contacts, especially for patients who test positive for MERS-CoV, and to discuss criteria for discontinuing any such measures.
- See: Prevention and Control for Hospitalized MERS Patients | MERS | CDC for more information.
- Provide guidance (see below) on "Preventing MERS-CoV from Spreading to Others in Homes and Communities" (MERS: Preventing Spreading in Homes & Communities | CDC) to anyone confirmed to have, or being evaluated for, MERS-CoV infection who will be cared for and isolated in a residential setting, Preventing MERS-CoV from Spreading to Others in Homes and Communities | CDC Archive.

The following prevention steps are recommended for people confirmed to have MERS-CoV infection who can receive care at home and do not need to be hospitalized for medical reasons; people being evaluated by a healthcare provider for MERS-CoV infection; caregivers and household members of a person confirmed to have, or being evaluated for, MERS-CoV infection; and other people who have had close contact with a person confirmed to have, or being evaluated for, MERS- CoV infection:

Note: If you are confirmed to have, or being evaluated for, MERS-CoV infection you should follow the prevention steps below until a healthcare provider or local or state health department says you can return to your normal activities.

- Stay home
  - You should restrict activities outside your home, except for getting medical care. Do not go to work, school, or public areas, and do not use public transportation or taxis.
- Separate yourself from other people in your home
  - As much as possible, you should stay in a different room from other

people in your home. Also, you should use a separate bathroom, if available.

- Call ahead before visiting your doctor
  - Before your medical appointment, call the healthcare provider and tell him or her that you have, or are being evaluated for, MERS-CoV infection. This will help the healthcare provider's office take steps to keep other people from getting infected.
- Wear a facemask
  - You should wear a facemask when you are in the same room with other people and when you visit a healthcare provider. If you cannot wear a facemask, the people who live with you should wear one while they are in the same room with you.
- Cover your coughs and sneezes
  - Cover your mouth and nose with a tissue when you cough or sneeze, or you can cough or sneeze into your sleeve. Throw used tissues in a lined trash can, and immediately wash your hands with soap and water.
- Wash your hands
  - Wash your hands often and thoroughly with soap and water. You can use an alcohol-based hand sanitizer if soap and water are not available and if your hands are not visibly dirty. Avoid touching your eyes, nose, and mouth with unwashed hands.
- Avoid sharing household items
  - You should not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with other people in your home. After using these items, you should wash them thoroughly with soap and water.
- Monitor your symptoms
  - Seek prompt medical attention if your illness is worsening (e.g., difficulty breathing). Before going to your medical appointment, call the healthcare provider and tell him or her that you have, or are being evaluated for, MERS-CoV infection. This will help the healthcare provider's office take steps to keep other people from getting infected. Ask your healthcare provider to call the local or state health department.

Caregivers and Household Members

The following prevention steps are recommended for anyone who lives with or provides care at home for a person confirmed to have, or being evaluated for, a novel coronavirus infection such as MERS-CoV infection:

- Make sure that you understand and can help the person follow the healthcare provider's
  instructions for medication and care. You should help the person with basic needs in the home and provide support for getting groceries, prescriptions, and other personal needs.
- Have only people in the home who are essential for providing care for the person.
  - Other household members should stay in another home or place of residence. If this is not possible, they should stay in another room or be separated from the person as much as possible. Use a separate bathroom, if available.

    - Restrict visitors who do not have an essential need to be in the home.
    - Keep elderly people and those who have compromised immune systems or certain health conditions away from the person. This includes people with chronic heart, lung or kidney conditions and diabetes.
- Make sure that shared spaces in the home have good air flow, such as by an air conditioner or an opened window, weather permitting.
- Wash hands often and thoroughly with soap and water, or with an alcohol-based hand sanitizer if hands are not visibly dirty. Avoid touching your eyes, nose, and mouth with unwashed hands.
- Wear a disposable facemask, gown, and gloves when you touch or have contact with the person's blood, body fluids and/or secretions, such as sweat, saliva, sputum, nasal mucus, vomit, urine or diarrhea.
    - Throw out disposable facemasks, gowns, and gloves after using them. Do not reuse them.
    - Wash your hands immediately after removing your facemask, gown and gloves.
- Avoid sharing household items.
    - Do not share dishes, drinking glasses, cups, eating utensils, towels, bedding, or other items with a person who is confirmed to have, or being evaluated for, a novel coronavirus infection such as MERS-CoV infection. After the person uses these items, he or she should be wash them thoroughly (see below "Wash laundry thoroughly").
- Clean all "high-touch" surfaces, such as counters, tabletops, doorknobs, bathroom fixtures, toilets, phones, keyboards, tablets and bedside tables, every day. Also, clean any surfaces that may have blood, body fluids and/or secretions or excretions on them.
- Read label of cleaning products and follow recommendations provided on product labels.
    - Labels contain instructions for safe and effective use of the cleaning product including precautions you should take when applying the product, such as wearing gloves or aprons and making sure you have good ventilation during use of the product.
    - Use a diluted bleach solution or a household disinfectant with a label that says "EPA-approved."
    - To make a bleach solution at home, add 1 tablespoon of bleach to 1 quart (4 cups) of water. For a larger supply, add ¼ cup of bleach to 1 gallon (16 cups) of water.
- Wash laundry thoroughly.
    - Immediately remove and wash clothes or bedding that have blood, body fluids and/or secretions or excretions on them.
    - Wear disposable gloves while handling soiled items. Wash hands immediately after removing your gloves.
    - Read and follow directions on labels of laundry or clothing items and detergent. In general, wash and dry with the warmest temperatures recommended on the clothing label.
- Place all used gloves, gowns, facemasks, and other contaminated items in a lined container before disposing them with other household waste. Wash hands immediately after handling these items.

- Monitor the person's symptoms. If he or she is getting sicker, call his or her medical provider and tell him or her that the person has, or is being evaluated for a novel coronavirus infection. This will help the healthcare provider's office take steps to keep other people from getting infected. Ask the healthcare provider to call the local or state health department.
- Caregivers and household members who do not follow precautions when in close contact3 with a person who is confirmed to have, or being evaluated for, a novel coronavirus infection, are considered "close contacts" and should monitor their health. Follow the prevention steps for close contacts below.

Close Contacts
Preventing MERS-CoV from Spreading to Others in Homes and Communities | CDC Archive
The following prevention steps are recommended for anyone who has had close contact with someone who is confirmed to have, or being evaluated for, a novel coronavirus infection:

- Monitor your health starting from the day you were first exposed to the person and continue for 14 days after you were last exposed to the person. Watch for these signs and symptoms:
  - Fever. Take your temperature twice a day.
  - Coughing.
  - Shortness of breath.
  - Other early symptoms to watch for are chills, body aches, sore throat, headache, diarrhea, nausea/vomiting, and runny nose.
- If you develop symptoms, follow the prevention steps described above for Confirmed, Probable or Suspected (PUI) Case-Patients, and call your healthcare provider as soon as possible.
  - Before going to your medical appointment, call the healthcare provider and tell him or her about your possible exposure to MERS-CoV. This will help the healthcare provider's office take steps to keep other people from getting infected.
  - Ask your healthcare provider to call the local or state health department.
- If you do not have any symptoms, you can continue with your daily activities, such as going to work, school, or other public areas.

Travelers to the Arabian Peninsula and Airline Crew
http://wwwnc.cdc.gov/travel/notices/alert/coronavirus-saudi-arabia-qatar

- General prevention measures for all travelers:
  - Wash your hands often with soap and water. If soap and water are not available, use an alcohol-based hand sanitizer.
  - Avoid touching your eyes, nose, and mouth. Germs spread this way.
  - Avoid close contact with sick people.
  - Be sure you are up-to-date with all of your shots, and if possible, see your health care provider at least 4–6 weeks before travel to get any additional shots.
- Visit CDC's Travelers' Health website (http://wwwnc.cdc.gov/travel/) for more information on healthy travel.
  - CDC does not recommend that travelers change their plans

because of MERS. Most instances of person-to-person spread have occurred in health care workers and other close contacts (such as family members and caregivers) of people sick with MERS. If you are concerned about MERS, you should discuss your travel plans with your doctor.

- Travelers who are ill:
  - Cover your mouth with a tissue when you cough or sneeze, and throw the tissue in the trash.
  - Avoid contact with other people to keep from infecting them. This might mean delaying your travel until you are well.
  - Call a doctor if you develop a fever and symptoms of lower respiratory illness, such as cough or shortness of breath, within 14 days after traveling from countries in or near the Arabian Peninsula. You should tell the doctor about your recent travel before you go in for an appointment.
  - Tell people who have been in close contact with you to monitor their health for 14 days after the last time they were around you.
  - They should call a doctor and tell them about your illness and travel history and their current symptoms.
- If you get sick while you are traveling, see "Getting Health Care Abroad" (http://wwwnc.cdc.gov/travel/page/getting-health-care-abroad) for information about how to locate medical services overseas.
- Persons considering exposure or exposed to camels during travel:
  - The MERS virus has been found in some camels, and some MERS patients have reported contact with camels. However, we do not know exactly how people become infected with the virus - many people with MERS have had close contact with a person sick with MERS.
- The World Health Organization (WHO) has posted a general precaution for anyone visiting farms, markets, barns, or other places where animals are present. Travelers should practice general hygiene measures, including regular hand washing before and after touching animals, and avoid contact with sick animals. Travelers should also avoid consumption of raw or undercooked animal products.
- The WHO considers certain groups to be at high risk for severe MERS; these groups include people with diabetes, kidney failure, or chronic lung disease and people who have weakened immune systems. The WHO recommends that these groups take additional precautions (for more information see http://www.who.int/csr/disease/coronavirus_infections/MERS_CoV_RA_201406 13.pdf?ua=1):
  - Avoid contact with camels.
  - Do not drink raw camel milk or raw camel urine.
  - Do not eat undercooked meat, particularly camel meat.
- Healthcare workers
  - People who are traveling to provide health care services in the Arabian Peninsula should review CDC's recommendations for infection control of confirmed or suspected MERS cases.
- Airline crew
  - Please follow your company's policy for personal protection.
  - Please report to CDC ill travelers (with symptoms below) arriving

from countries in and near the Arabian Peninsula.

- Report to CDC if the ill person:
  - Feels warm to the touch, gives a history of feeling feverish, or has an actual measured temperature of 100° F (37.8° C) or higher, **PLUS**
  - Has a cough or difficulty breathing.
- Please report as soon as possible - before arrival - by one of the methods described in the "Guidance for Airlines on Reporting Onboard Deaths or Illnesses to CDC" (http://www.cdc.gov/quarantine/air/reporting-deaths-illness/guidance-reporting-onboard-deaths-illnesses.html).
- CDC will update the airline about the results of the testing and any need for follow- up or treatment of exposed crew members or passengers.

General Population

- CDC advises that people follow prevention steps to help reduce their risk of getting infected with respiratory viruses, like MERS-CoV:
  - Wash your hands often with soap and water for 20 seconds, and help young children do the same. If soap and water are not available, use an alcohol-based hand sanitizer.
  - Cover your nose and mouth with a tissue when you cough or sneeze, then throw the tissue in the trash.
  - Avoid touching your eyes, nose and mouth with unwashed hands.
  - Avoid personal contact, such as kissing, or sharing cups or eating utensils, with sick people.
  - Clean and disinfect frequently touched surfaces such as toys and doorknobs.
- You are not considered to be at risk for MERS-CoV infection if you have not had close contact with someone who is confirmed to have, or being evaluated for, MERS-CoV infection.
- If you are caring for or living with a person confirmed to have, or being evaluated for, MERS-CoV infection, see "Interim Guidance for Preventing MERS-CoV from Spreading in Homes and Communities" at: Preventing MERS-CoV from Spreading to Others in Homes and Communities | CDC Archive.
- Currently, there is no vaccine to prevent MERS-CoV infection. The U.S. National Institutes of Health is exploring the possibility of developing one.

School/Daycare Exclusion Criteria

Children with a fever from any infectious disease cause should be excluded from school and daycare for at least 24 hours after fever subsides without the use of fever-suppressing medications. It is recommended that adults not return to work for at least 24 hours after fever has subsided without the use of fever suppressing medications. Do not exclude close contacts from daily activities such as work or school as long as they have no other reasons for exclusion. In the event of a pandemic the exclusion period may be extended.

CONTACT TRACING

For all confirmed and probable cases of novel coronavirus infection, contact tracing for close contacts (see CDC's close contact definition below) is required. In addition, because MERS-CoV and other novel coronaviruses are not fully understood, DSHS Austin may request that contact tracing activities for confirmed and probable cases include healthcare workers who were wearing recommended PPE but otherwise meet the definition of close contact.

The extent of follow-up required for close contacts of confirmed or probable cases may depend on the number of cases identified, the severity of illness or interest from public health leaders or media. Contract tracing requirements may cease in specific situations (e.g., in the case of an ongoing pandemic), as specified by DSHS Austin.

Contact tracing

- Contact tracing should be done for all probable and confirmed cases.
    - Complete the Respiratory Disease Contact Tracking Form found at http://www.dshs.texas.gov/eaidu/investigation/ and provide a copy to DSHS either by fax or secure email: IRID@dshs.texas.gov.
    - Advise contacts of signs and symptoms of illness, and refer them to their healthcare providers if they experience any symptoms compatible with novel coronavirus infection within 14 days of their last contact with the confirmed or probable case.
    - Advise ill close contacts to call ahead prior to visiting their healthcare provider and inform their healthcare provider about recent contact with a confirmed or probable case.
    - Close contacts with respiratory or other compatible symptoms should be tested for novel coronavirus.
        - Close contacts should be actively monitored for symptoms of novel coronavirus infection for a minimum of 14 days after last contact with the confirmed/probable case (i.e., follow- up should be performed at regular intervals).
        - Collect serum specimens or other laboratory specimens on asymptomatic close contacts, when requested (See Laboratory Procedures section)
        - Provide close contacts with a disease fact sheet, if available.

Close contacts definition for MERS:

Close contact is defined as a) being within approximately 6 feet (2 meters), or within the room or care area, of a confirmed MERS case for a prolonged period of time (such as caring for, living with, visiting, or sharing a healthcare waiting area or room with, a confirmed MERS case) while not wearing recommended personal protective equipment or PPE (e.g., gowns, gloves, NIOSH-certified disposable N95 respirator, eye protection); or b) having direct contact with infectious secretions of a confirmed MERS case (e.g., being coughed on) while not wearing recommended personal protective equipment (i.e., gowns, gloves, respirator, eye protection).

Data to inform the definition of close contact are limited; considerations when assessing close contact include the duration of exposure (e.g., longer exposure time likely increases exposure risk) and the clinical symptoms of the person with MERS (e.g., coughing likely increases exposure risk). At this time, transient interactions, such as walking by a person with MERS, are not thought to constitute an exposure; however, final determination should be made in consultation with public health authorities. For guidance on appropriate PPE please see: Prevention and Control for Hospitalized MERS Patients | MERS | CDC.

MANAGING SPECIAL SITUATIONS

Clusters of Patients with Severe Acute Respiratory Illness

- Clusters of patients with severe acute respiratory illness (e.g., fever and pneumonia requiring hospitalization) without recognized links to a case of MERS-CoV infection or to travelers from countries in or near the Arabian Peninsula should be evaluated for common respiratory pathogens.
- If the illnesses remain unexplained, providers should consider testing for MERS-CoV, in consultation with state and local health departments.
- In accordance with the World Health Organization's guidance for MERS-CoV, a cluster is defined as two or more persons with onset of symptoms within the same 14 days period, and who are associated with a specific setting such as a classroom, workplace, household, extended family, hospital, other residential institution, military barracks or recreational camp.
    - If a cluster of patients with severe acute respiratory illness is identified, notify EAIDU **immediately** at **(800) 252-8239** or **(512) 776-7676**.

Multiple Cases/Outbreaks of Novel Coronavirus

If there is more than one case of novel coronavirus in a jurisdiction, local area or facility, or an outbreak is suspected, notify EAIDU **immediately** at **(800) 252-8239 or (512) 776-7676**.

The local/regional health department should:

- Investigate common exposures among the cases and work with any identified facilities or entities.
    - Recommend appropriate control measures for the specific entity or setting.
        - Perform contact tracing and monitoring for close contacts of confirmed/probable cases.
        - Collect specimens from close contacts, if requested.
        - Encourage persons with compatible symptoms to be evaluated by a healthcare provider.
        - Alert all healthcare providers in the area to be cognizant of possible cases and encourage immediate reporting of suspected cases.
        - Collect and ship specimens on all suspected or probable cases to the DSHS laboratory or another public health laboratory qualified to perform novel coronavirus testing using CDC- approved protocols for a specific novel strain.
        - Enhance respiratory virus surveillance (e.g., case

reporting and laboratory testing) in the facility or in a defined geographic area (depending on the specific outbreak situation)
- Refer to the *Public Health Preparedness, Surveillance, and Response Plan for Texas: Respiratory Viruses Having Pandemic Potential* for a list of responsibilities by department and program area.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases of novel coronavirus infection are required to be reported immediately to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at (800) 252-8239 or (512) 776-7676.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:
- Enter the case into NBS and submit an NBS notification on all confirmed and probable cases to DSHS within 30 days of receiving a report of such a case.
  - Please refer to the NBS Data Entry Guidelines for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Investigation forms should be faxed or securely emailed as soon as an investigation has been completed.
- Investigation forms may be faxed to DSHS EAIDU at **512-776-7616** or securely emailed to the IRID team lead.

When an outbreak is investigated, local and regional health departments should:
- Report outbreaks immediately to the regional DSHS office or to DSHS EAIDU at **512-776-7676**.
- Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.
  - Fax or send by secure email a copy to the DSHS regional office and/or to EAIDU at 512-776-7676. The secure email should be sent to the IRID team lead at EAIDU.
  - The Respiratory Disease Outbreak Summary Form is available at http://www.dshs.texas.gov/eaidu/investigation/.

LABORATORY PROCEDURES

Identification of a novel coronavirus such as MERS-CoV is available in Texas through the DSHS Austin Laboratory. Additionally, some Texas Laboratory Response Network (LRN) laboratories are able to test for novel coronavirus. For a list of laboratories in Texas currently qualified to perform novel coronavirus testing, please contact DSHS EAIDU at 512-776-7676. Specimens should be sent on all cases that meet the current definitions of

suspected (PUI), probable or confirmed cases.

Specimen Collection
Please see: MERS-CoV Interim Guidelines for Clinical Specimens from PUI | CDC for the most up-to-date guidelines.

Specimen Type and Priority
To date, little is known about pathogenic potential and transmission dynamics of MERS-CoV. To increase the likelihood of detecting infection, CDC recommends collecting multiple specimens from different sites at different times after symptom onset, if possible.

Points to consider when determining which specimen types to collect from a patient under investigation for MERS include:

- The number of days between specimen collection and symptom onset Symptoms at the time of specimen collection
- Additional points to consider:
    - Maintain proper infection control when collecting specimens
    - Use approved collection methods and equipment when collecting specimens
    - Handle, store, and ship specimens following appropriate protocols

Collection of all three specimen types (not just one or two of the three)—lower respiratory, upper respiratory and serum specimens—for testing using the CDC MERS rRT-PCR assay is recommended. Lower respiratory specimens are preferred, but collecting nasopharyngeal and oropharyngeal (NP/OP) specimens, and serum, is strongly recommended depending upon the length of time between symptom onset and specimen collection. Respiratory specimens should be collected as soon as possible after symptoms begin – ideally within 7 days. However, if more than a week has passed since symptom onset and the patient is still symptomatic, respiratory samples should still be collected, especially lower respiratory specimens since respiratory viruses can still be detected by rRT- PCR. For example,

- If symptom onset for a PUI with respiratory symptoms was less than 14 days ago, a single serum specimen (see Serum section, below), an NP/OP specimen, and a lower respiratory specimen (see Respiratory Specimens section, below) should be collected for CDC MERS rRT-PCR testing at an authorized state or local public health laboratory.
- If symptom onset for a PUI with an ongoing respiratory tract infection (especially a lower respiratory tract infection) was 14 or more days ago, a single serum specimen for serologic testing at CDC (see Serum section, below) in addition to a lower respiratory specimen and an NP/OP specimen (see Respiratory Specimens section, below) are recommended.

General Guidelines
For short periods (≤ 72 hours), most specimens should be held at 2-8°C rather than frozen. For delays exceeding 72 hours, freeze specimens at -70°C as soon as possible after collection (with exceptions noted below). Label each specimen container with the patient's ID number, specimen type and the date the sample was collected.

Respiratory Specimens

A. Lower respiratory tract

- ☐ Bronchoalveolar lavage, tracheal aspirate, or pleural fluid
  - Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.
  - Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.
- ☐ Sputum
  - Have the patient rinse his/her mouth with water and then expectorate (deep cough) sputum directly into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.
  - Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

B. Upper respiratory tract

- ☐ Nasopharyngeal AND oropharyngeal swabs (NP/OP swabs)
  - Collection of both nasopharyngeal and oropharyngeal swabs, or a combined NP/OP specimen, is recommended.
  - Use only synthetic fiber swabs with plastic shafts. Do not use calcium alginate swabs or swabs with wooden shafts, as they may contain substances that inactivate some viruses and inhibit PCR testing.
  - Collection technique
    - Nasopharyngeal swabs:
      - Insert a swab into the nostril parallel to the palate.
      - Leave the swab in place for a few seconds to absorb secretions.
      - Swab both nasopharyngeal areas.
    - Oropharyngeal swabs:
      - Swab the posterior pharynx, avoiding the tongue.
  - Place swabs immediately into sterile tubes containing 2-3 ml of viral transport media. NP/OP specimens can be combined, placing both swabs in the same vial.
  - Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.
- ☐ Nasopharyngeal wash/aspirate or nasal aspirates
  - Collect 2-3 mL into a sterile, leak-proof, screw-cap sputum collection cup or sterile dry container.
  - Refrigerate specimen at 2-8°C if the specimen will arrive at the testing laboratory within 72 hours of collection; if exceeding 72 hours, freeze at -70°C and ship on dry ice.

Serum

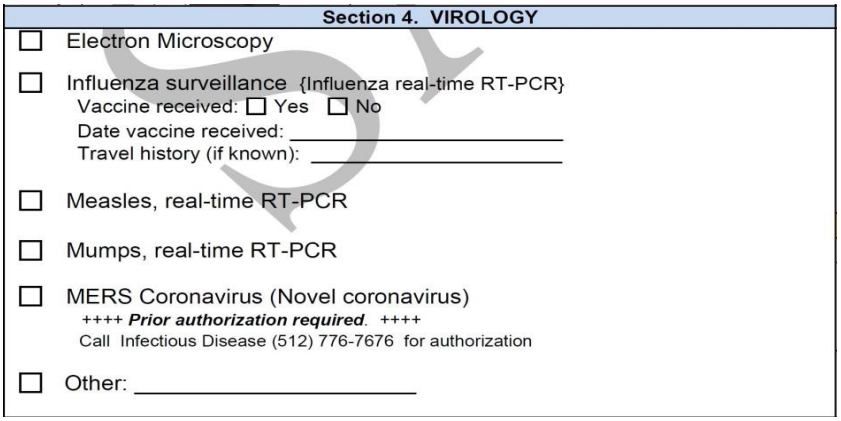
- ☐ Serum (for serologic testing at CDC) [Note: Use this serum guidance if the only serum specimen available would be collected 14 or more days after illness onset]
  - Because we do not want to delay detection of MERS infection and since the prevalence of MERS in the US is low, serologic testing

on a single serum sample collected 14 or more days after symptom onset may still be beneficial. This is in contrast to serologic testing for many other respiratory pathogens which require collection and testing of acute and convalescent serum specimens. Serologic testing is currently available at CDC upon request and approval. Please be aware that the MERS-CoV serologic test is for research/surveillance purposes and not for diagnostic purposes - it is a tool developed in response to the MERS-CoV outbreak. Contact CDC's Emergency Operations Center (EOC) (770-488-7100) for consultation and approval if serologic testing is being considered.

- ☐ Serum (for rRT-PCR testing at authorized state or local public health lab) [Note: Use this serum guidance for specimens collected during the first two weeks of the patient's illness onset]
  - For rRT-PCR testing (i.e., detection of the virus and not antibodies), a single serum specimen collected optimally during the first 10-12 days after symptom onset is recommended. Note: The kinetics of MERS-CoV are not well understood. Once additional data become available, these recommendations will be updated as needed.
  - The minimum amount of serum required for MERS-CoV testing (either serologic or rRT-PCR) is 200 µL. If both MERS-CoV serology and rRT-PCR tests are planned, the minimum amount of serum required is 400 µL (200 µL for each test). Serum separator tubes should be stored upright for at least 30 minutes, and then centrifuged at 1000–1300 relative centrifugal force (RCF) for 10 minutes before removing the serum and placing it in a separate sterile tube for shipping (such as a cryovial). Refrigerate the serum specimen at 2-8°C and ship on ice-pack; freezing and shipment of serum on dry ice is permissible.
  - Children and adults
    - Collect 1 tube (5-10 mL) of whole blood in a serum separator tube.
  - Infants
    - A minimum of 1 mL of whole blood is needed for testing pediatric patients.
    - If possible, collect 1 mL in a serum separator tube.

Submission Form

- ☐ Use DSHS Laboratory G-2V Specimen Submission Form for specimen submission. On the form under the Virology section, check the box "MERS Coronavirus (Novel coronavirus)".



Section 4. VIROLOGY

☐ Electron Microscopy

☐ Influenza surveillance {Influenza real-time RT-PCR}
Vaccine received: ☐ Yes ☐ No
Date vaccine received: _____
Travel history (if known): _____

☐ Measles, real-time RT-PCR

☐ Mumps, real-time RT-PCR

☐ MERS Coronavirus (Novel coronavirus)
++++ ***Prior authorization required***. ++++
Call Infectious Disease (512) 776-7676 for authorization

☐ Other: _____

- ☐ Make sure the patient's name and approved secondary identifier on the form exactly match what is written on the specimen tube.
    - An approved secondary identifier should be one of the following: date of birth, medical record number, social security number, Medicaid number, or CDC number.
- ☐ Fill in the patient's first name, last name, address, city, state, zip code, sex, date of birth, date and time of collection, date of onset and diagnosis/symptoms.
- ☐ The submitter will not incur a cost for novel coronavirus testing when patients meet testing criteria as long as the appropriate payor source is selected on the submission form. Contact DSHS EAIDU at 512-776-7676 for instructions on filling out the Payor Source section of the G-2V Specimen Submission Form.

Specimen Shipping

- ☐ **Notify the testing laboratory that you will be shipping the specimen and provide the shipment date and tracking number.**
- ☐ Transport temperature: Store the specimen at 2-8°C if the specimen will be received at the laboratory within 72 hours of collection; ship the specimen on cold or freezer packs. Otherwise, the specimen must be frozen at -70°C and shipped on dry ice.
- ☐ Ship specimens via overnight delivery.
- ☐ DO NOT mail on a Friday or the day before a holiday unless special arrangements have been made in advance with the DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Incorrect source of specimen
- ☐ The specimen is received at an incorrect temperature
- ☐ The specimen is received more than 72 hours after collection (if refrigerated)
- ☐ Missing or discrepant information on form/specimen
- ☐ Patient does not meet testing criteria or has not been approved for

testing by epidemiology

REVISION HISTORY

December 2021

- Removed inactive links
- Added IRID inbox email as a contact

January 2018

- Definitions: updated case definitions
- Surveillance and Case Investigation: added that completed PUI forms may be sent to DSHS by secure email, removed information about reporting ill travelers from South Korea to the CDC, and made some minor grammatical and formatting changes
- Reporting and Data Entry Requirements: added that completed case investigation forms and the completed Respiratory Disease Summary Outbreak form may be sent to the IRID team lead by secure email

Paragonimiasis

BASIC EPIDEMIOLOGY

Infectious Agent

Paragonimus species, a parasitic lung fluke (flat worm). More than 30 species of trematodes (flukes) of the genus *Paragonimus* have been reported which infect animals and humans; the most important is *P. westermani,* which occurs primarily in Asia. Although rare, human paragonimiasis from *P. kellicotti* has been acquired in the United States.

Transmission

Transmission occurs through consumption of raw, salted, pickled, or partially cooked freshwater crabs or crayfish (crawfish) containing infectious larvae (metacercariae). The larvae are released when the crab or crayfish are digested, and then migrate within the body, most often ending up in the lungs. Infection can also be acquired by ingestion of raw meat from other infected vertebrae hosts that contain young flukes (e.g., wild boars). Transmission has also been implicated from contaminated utensils, such as knives or cutting boards. Infection is not transmitted directly from person to person.

Incubation Period

Variable; approximately 7-12 weeks after ingestion of the infectious larvae (when flukes mature and begin to lay eggs). The long, variable, poorly defined interval until symptoms appear depends on the organ invaded and the number of worms involved.

Communicability

Eggs may be shed by those infected for up to 20 years. Duration of infection in mollusk and crustacean hosts is unknown. Animals, such as pigs, dogs and a variety of feline species, can also harbor *P. westermani.*

Clinical Illness

Disease most frequently involves the lungs as adult flukes living in the lung cause lung disease. Initial signs and symptoms may be diarrhea and abdominal pain followed several days later by fever, chest pain, and fatigue. The symptoms may also include a dry cough, which later becomes productive with rusty-colored or blood-tinged sputum on exertion, and pleuritic chest pain. Extrapulmonary disease is not uncommon, with flukes found in such sites as the CNS, subcutaneous tissues, intestinal wall, peritoneal cavity, liver, lymph nodes and genitourinary tract. Infection usually lasts for years, and the infected person may be asymptomatic. The symptoms of paragonimiasis can be similar to those of tuberculosis, clinically and on chest X-rays.

DEFINITIONS

Clinical Case Definition

Paragonimiasis (lung fluke trematode) is transmitted by eating inadequately cooked crustaceans (primarily crayfish in the US) that are infected with the parasite. Disease most frequently involves the lungs. Initial signs and

symptoms may be diarrhea and abdominal pain followed several days later by fever, chest pain, and fatigue. The symptoms may also include a dry cough, which later becomes productive with rusty-colored or blood-tinged sputum on exertion, and pleuritic chest pain. X-ray findings may include diffuse and/or segmental infiltrates, nodules, cavities, ring cysts and/or pleural effusions. Extrapulmonary disease is not uncommon, with flukes found in such sites as the CNS, subcutaneous tissues, intestinal wall, peritoneal cavity, liver, lymph nodes and genitourinary tract. Infection usually lasts for years, and the infected person may be asymptomatic. Paragonimiasis may be mistaken for tuberculosis, clinically and on chest X-rays.

Laboratory Confirmation

- Microscopic identification of *Paragonimus* eggs in feces, sputum, pleural fluid, CSF, or pus
- Identification of worms or eggs in biopsies of pulmonary, cerebral, subcutaneous, or intra- abdominal nodules or cystic lesions

Case Classifications

- **Confirmed**: A case that is laboratory confirmed
- **Probable**: A clinically compatible case with
    - Detection of Paragonimus antibodies by CF, EIA, or immunoblot, **OR**
    - Positive skin test for Paragonimus, **OR**
    - History of ingestion of inadequately cooked crustaceans and marked eosinophilia with total WBC count in the normal range or supportive x-ray findings

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of paragonimiasis. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the Paragonimiasis Investigation Form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to get detailed exposure history and risk factor information.
    - Use the **Paragonimiasis Investigation Form** to record information from the interview.
    - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
    - Provide education to the case or his/her surrogate about

effective hand washing and food safety practices. See Prevention and Control Measures.

- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616**
  - For lost to follow-up (LTF) cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/e-mail securely to DSHS EAIDU and indicate the reason for any missing information.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- ☐ Routine hand washing with soap and warm water.
- ☐ Never eat raw freshwater crabs or crayfish. Cook crabs and crayfish to at least 145°F (~63°C).
- ☐ Travelers should be advised to avoid traditional meals containing undercooked freshwater crustaceans.

Exclusions

School/child-care: No exclusions are specified for paragonimiasis but the standard exclusion for diarrhea or fever applies:

- ☐ Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- ☐ Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for paragonimiasis but the standard exclusion for vomiting or diarrhea applies:

- ☐ Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications **OR**
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks/Clusters

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- ☐ Interview all cases suspected as being part of the outbreak or cluster.
- ☐ Request medical records for any case in your jurisdiction that died, was

too ill to be interviewed, or for whom there are no appropriate surrogates to interview.

- ☐ Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky exposures, such as consumption of freshwater crustaceans, recreational water contact or travel to an endemic country reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Risks	Notes
1	NT	34	F	White / non-Hispanic	12/4/23	Diarrhea, Chest Pain, Dry cough	Ate crayfish that brother purchased at a festival	Brother ill
2	PR	4	M	Unknown	11/30/23	Blood in sputum, chest pain	Attended The Crayfish festival in October	Lost to follow up (LTF)

- ☐ If the outbreak was reported in association with an apparent common risk factor (e.g., food establishment serving freshwater crustaceans, recreational body of water or travel), contact hospitals in your jurisdiction to alert them to the possibility of additional paragonimiasis cases.
- ☐ Determine the source of infection to prevent additional cases.
- ☐ Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- ☐ Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be

entered upon completing the investigation.

- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist FOODBORNETEXAS@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- ☐ Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676.**
- ☐ Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Outbreaks as indicated above with patients in the same household.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- ☐ To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

Testing for paragonimiasis is widely available from most private laboratories. Specimens are encouraged to be submitted to the DSHS laboratory for confirmation. Contact an EAIDU foodborne epidemiologist to discuss further.

Specimen Collection

- ☐ Submit a stool specimen in a sterile, leak-proof container.
  - Required volume: Stool 15g solid or 15mL liquid.
- ☐ Fresh stools that cannot be received by the lab in less than 5 hours should be placed in formalin and PVA immediately.
- ☐ For sputum and any other specimen types (e.g., tissue section), please contact the DSHS Parasitology Lab **at 512-776-7560.**

Submission Form

- ☐ Use DSHS Laboratory G-2B form for specimen submission.
- ☐ Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B

form.
- ☐ Fill in the date of collection and select the appropriate test.
- ☐ If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- ☐ Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- ☐ Transport temperature: May be shipped at ambient temperature or 2-8ºC.
- ☐ Ship specimens via overnight delivery.
- ☐ DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- ☐ Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- ☐ Specimen not in correct transport medium.
- ☐ Missing or discrepant information on form/specimen.
- ☐ Unpreserved specimen received greater than 5 hours after collection.
- ☐ Transport media was expired.
- ☐ Specimen too old.

REVISION HISTORY

March 2021

- Minor Edits

Pertussis

BASIC EPIDEMIOLOGY

Infectious Agent

Bordetella pertussis (*B. pertussis*), a fastidious Gram-negative bacillus

Transmission

Transmitted from person to person through direct contact with respiratory secretions, most commonly through direct contact with airborne droplets from infectious individuals.

Incubation Period

Average of 7-10 days (range 4-21 days)

Communicability

Pertussis is highly contagious. Persons with pertussis are most infectious during the catarrhal period and for 21 days after cough onset. Persons with pertussis are no longer contagious after appropriate antibiotic treatment has been completed, usually 5 days.

Clinical Illness

The clinical course of illness is divided into the following three stages:

- The **catarrhal stage** is characterized by the onset of a runny nose, sneezing, low-grade fever, and a slight cough. The cough gradually becomes more severe and after 1-2 weeks, the next stage develops.
- The **paroxysmal stage** is characterized by coughing fits (paroxysms), which may be followed by an inspiratory whooping sound, apnea, or vomiting. This usually lasts 1-6weeks but may continue for 10 weeks.
- In the **convalescent stage**, there is a gradual resolution of the paroxysmal coughing. The coughing may resolve after a few weeks but may continue for months.

Regardless of vaccination history, pertussis can occur at any age. In infants less than 12 months of age, apnea may be the initial or most important symptom. An indication to the diagnosis **in infants only** is an elevated white blood count (over 15,000/mm3). In infants, pertussis symptoms can include apnea, pneumonia, pulmonary hypertension, seizures, and encephalopathy. Pertussis can cause serious complications and even death in infants. Among older children, adolescents, and adults, pertussis symptoms are usually milder.

Other *Bordetella* infections

B. parapertussis is a less common, non-reportable infection requiring no public health action. Parapertussis symptoms are similar but milder than pertussis, and serious complications are rare. *B. pertussis* infections provide little cross-protection against subsequent infection with the *B. parapertussis* and vice versa; pertussis vaccine does not prevent parapertussis. *Bordetella holmesii* has been associated most often with sepsis in patients with underlying conditions.

B. bronchiseptica is rare in humans. We recommend that reports of parapertussis, holmesii and bronchiseptica infection not be investigated further, except in certain outbreak instances. We do not recommend chemoprophylaxis for close contacts to be given. The decision to treat patients with these non-pertussis *Bordetella* infections may be left to the clinician's judgment.

DEFINITIONS

Clinical Case Definition

A cough illness lasting at least 14 days AND at least one of the following additional symptoms in the absence of a more likely diagnosis:

- Paroxysmal coughing, OR
- Inspiratory "whoop," OR
- Post-tussive vomiting, OR
- Apnea (with or without cyanosis)

Laboratory Criteria for Diagnosis

- Isolation (culture) of *Bordetella pertussis* from a clinical specimen, **OR**
- Positive PCR assay for *Bordetella pertussis*.

Note:

- Because *B. pertussis* can be difficult to culture, a negative culture result does not rule out pertussis.
- Negative PCR results do not require investigation unless reported as a suspected case by a health professional.
- Direct fluorescent antibody (DFA) staining of a patient's specimen and serological laboratory results (pertussis IgA, IgG or IgM) are NOT considered confirmatory for pertussis but should be investigated as soon as possible.

Case Classification

- **Confirmed**: Must meet one of the following criteria:
    - A person with an acute cough illness of any duration who is culture positive, **OR**
    - A person with an acute cough illness of any duration who is PCR positive, **OR**
- **Probable:** A person must meet one of the following criteria (in the absence of a more likely diagnosis):
    - A person with an acute cough illness of any duration, with at least one of the following signs or symptoms:
        - Paroxysms of coughing, **OR**
        - Inspiratory whoop, **OR**
        - Post-tussive vomiting, **OR**
        - Apnea (with or without cyanosis)
          AND
        - epidemiological linkage to a laboratory confirmed case
          OR
        - A person who meets the clinical case definition

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of pertussis. Investigation should include identification and evaluation of close contacts.

All positive lab results should be investigated, even non-confirmatory ones (e.g., DFA, serology results). Priority for investigating lab results should be culture/PCR, DFA, serology. Serology results can be further prioritized into pertussis toxin IgG, toxin/FHA IgG total antibody, IgA results, IgM results, everything else.

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition and vaccination status.
    - The Pertussis Investigation Form should be used to record information collected during the investigation.
- ☐ Droplet precautions should be used for confirmed and probable cases until the case has received at least five days of an appropriate antibiotic.
- ☐ Interview patient (or surrogate).
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
    - Case (or parent), ImmTrac, school nurse records, primary care provider, etc.
- ☐ Identify close contacts and ensure appropriate prophylaxis is provided as appropriate (see Close Contacts below).
- ☐ Notify school/daycare if the case attended while infectious.
- ☐ In the event of a death, notify EAIDU **immediately**. Copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS EAIDU.
    - The Pertussis Death Investigation Form must also be completed and submitted to EAIDU
- ☐ Hospitalized cases should be followed until discharge, especially if the case is an infant.
    - NBS data entry/initial reports can be sent to DSHS prior to discharge.
- ☐ Maternal vaccination history should be obtained for all pertussis cases under one year of age.
- ☐ Secure email, fax, or mail the completed the Pertussis Investigation Form and if applicable, the Pertussis Death Investigation Form to DSHS.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS) within 30 days of report. Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Managing Close Contacts

- Close contacts are defined to include immediate family members (those who spend many hours together or sleep under the same roof) and anyone who had direct contact with respiratory secretions.
- Identify all exposed contacts including the following:
    - Household contacts
    - Apart from household contacts, the definition of close contact can vary. The following are options of how to define a close contact:
        - Those within close proximity (2 feet) for 2 hours or longer at any one period of time
        - Those who shared confined space (within ~6 feet) for >1 hour during the communicable period.
        - Healthcare workers caring for a case without wearing a mask.
        - Schoolchildren sitting within ~3 feet of a case (i.e., adjacent seating) can also be included.
- High risk people are those who personally are at high risk of developing severe illness, or those people who will have close contact with people at high risk of severe illness. High risk people include:
    - Infants
    - Women in their third trimester of pregnancy
    - All persons with pre-existing health conditions that may be exacerbated by a pertussis infection (such as immunocompromised persons or moderate to severe medically-treated asthma)
    - People who routinely come into contact with any of the above are classified as high risk
    - All people in high-risk settings that include infants aged <12 months or women in their third trimester of pregnancy. These include, but are not limited to neonatal intensive care units, childcare settings, and maternity wards.

Prophylaxis Guidelines

- **Not all contacts need prophylaxis**, some may just need to be evaluated for symptoms and educated about pertussis. **High risk contacts should be prophylaxed and household contacts**.
- Antibiotic prophylaxis is recommended if initiated within 21 days of exposure for all household and high risk contacts.
    - Within families, secondary attack rates have been demonstrated to be high, even when household contacts are current with immunizations. Administration of antimicrobial prophylaxis to asymptomatic household contacts within 21 days of onset of cough in the index patient can prevent symptomatic infection.
    - Initiating antibiotic treatment more than 3 weeks after exposure has limited benefit and is not recommended, except for high-risk contacts that may benefit from antibiotic prophylaxis up to 6 weeks after exposure.
    - For more information, see CDC postexposure antimicrobial prophylaxis page: Postexposure Antimicrobial Prophylaxis |

Pertussis (Whooping Cough) | CDC.

- Refer to the table below for antibiotics recommended as treatment and postexposure prophylaxis.

- The Texas Medical Board recently changed its rules (Texas Administrative Code, Title 22, Part 9, Chapter 190, Subchapter B, §190.8) regarding the prescribing of prophylaxis for close contacts to infectious disease. Physicians can now prescribe pertussis antibiotics to contacts of pertussis cases without first medically evaluating the contact.
- Anyone age 11 or older who has not received Tdap should get vaccinated.
- Children who received their third dose of DTaP vaccine 6 months or more before exposure should be given a fourth dose at this time.
- Children who have had at least 4 doses of DTaP should receive a booster dose of DTaP
  unless a dose has been given within the last 3 years or they are 7 years of age or older.
- Close contacts younger than 7 years who are unvaccinated or who have fewer than 4 doses of DTaP vaccine should be vaccinated according to the recommended schedule.
- Exposed children should be observed for 21 days after last contact with the exposed person.
- For health departments that do not maintain their own supply of antibiotics, DSHS has limited quantities of antibiotics available for prophylaxis of high-risk and household contacts that cannot otherwise obtain them.
  - Contact your regional office to obtain antibiotics

The current CDC guidelines for treatment and postexposure prophylaxis of pertussis are summarized in the table below and can also be found at: Treatment of Pertussis | Pertussis (Whooping Cough) | CDC and Prevention of Pertussis, Tetanus, and Diphtheria with Vaccines in the United States: Recommendations of the Advisory Committee on Immunization Practices (ACIP) | MMWR.

Recommended Antimicrobial Treatment and Postexposure Prophylaxis for Pertussis, by Age Group

Primary Agents				Alternate Agent*
Age Group	Azithromycin	Erythromycin	Clarithromycin	TMP-SMZ
<1 month	Recommended agent. 10 mg/kg per day in a single dose for 5 days (only limited safety data available)	Not preferred. Erythromycin is associated with infantile hypertrophic pyloric stenosis Use if azithromycin is unavailable; 40 to 50 mg/kg per day in 4 divided doses for 14 days	Not recommended (safety data unavailable)	Contraindicated for infants aged <2 months (risk for kernicterus)
1-5 months	10 mg/kg per day in a single dose for 5 days	40 to 50 mg/kg per day in 4 divided doses for 14 days	15 mg/kg per day in 2 divided doses for 7 days	Contraindicated at age <2 months. For infants aged ≥2 months, TMP 8 mg/kg per day, SMZ 40 mg/kg per day in 2 divided doses for 14 days
Infants (aged >6 months) and children	10 mg/kg in a single dose on day 1 then 5 mg/kg per day (maximum: 500 mg) on days 2-5	40 to 50 mg/kg per day (maximum: 2 g per day) in 4 divided doses for 14 days	15 mg/kg per day in 2 divided doses (maximum: 1 g per day) for 7 days	TMP 8 mg/kg per day, SMZ 4 mg/kg per day in 2 divided doses for 14 days
Adults	500 mg in a single dose on day 1 then 250 mg per day on days 2-5	2 g per day in 4 divided doses for 14 days	1 g per day in 2 divided doses for 7 days	TMP 320 mg per day, SMZ 1,600 mg per day in 2 divided doses for 14 days

* Trimethoprim sulfamethoxazole (TMP-SMZ) can be used as an alternative agent to macrolides in patients aged ≥2 months who are allergic to macrolides, who cannot tolerate macrolides, or who are infected with a rare macrolide-resistant strain of *Bordetella pertussis.*

Control Measures
Educate the public on the advantages of immunization beginning at 2 months old.

- ☐ Infants and children
  - CDC recommends routine DTaP vaccination for all infants and children younger than 7 years old, with administration of a 5-dose DTaP series, with 1 dose each at 2 months, 4 months, 6 months, 15-18 months, and 4-6 years.
- ☐ Adolescents
  - CDC recommends routine Tdap vaccination for all adolescents, ideally with a single dose of Tdap at 11 to 12 years of age.
- ☐ Adults
  - CDC recommends vaccination every 10 years for all adults to maintain protection against diphtheria.

Treatment
Pertussis infection can be treated through appropriate antibiotic usage as prescribed by a health care provider.

Exclusion
Until completion of 5 days of antibiotic therapy if cough onset is within past 21 days. If more than 21 days have passed since cough onset, no exclusion is necessary.

MANAGING SPECIAL SITUATIONS

Communication Toolkits can be found at https://www.dshs.texas.gov/eaidu/health/vaccine_preventable_diseases/VPD-Resources.aspx and provide examples of letters used to complete the following activities.

Outbreaks

- Three cases of pertussis that overlap in time (cough onsets within 21 days of each other) and place is considered an outbreak in Texas.
- Three or more cases in a household do not count as an outbreak.
- Outbreak names should be requested from the NEDSS office and entered into NBS for each case associated with the outbreak.
- Even in the event of an outbreak, antibiotic prophylaxis is still only recommended for household and high-risk contacts.
- A broader use of PEP may be appropriate in limited closed settings when the number of identified cases is small and when a community-wide outbreak is not ongoing. However, when continued transmission of pertussis is evident, multiple rounds of antibiotics would not be recommended. Rather than repeating a course of antibiotics, you should monitor people exposed to pertussis for onset of pertussis signs and symptoms for 21 days.
- Active screening for symptomatic patients with suspected pertussis can be considered during outbreaks in settings such as schools, daycare centers, and hospitals.
- If an outbreak of pertussis is suspected, notify the regional DSHS office

or EAIDU at **(800) 252-8239 or (512) 776-7676**.

Healthcare exposures:

- Any healthcare exposures that involve high-risk contacts (e.g., NICU, OB/GYN offices) should be investigated. High risk individuals should be identified and referred for evaluation and possible PEP.
- If the case is a healthcare worker, the infection control practitioner (ICP) of the affected facility should identify and refer all symptomatic contacts (patients and coworkers) for medical evaluation and presumptive treatment immediately. In addition, chemoprophylaxis should be given to exposed healthcare personnel (HCP) who have not had Tdap; or are likely to expose a neonate or a pregnant woman (even if they have had Tdap).
- In addition, unvaccinated HCW should be given Tdap, regardless of age; and all exposed HCW should be monitored daily for 21 days and treated promptly should symptoms of pertussis ensue.
- The asymptomatic contacts may remain in the workplace if they comply with prophylaxis and lack respiratory symptoms; they should be under surveillance for 21 days past their last known exposure.
- Health care workers should contact the facility ICP if respiratory symptoms develop and not work until pertussis is excluded. If the facility has no ICP, the health department may need to coordinate these activities.

Schools:

- PEP is not recommended by the CDC in school settings.
- School nurses or administration should be made aware of the exposure and should monitor classroom contacts for symptoms.
- Coughing contacts should be referred to their healthcare provider for evaluation.
- If two or more cases are identified in a classroom DSHS recommends sending letters home (from the HD or school) to parents of exposed children.

Daycares:

- If the exposure involves children under one year of age, PEP is recommended. Otherwise follow the instructions for schools.
- Daycares may be required to notify parents in accordance with DFPS licensure.

Infant cases and contacts:

- Infant cases are treated differently than older pertussis cases. Infants are the most vulnerable age group, especially for adverse outcomes, hospitalization and death.
- Additional information is required when investigating infant cases of pertussis.
    - Hospitalized infants must have dates of admission and discharge recorded in NBS. If the investigation is complete, but the child remains hospitalized, please enter the case in NBS and continue to monitor the child's hospital stay until discharge (or death) and

then update NBS accordingly.
    - Vaccination status of the mothers of infant cases is also required. Please use the patient interview, hospital records, Immtrac2, and even prenatal care records to determine the mother's pre/perinatal vaccination history.
        - If the mother does not remember, please ask leading questions such as if she received any vaccines while pregnant or if she any received prenatal care.
        - Any information obtained about maternal vaccination should be recorded in NBS.
- Much of pertussis investigation now focuses on preventing adverse effects in infants.
    - Pertussis contacts that are infants, are pregnant, or are household contacts of infants or pregnant women should be prioritized.
    - Post-exposure prophylaxis and appropriate vaccination (if indicated) of these contacts should be done immediately.
- Infants may also have a different clinical picture and to that end, a different case definition is used for infant cases only (see the case definition at the beginning of this chapter).

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 work day** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS within 30 days of receiving a report of a confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616,** securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Emerging and Acute Infectious Disease Unit
Texas Department of State Health Services
Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.
- All outbreaks should be recorded in NBS.
    - Outbreak names must be requested through the NEDSS (NBS) office.

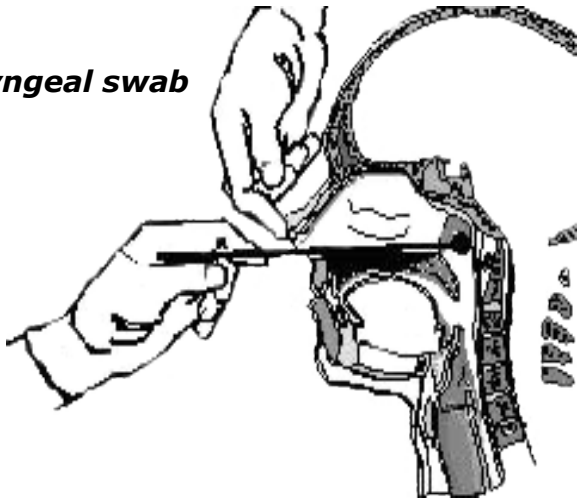
LABORATORY PROCEDURES

Isolation of the organism by culture is ideal; however, it is not readily available. Culture is highly specific, but relatively insensitive. Culture confirmation is recommended for outbreaks. Pertussis culture testing is complicated, so please contact EAIDU for further information during outbreaks. Direct fluorescent antibody (DFA) testing of nasopharyngeal secretions has been shown to have low sensitivity and variable specificity; therefore, it should only be used for screening and not relied upon for laboratory confirmation. DFA is not available from the DSHS Laboratory.

The preferred laboratory test for pertussis is Polymerase Chain Reaction (PCR). PCR testing can be a rapid, sensitive, and specific method for diagnosing pertussis. Pertussis PCR is now widely available at commercial hospitals and laboratories. DSHS performs the testing, usually for a fee.

To obtain pertussis PCR testing kits, contact the DSHS Laboratory at **(512) 776-7661**. **Specimen Collection and Submission**
Nasopharyngeal Swab for PCR Testing

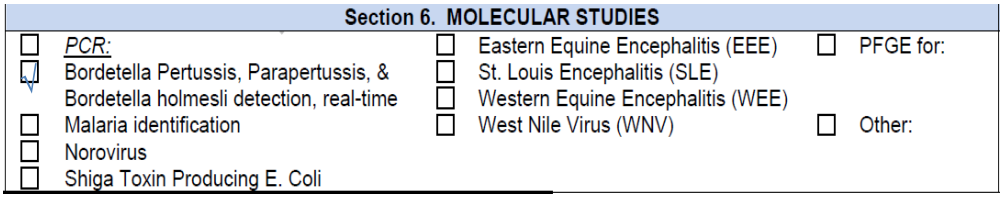
Appropriate positioning of a nasopharyngeal swab



- Use a Rayon or Dacron nasopharyngeal swab with aluminum or plastic handles.
    - If you are not using swabs provided through the DSHS testing kit, be sure the swab you are using is a “mini-tip” Rayon or Dacron swab.
- Immobilize the patient’s head.
- Gently insert nasopharyngeal swab into a nostril until the posterior nares is reached.
- Leave the swab in place for up to 10 seconds. This procedure may induce coughing and tearing.
- If resistance is encountered during insertion
- of the swab, remove it and attempt insertion on the opposite nostril.
- Remove the swab slowly.
- After collection, the swab should be inserted back into the dry transport tube. Store at 2-8°C until shipment at refrigerated temperature (2-8°C).

Submission Form

- Use a G-2B Specimen Submission Form.
- Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, and diagnosis/symptoms.
- On the DSHS Specimen Submission Form G-2B, in section 6: Molecular Studies, check PCR Bordetella Pertussis.



Section 6. MOLECULAR STUDIES		
☐ *PCR:*	☐ Eastern Equine Encephalitis (EEE)	☐ PFGE for:
☑ Bordetella Pertussis, Parapertussis, & Bordetella holmesli detection, real-time	☐ St. Louis Encephalitis (SLE)	
☐ Malaria identification	☐ Western Equine Encephalitis (WEE)	
☐ Norovirus	☐ West Nile Virus (WNV)	☐ Other:
☐ Shiga Toxin Producing E. Coli		

Specimen Shipping

- Transport temperature: Keep at 2-8ºC (refrigerated).
- Ship specimens via overnight delivery on cold packs or wet ice (double bagged) within48 hours of collection.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Discrepancy between name on tube and name on form
- Incorrect swab (must use nasopharyngeal swab)
- Obvious contamination with blood
- Tube broken in transport
- Received at ambient temperature

REVISION HISTORY

March 2021

- Pertussis case definition updated.
- Updated postexposure prophylaxis guideline wording to match CDC and for clarity
- Updated structure for Managing Close Contacts and Prophylaxis Guidelines
- Updated Outbreaks section of Managing Special Situations
- Updated flow chart

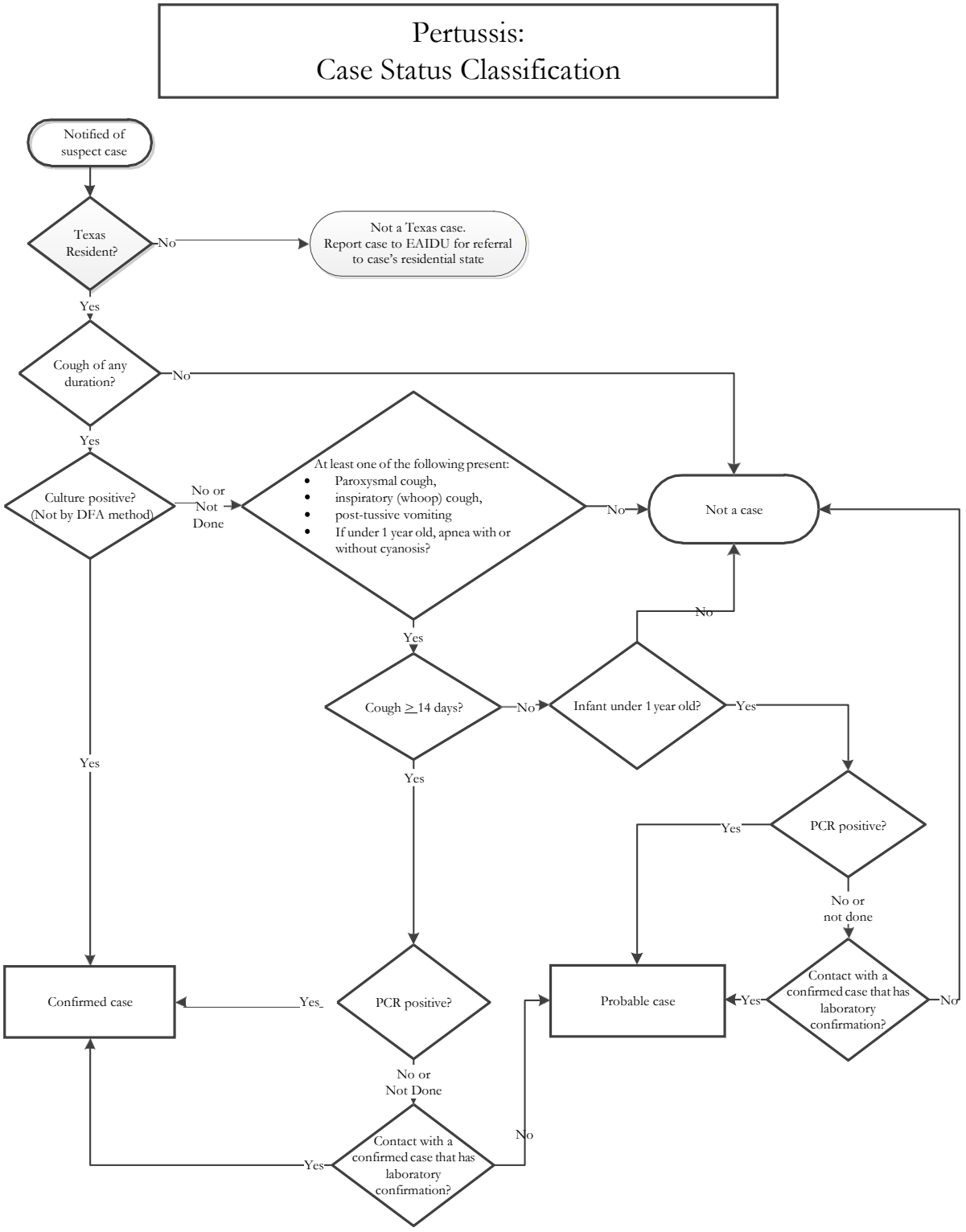
December 2022

- Updated Case Investigation Checklist

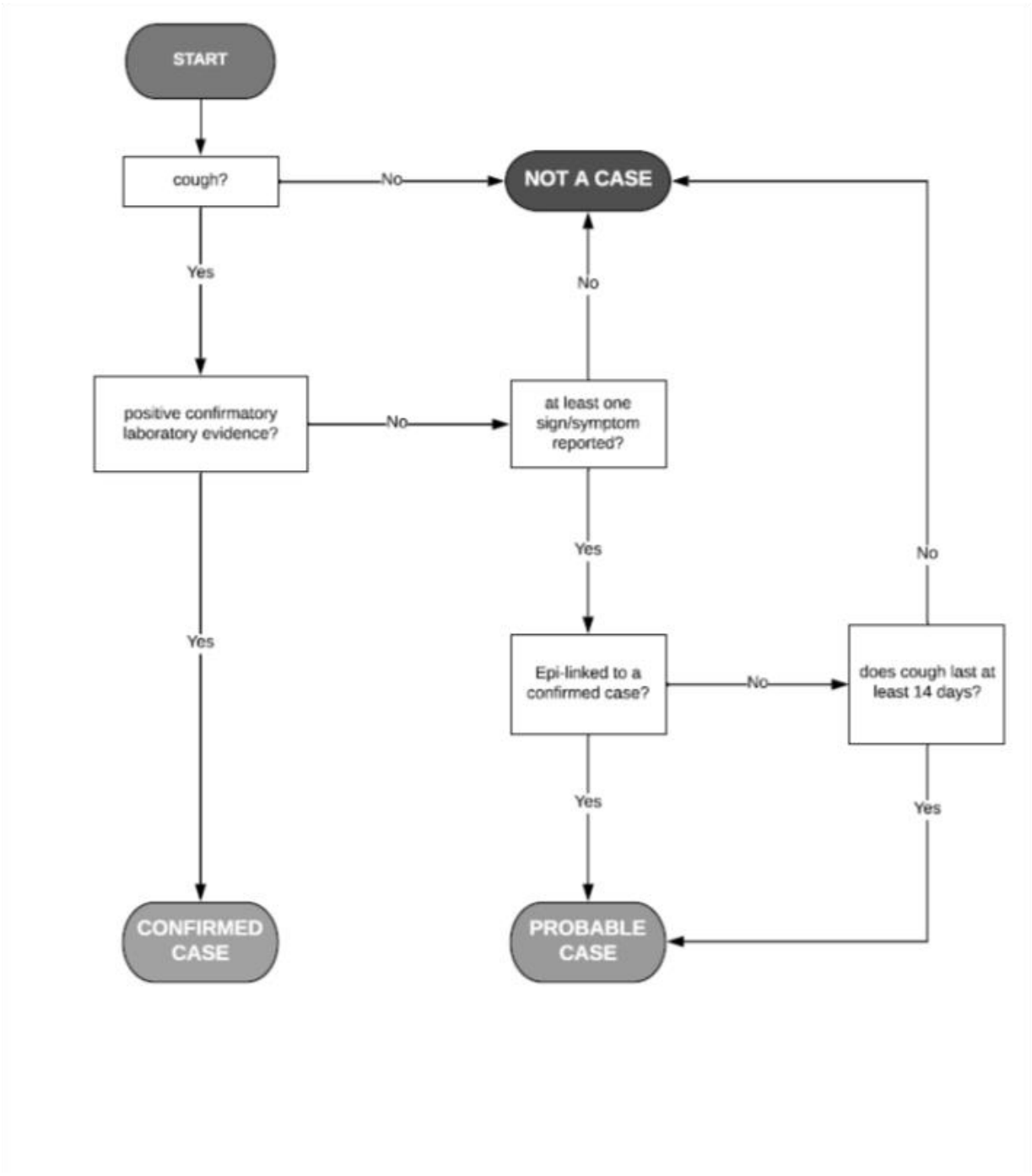
September 2024

- Updated infant & contacts subsection under Managing Special Situations
- Add section for Control Measures with vaccine schedule
- Added a chart for Optimal Timing for Diagnostic Testing
- Updated flowchart section to best align with current case definition

FLOW CHARTS


Pertussis:
Case Status Classification
Notified of suspect case
Texas Resident?
No
Not a Texas case. Report case to EAIDU for referral to case's residential state
Yes
Cough of any duration?
No
Yes
Culture positive? (Not by DFA method)
No or Not Done
At least one of the following present:
Paroxysmal cough,
inspiratory (whoop) cough,
post-tussive vomiting
If under 1 year old, apnea with or without cyanosis?
No
Not a case
Yes
No
Cough ≥ 14 days?
No
Infant under 1 year old?
Yes
Yes
Yes
PCR positive?
Yes
No or not done
Confirmed case
Yes
PCR positive?
Probable case
Yes
Contact with a confirmed case that has laboratory confirmation?
No
No or Not Done
Contact with a confirmed case that has laboratory confirmation?
No
Yes

Pertussis:
Case Status Classification



Polio (Paralytic and Non-paralytic Infection)

BASIC EPIDEMIOLOGY

Infectious Agent
Poliovirus (genus *Enterovirus*) types, 1, 2, and 3.

Transmission
Poliovirus is transmitted by person-to-person contact, primarily via the fecal-oral route. Virus proliferates in both the pharynx (throat) and intestines. Infection may occur following inhalation of contaminated salivary droplets or ingestion of contaminated food products. It should be made clear that poliovirus is disseminated via droplet spread and is not airborne. Virus may persist in the feces of those with and without symptoms for 3-6 weeks post-infection.

Incubation Period
Commonly 7-14 days for paralytic cases; reported range of up to 35 days.

Communicability
Not precisely defined, but transmission is possible as long as the virus is excreted.

Clinical Illness
The virus infects the throat and intestine, with invasion of local lymph nodes. Up to 95% of polio infections are asymptomatic or unapparent. Some persons have nonspecific mild illnesses including fever, sore throat, or gastrointestinal symptoms. In rare cases, poliovirus infects the spinal cord or brain stem resulting in aseptic meningitis or acute asymmetric flaccid paralysis.

DEFINITIONS

Poliomyelitis, paralytic Clinical Case Definition
Acute onset of flaccid paralysis with decreased or absent tendon reflexes in the affected limbs, in the absence of a more likely alternative diagnosis.

Laboratory Criteria for Diagnosis
- Poliovirus detected by sequencing of the capsid region of the genome by the CDC Poliovirus Laboratory, **OR**
- Poliovirus detected in an appropriate clinical specimen (e.g., stool [preferred], cerebrospinal fluid, oropharyngeal secretions) using a properly validated assay, AND specimen is not available for sequencing by the CDC Poliovirus Laboratory

Case Classification
- **Confirmed*:** Meets clinical criteria **AND** confirmatory laboratory evidence.

* Note: All suspected cases of paralytic poliomyelitis are reviewed by a panel of expert consultants at the Centers for Disease Control and Prevention (CDC) before final case classification occurs.

Poliovirus infection, nonparalytic Clinical Case Definition
Most poliovirus infections are asymptomatic or cause mild febrile disease.

Laboratory Criteria for Diagnosis

- Poliovirus detected by sequencing of the capsid region of the genome by the CDC Poliovirus Laboratory, **OR**
- Poliovirus detected in an appropriate clinical specimen (e.g., stool [preferred], cerebrospinal fluid, oropharyngeal secretions) using a properly validated assay, AND specimen is not available for sequencing by the CDC Poliovirus Laboratory

Case Classification

- **Confirmed:** Meets confirmatory laboratory evidence.

Post-polio syndrome

Post-polio syndrome is a condition that can affect survivors of poliovirus infection decades after recovering from their initial infection. A person with post-polio syndrome should not be enumerated as a new case.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should immediately investigate any reported suspect cases of polio. Identify and evaluate close contacts. Implement control measures and provide education to prevent further spread of disease. Report all cases of paralytic polio immediately to DSHS EAIDU.

Case Investigation Checklist

- ☐ Notify DSHS EAIDU immediately.
- ☐ Confirm that the clinical and laboratory results meet the case definition. See Polio Reports among a Recently Vaccinated Child below.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, underlying health conditions, course of illness, vaccination status and travel history.
    - Collect full demographics (name, age, sex, race, complete address, and occupation of patient).
    - Request copies of admission and discharge summaries and laboratory results.
    - Clinical summary should include sites of paralysis and any complications of illness.
    - If patient dies, request copies of the autopsy report, death summary and death certificate.
    - Record information on the Suspected Polio Case Worksheet available at https://www.cdc.gov/polio/php/case-reporting/index.html- wrsht.pdf.
- ☐ Determine vaccination history of the case.
    - Collect the dates, and lot numbers of all previous doses of polio vaccine
        - Sources of vaccination status that should be checked include: case (or parent), ImmTrac2, school nurse records, primary care provider, etc.
- ☐ Verify immunologic status.
    - If any doubt exists about the patient's status, an immunologic evaluation of quantitative immunoglobulin, T and B cell quantification, lymphocyte transformation, etc. should be considered.

- ☐ Interview the case to get a detailed exposure history.
    - Recent travel of patient or a close contact outside of the US.
    - Contact with any known case of poliomyelitis.
    - Polio remains endemic in two countries, Afghanistan and Pakistan, and other countries have experienced outbreaks of poliovirus variants, which can emerge in areas where immunization rates are low.
    - Contact within previous 30 days with any person who received oral poliovirus vaccine (OPV) within the last 60 days (include date of contact, nature of contact, date contact received OPV, lot number of vaccine, age of contact, and relationship to patient). Please note that OPV is no longer used in the United States but is routinely used in other countries.
- ☐ Identify and follow-up with all close contacts.
    - Monitor the close contacts for symptoms.
    - If the contact was exposed to the case's stool or may be exposed to the case's stool then vaccinate as appropriate.
- ☐ Submit specimens from case and close contacts to the DSHS laboratory.
    - Testing will be performed at CDC for case confirmation.
- ☐ Obtain copy of 60-day follow-up report to ascertain if there is any residual paralysis.
- ☐ Fax a detailed summary report along with hospital records, vaccination records, laboratory results and the Suspected Polio Case Worksheet to DSHS EAIDU.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- Educate the public on the advantages of immunization in early childhood.
    - CDC recommends that all infants and children in the United States are vaccinated against polio with 4 doses of inactivated polio vaccine (IPV) given at ages 2 months, 4 months, 6–18 months, and 4–6 years.

Polio Reports among a Recently Vaccinated Child

It is not uncommon for a poliovirus to be identified in a clinical specimen from an infant or young child who has recently received a dose of OPV. If you receive a laboratory report indicating that a poliovirus has been identified, obtain the following information on the patient:

- Complete immunization history (the number, dates, and lot numbers of all previous doses of OPV and inactivated poliovirus vaccine (IPV) vaccine)
- Clinical history (were there any clinical signs of paralysis?), and
- Diagnosis
- Obtain isolate to submit to CDC for further testing.

If the patient is suspected of having paralytic poliomyelitis, investigate case according to paralytic poliomyelitis guidelines.

Treatment

Treatment for polio is supportive only.

Exclusion
There is no exclusion in Texas Administrative Code for polio.

MANAGING SPECIAL SITUATIONS

Outbreaks
If an outbreak of polio is suspected, notify the regional DSHS office or EAIDU at **(800) 252-8239** or **(512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed, probable, and clinically suspected cases of acute paralytic poliomyelitis are required to be reported **immediately** to the local or regional health department or to DSHS EAIDU at **(800) 252- 8239 or (512) 776-7676.** Confirmed, probable, and clinically suspected non-paralytic poliovirus infections are required to be reported **within 1 work day** to the local or regional health department or to DSHS EAIDU.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Call DSHS EAIDU immediately when a polio investigation is being done or considered.
- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS within 30 days of receiving a report of confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
    - **Final confirmation of case status can only be done by the CDC. Cases may be in NBS pending case status designation until CDC makes a ruling on the case status.**
- Fax, send a secure email, or mail the Suspected Polio Case Worksheet, all hospital records, vaccination records and laboratory results within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616,** securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Emerging and Acute Infection Disease Unit
Texas Department of State Health Services
Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.

LABORATORY PROCEDURES

Before shipping specimens, be sure to notify DSHS EAIDU VPD staff at **(512) 776-7676.** The CDC will conduct all poliovirus testing, but specimen submission is coordinated through the DSHS laboratory. It is essential to notify DSHS EAIDU VPD staff before sending specimens because the CDC may request additional types of specimens.

Virus Isolation Specimen Collection and Submission Enterovirus Culture - Isolation

- Preferred specimen and quantity:
  - CSF - 2-5 mL
  - Stool - 2-4g - place in viral transport media.
  - Nasopharyngeal (NP) Swab - in viral transport media
  - Tissue in enough viral transport media to prevent drying

Submission Form

- Use a G-2V Specimen Submission Form.
- Make sure the patient's name and date of birth or social security number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, and diagnosis/symptoms.

Specimen Shipping

- Transport temperature: Keep at 2-8°C (refrigerated).
- If specimen will arrive at lab > 48 hours from collection, store at -70° C and send on dry ice.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Specimen submitted on a preservative, such as formalin
- Discrepancy between name on tube and name on form

REVISION HISTORY

January 2021

- Updated Emerging and Acute Infectious Disease Unit name throughout

September 2024

- Updated exposure history section of the Case Investigation Checklist to include endemic countries
- Updated Control Measures to include polio vaccine schedule

Rubella

BASIC EPIDEMIOLOGY

Infectious Agent
Rubella virus (family Togaviridae; genus *Rubivirus)*

Transmission
Rubella is spread from person to person via direct or droplet contact shed from nasopharyngeal secretions of infected persons. Rubella may be transmitted by persons with subclinical or asymptomatic cases (up to 50% of all rubella virus infections). Perinatal transmission also occurs, see next chapter (CRS).

Incubation Period
From 14-18 days with a range of 12-23 days.

Communicability
Rubella is only moderately contagious. The disease is most contagious when the rash first appears, but virus may be shed from 7 days before rash to 5–7 days or more after rash onset.

Clinical Illness
Symptoms are often mild, and up to 50% of infections may be subclinical or unapparent. In children, rash is usually the first manifestation and a prodrome (early symptom indicating onset of disease) is rare. In older children and adults, there is often a 1 to 5 day prodrome with low-grade fever, malaise, lymphadenopathy (disease of the lymph nodes), and upper respiratory symptoms preceding the rash. The rash of rubella is maculopapular (rash characterized by flat, red on the skin that is covered with small confluent bumps) and occurs 14 to 17 days after exposure. The rash usually occurs initially on the face and then progresses from head to foot. It lasts about 3 days and is occasionally pruritic (intensely itchy). The rash is fainter than measles rash and does not come together to form one massive rash. The rash is often more prominent after a hot shower or bath. Lymphadenopathy may begin a week before the rash and last several weeks. Postauricular, posterior cervical, and suboccipital nodes are commonly involved.

Arthralgia (joint pain) and arthritis (inflammation and stiffness of joints) occur so frequently in adult women that they are considered by many to be an integral part of the illness rather than a complication. Other symptoms of rubella include conjunctivitis (pink eye), testalgia (testicular pain), or orchitis (inflammation of the testicles). Forschheimer spots may be noted on the soft palate but are not diagnostic for rubella. A rubella rash may be confused or mistaken to be parvovirus B19 (Fifth's disease) because the rashes are similar in appearance.

DEFINITIONS

Clinical Case Definition
An illness that has all of the following characteristics:

- Acute onset of generalized maculopapular rash, **AND**
- Fever or temperature $\geq$99^{O}F (>37.20C), if measured, **AND**
    - Arthralgia/arthritis **OR**

- Lymphadenopathy **OR**
- Conjunctivitis

Laboratory Criteria

Confirmatory Lab Evidence

• Detection of rubella virus (e.g., RT-PCR, culture, next generation sequencing [NGS])
• Significant rise (at least four-fold) between acute- and convalescent-phase titers in serum rubella immunoglobulin G (IgG) antibody level* by any standard serologic assay
• Positive serum rubella immunoglobulin M (IgM) antibody**,*** AND low IgG avidity**

Presumptive Laboratory Evidence†:

• Positive serum rubella immunoglobulin M (IgM) antibody**,***†

* Note: The categorical labels used here to stratify laboratory evidence are intended to support the standardization of case classifications for public health surveillance. These categorical labels should not be used to interpret the utility or validity of any laboratory test methodology.
** In the absence of rubella vaccination during the previous 6-45 days.
*** Acquired rubella was suspected, testing not conducted as part of routine immunity screening (e.g., titers for employment documentation).
† When not superseded by more specific testing in a public health laboratory.

Epidemiologic Linkage Criteria

• Contact with a laboratory-confirmed rubella or congenital rubella case during the case's likely infectious period
• Close contact (e.g., household contact) with a laboratory-confirmed rubella or congenital rubella case during the case's likely infectious period
• International travel in the 23 days prior to rash onset
• Gave birth to an infant with confirmed congenital rubella

Other Criteria

• Lacks presumptive evidence of rubella immunity prior to infection
Documentation of vaccination with 1 dose of live rubella virus-containing vaccine §
Laboratory evidence of immunity ¶
Laboratory confirmation of previous disease
Born before 1957 (except women of childbearing age who could become pregnant§§)

§ The first dose of MMR vaccine should be administered at age ≥12 months; the second dose of measles- or mumps-containing vaccine should be administered no earlier than 28 days after the first dose.
¶ Measles, rubella, or mumps immunoglobulin G (IgG) in serum; equivocal results should be considered negative.
§§ Women of childbearing age are adolescent girls and premenopausal adult women. Because rubella can occur in some persons born before 1957 and because congenital rubella and congenital rubella syndrome can occur in the offspring of women infected with rubella virus during pregnancy, birth before 1957 is not acceptable evidence of rubella immunity for women who could become pregnant.

Case Classification
Confirmed:
• Meets confirmatory laboratory evidence, **OR**
• Meets presumptive laboratory evidence AND epidemiologic linkage criterion of "contact with a laboratory-confirmed rubella or congenital rubella case during the case's likely infectious period", **OR**
• Meets clinical criteria, **AND** meets epidemiologic linkage criterion of "close contact (e.g., household contact) with a laboratory-confirmed rubella or congenital rubella case during the case's likely infectious period", **OR**
• Meets presumptive laboratory evidence **AND** meets epidemiologic linkage criterion of "international travel in the 23 days prior to rash onset" **AND** lacks presumptive evidence of rubella immunity prior to infection, **OR**
• Meets epidemiologic linkage criterion of "gave birth to an infant with confirmed congenital rubella."

Probable:
• Meets clinical criteria **AND** meets presumptive laboratory evidence AND lacks presumptive evidence of rubella immunity prior to infection.
Serum rubella IgM test results that are false positives have been reported in persons with other viral infections (e.g., acute infection with Epstein-Barr virus [infectious mononucleosis], recent cytomegalovirus infection, and parvovirus infection) or in the presence of rheumatoid factor. Patients who have laboratory evidence of recent measles infection are excluded.

Note: IgM results from specimens collected within 45 days of MMR vaccination do not count as laboratory confirmation.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation
Local and regional health departments should promptly investigate all reports of congenital rubella. For infants exposed in utero, see the Congenital Rubella Section.

Case Investigation Checklist
- ☐ Ensure isolation is in place if within 7 days of rash onset.
- ☐ Confirm that the laboratory results meet the case definition.
- ☐ Request that the laboratory forward viral isolation specimens to the DSHS laboratory. See laboratory procedures.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, clinical picture, treatment history, and vaccination status.
    - The Rash-Fever Illness Case Track Record should be used to record information collected during the investigation.
- ☐ If a pregnant woman is infected with rubella, immediate medical consultation is necessary.
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
    - Case (or parent), ImmTrac, school nurse records, primary care provider, etc.

- ☐ Identify and follow-up with all exposed contacts.
    - Determine their susceptibility (fully vaccinated or lab evidence of rubella-specific IgG).
    - If susceptible, give vaccination as appropriate for age and vaccination status.
    - See control measures below.
        - For infants, see the control measures in the Congenital Rubella section.
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS EAIDU.
- ☐ Fax the completed the Rash-Fever Illness Case Track Record to DSHS.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- Identify contacts:
    - Any direct contact with a patient with rubella during the infectious period is defined as an exposure.
    - Every effort should be made to identify all pregnant women who may have been exposed to a patient and evaluate them serologically for rubella-specific IgM and IgG antibodies.
    - All women of childbearing age who are contacts of a person with a suspected or confirmed case should have their pregnancy status determined. (Refer to Managing Special Situations)
- Determine vaccine status of exposed contacts
    - If not up-to-date with vaccination, vaccinate with MMR according to the recommended immunization schedule.
    - Persons ☐1 year of age should have a history of 1 dose of MMR or serologic evidence of immunity to rubella.
    - Persons who cannot readily provide laboratory evidence of rubella or a documented history of vaccination on or after their first birthday should be considered susceptible and should be vaccinated if there are no contraindications.
        - Acceptable presumptive evidence of immunity against rubella includes at least one of the following:
            - Written documentation of vaccination with one dose of live rubella virus- containing vaccine administered on or after the first birthday,
            - Laboratory evidence of immunity,
            - laboratory confirmed of rubella disease, or
            - birth before 1957
            - Healthcare providers should not accept verbal reports of vaccination without written documentation as presumptive evidence of immunity.
    - If vaccination of exposed contact is contraindicated, exclude exposed contact from school or child-care facility for at least 3 weeks after last rash onset.

- **Isolation**

- Patients with rubella should be isolated for 7 days after they develop rash.
- In settings where pregnant women may be exposed, outbreak control measures should begin as soon as rubella is suspected and should not be postponed until laboratory confirmation of cases.
- People at risk who cannot provide acceptable evidence of rubella immunity should be considered susceptible and should be vaccinated.
- People without evidence of immunity who are exempt from rubella vaccination should be excluded.
- Unvaccinated people who receive MMR vaccine as part of rubella outbreak control may immediately return to school provided all people without documentation of rubella immunity have been excluded.

Treatment
No specific treatment for rubella infection is available. Immunoglobulin (IG) or other forms of post-exposure prophylaxis are not recommended for treatment.

Exclusion
According to the Texas Administrative Code (TAC), children in school and childcare settings shall be excluded for seven days after onset of rash. In an outbreak, unvaccinated children and pregnant women should be excluded for at least three weeks after the onset of the last rash.

MANAGING SPECIAL SITUATIONS

Pregnant Women or Women of Childbearing Age

- If a pregnant woman is infected with rubella, immediate medical consultation is necessary.
- All women of childbearing age who are contacts of a person with a suspected or confirmed case should have their pregnancy status determined.
- Every effort should be made to identify all pregnant women who might have been exposed to a patient and evaluate them serologically for rubella-specific IgM and IgG antibodies.
  - If a pregnant woman is exposed to rubella, evidence of rubella immunity should be obtained as soon as possible. If rubella IgG antibodies are not detected, a second specimen should be obtained 3-4 weeks later and tested again for rubella IgM and rubella IgG antibodies. If IgG is present, infection is assumed to have occurred and precautions will need to take place at delivery as the infant may be infectious (see next section: CRS).
- If a pregnant woman lacks laboratory evidence of rubella immunity, precautions should be taken to prevent any type of exposure to persons infected with rubella. Precautions may include isolating women from settings where rubella virus has been identified and ensuring household contacts are immune.

If an outbreak of rubella is suspected, notify the regional DSHS office or EAIDU at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 work day** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** cases to DSHS within 30 days of receiving a report of confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email or mail a completed investigation form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616** , securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Emerging and Acute Infectious Disease
Unit Texas Department of State Health
Services Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.

LABORATORY PROCEDURES

Please submit specimens for viral isolation (culture or PCR) to the DSHS laboratory in Austin. Specimens may be submitted for serology if serology is not available from a commercial lab.

Virus Isolation/PCR Specimen Collection and Submission (preferred)
Rubella virus isolates are critical in the diagnosis of acute rubella and CRS and are needed to establish the molecular epidemiology of rubella and to distinguish rubella from other viral rash illnesses.

Specimen Collection

- Use a synthetic swab such as polyester or rayon swab. Flocked synthetic swabs are acceptable. Do not use cotton swabs. Place the swab in 2-3 mL of viral transport media.
- Obtain a pharyngeal (throat swab, nasal swab, or nasal aspirate) swab or

a urine sample within 4 days of rash onset. If possible, collecting both a pharyngeal swab and urine sample can increase the likelihood of detecting the virus.
- Label the specimen tube with the patient's name and date of birth or social security number.

Submission Form
- Use Specimen Submission Form G-2V.
- Make sure the patient's name and date of birth/social security number match exactly what is written on the specimen tube.
- Write in rubella PCR or check virus isolation-rubella, disease suspected, date of onset, and date of collection.

Specimen Shipping
- Transport temperature:
  - Keep the specimen at 2-8ºC and ship overnight on wet ice within 48 hours.
  - If the specimen must be held longer, freeze at -70ºC and ship on dry ice.
  - Send the specimen to the laboratory via overnight delivery on wet or dry ice as noted above.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569
1100 West 49th Street
Austin, TX 78756-3199

Serology Specimen Collection and Submission (if needed)

IgM Serology: Single specimen collected early in the course of illness. Because rubella IgM antibodies rise more slowly in some individuals, a negative rubella IgM result on a specimen collected within 5 days of rash onset will NOT rule out a diagnosis of rubella; the only exception to this is when the specimen is IgG positive, indicating prior immunity. Therefore, if the patient is an unvaccinated infant, a specimen for IgM testing should be collected at least 5 days post rash onset.
All other specimens should be collected as soon as possible. Rubella IgM may cross-react with other viruses, especially parvovirus.

IgG Serology: Acute AND convalescent samples required. Collect acute early in course of illness and convalescent 10-14 days later. Evidence of rubella immunity by measuring IgG antibody (e.g., in an exposed pregnant woman) can be determined with a single blood specimen.
Specimen Collection
Option 1:
- Collect at least 5 mL blood in red top tube.
- Label blood tubes with patient's first and last name, and we recommend a

second identifier such as date of birth or medical record number or social security number. If the first and last name is not provided, the specimen will be rejected.
    - Centrifuge the **red top blood** collection tube within 2 hours from the time of collection to separate the serum from the red blood cells (clot).
    - Transfer the serum from the red top tube into a serum transport tube properly labeled with the patient's name and date of birth or social security number and ship cold with cool packs and must be received within 48 hours.
    - If the serum samples will not be delivered to the laboratory within 48 hours of collection, then the samples must be frozen at –20°C (frozen) or lower and shipped frozen with dry ice.
    - Do not freeze whole blood in red top tube for shipping.

Option 2:

- Collect at least 5 mL blood in **gold top** or **tiger top** blood collection tube containing a gel serum separator (Gold top or tiger top tubes are types of serum separator tubes with the gel that keeps the serum separated from the clot after the centrifugation).
- Label blood tubes with patient's first and last name, and we recommend a second identifier such as date of birth or medical record number or social security number. If the first and last name is not provided, the specimen will be rejected.
    - Centrifuge the gold top blood collection tube within 2 hours from the time of collection to separate the serum from the red blood cells (clot) and ship cold with cool packs and must be received within 48 hours.
    - If more than 48 hours, transfer the serum into a serum transport tube properly labeled with the patient's name and date of birth or social security number and ship frozen with dry ice.
    - Do not freeze serum in serum separator tube (SST) for shipping. Freezing will cause hemolysis and hemolyzed specimens will be unsatisfactory for testing.

Submission Form

- Use the DSHS Laboratory current version of G-2A form for specimen submission.
- Make sure the patient’s first and last name and date of birth/social security number match exactly what is written on the tube.
- Mark the laboratory test requested, date of onset, and date of collection. Be certain that the names on acute and convalescent sera match exactly.
- Call DSHS Laboratory at 512-776-7138 if needing information for specimen submission.

Specimen Shipping

- To avoid specimen rejection, ship separated serum or centrifuged SST Monday through Thursday to the DSHS laboratory via overnight delivery following the above guidelines.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.

  - If the serum samples will not be delivered to the DSHS laboratory within 48 hours of collection, transfer into a serum transport tube and freeze on Fridays. Ship frozen specimens with dry ice on Monday. Lone Star service will not deliver specimen to the DSHS lab on Saturday.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass
(512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Discrepancy between name on tube and name on form
- Two patient identifiers such as patient first and last name AND date of birth not included on the tube
- Insufficient quantity of serum for testing specimens received with extended transit time
- Received at incorrect temperature or no date of collection

REVISION HISTORY

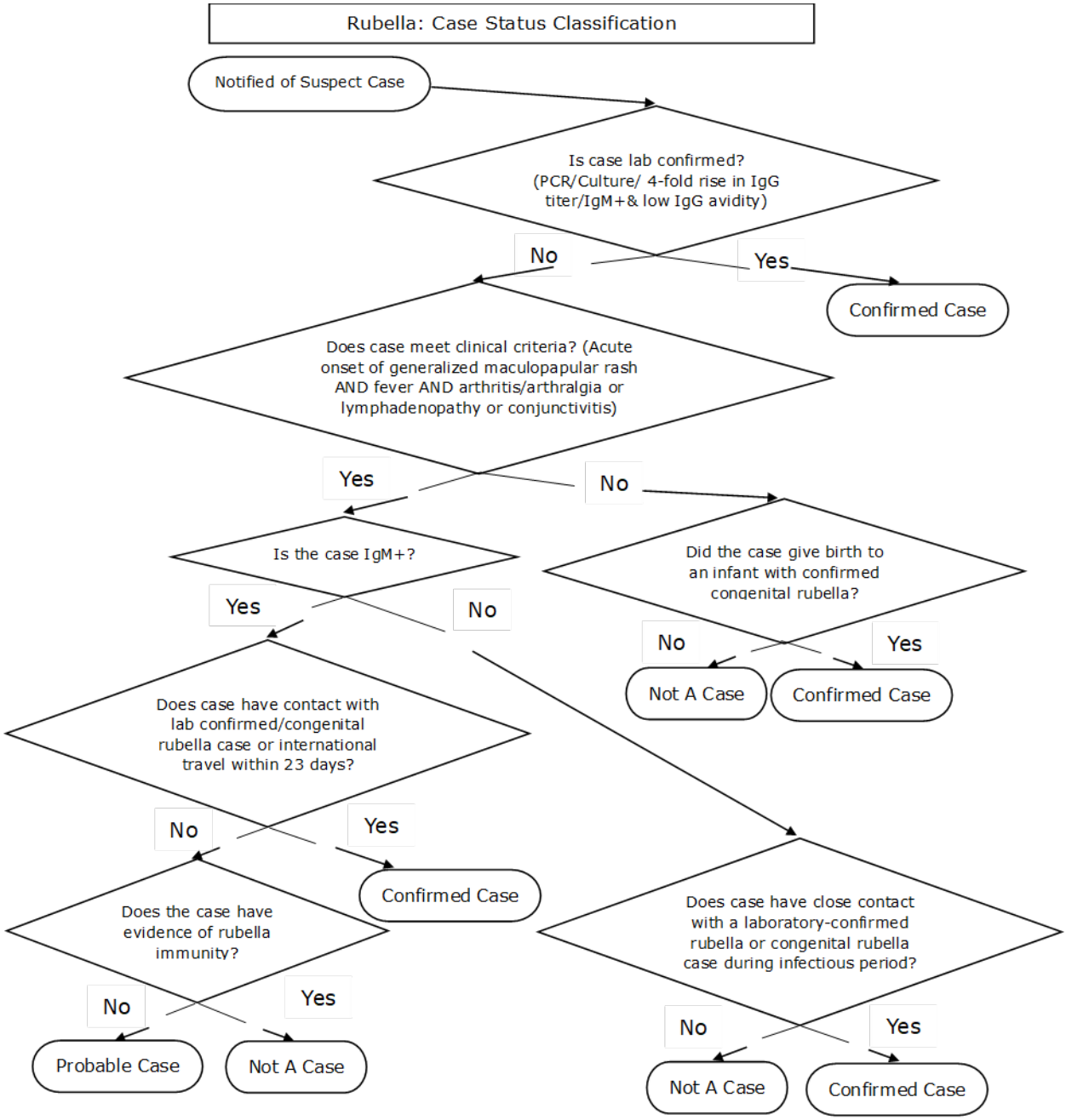
January 2021

- Added a section about managing pregnant women and women of childbearing age to Managing Special Situations section.
- Updates to laboratory specimen collection.
- Updated flow chart.

September 2024

- Updated case definition
- Updated Treatment section
- Updated flow chart

FLOW CHART


Rubella: Case Status Classification
Notified of Suspect Case
Is case lab confirmed? (PCR/Culture/ 4-fold rise in IgG titer/IgM+& low IgG avidity)
No
Yes
Confirmed Case
Does case meet clinical criteria? (Acute onset of generalized maculopapular rash AND fever AND arthritis/arthralgia or lymphadenopathy or conjunctivitis)
Yes
No
Is the case IgM+?
Did the case give birth to an infant with confirmed congenital rubella?
Yes
No
No
Yes
Not A Case
Confirmed Case
Does case have contact with lab confirmed/congenital rubella case or international travel within 23 days?
No
Yes
Confirmed Case
Does the case have evidence of rubella immunity?
Does case have close contact with a laboratory-confirmed rubella or congenital rubella case during infectious period?
No
Yes
No
Yes
Probable Case
Not A Case
Not A Case
Confirmed Case

Salmonellosis (Non-Paratyphi/Non-Typhi)

BASIC EPIDEMIOLOGY

Infectious Agent

Salmonella species, a Gram-negative bacilli. There are two species of *Salmonella* (*Salmonella enterica* and *Salmonella bongori*), with the most common cause of human illness being *S. enterica*. The two species are further separated into subspecies and then serotypes based on defining antigens. Due to most human illness being attributed to the same species and subspecies, they are commonly referred to and distinguished by their defined serotype, such as *S.* Heidelberg (*Salmonella enterica* subsp. *enterica* subtype Heidelberg).

Transmission

Transmission occurs via the fecal-oral route and can occur through the ingestion of food or water contaminated with feces, or improperly cooked or prepared food. Transmission may also occur via direct contact with an infected person, fomite, animal or an animal's environment.

Incubation Period

Usually 12-36 hours (ranges 6 to 72 hours). Longer incubations, up to 16 days, have been documented.

Communicability

People are infectious as long as bacteria are shed in their stool. On average bacteria can be shed in stool through the course of infection, usually several days to several weeks, with a small percentage of cases excreting the organism for many months. Antibiotic use during the acute illness can prolong the carrier state.

Clinical Illness

Non-typhoidal salmonellosis is characterized by diarrhea, nausea, headache, and sometimes vomiting. Fever is almost always present. Bloody diarrhea and invasive disease may occur, particularly with certain serotypes. Invasive infection may present as urinary tract infection, septicemia, abscess, arthritis, cholecystitis and rarely as endocarditis, pericarditis, meningitis, or pneumonia. A carrier state may develop.

DEFINITIONS

Clinical Case Definition

An illness of variable severity commonly manifested by diarrhea, fever, abdominal pain, nausea, and sometimes vomiting. Asymptomatic infections can occur, and the organism can cause extra-intestinal infections.

Laboratory Confirmation

- Isolation of *Salmonella* (except *S*. Typhi and S.Paratyphi [A, B (tartrate negative) and C])* from a clinical specimen.

Notes:

- *S.* Typhi is reportable as *Salmonella* Typhi.
- *S.* Paratyphi is reportable as *Salmonella* Paratyphi.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis. When available, *Salmonella* serotype characterization should be reported.

- **Probable:**
  - A case with *Salmonella* sp. (excluding *S.* Typhi and *S.* Paratyphi [A, B (tartrate negative), and C]) detected, in a clinical specimen, by use of culture independent laboratory methods (non- culture based), **OR**
  - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: A case with isolation of *S.* Paratyphi B (tartrate positive) from a clinical specimen should be reported as a salmonellosis, non-Paratyphi/non-Typhi case.

Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.

A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

It is recommended that local and regional health departments investigate all reported cases of salmonellosis to identify potential sources of infection. Sporadic cases of salmonellosis do not require an investigation form be sent to DSHS EAIDU.

Case Investigation Checklist

- Confirm laboratory results meet the case definition.
- If an isolate has not been sent to the DSHS laboratory, request the laboratory to forward the isolate to the DSHS laboratory for serotyping and whole genome sequencing (WGS).
- Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- **Salmonellosis cluster or outbreak cases**: Use the TXDSHS/CDC Hypothesis Generating Questionnaire or an outbreak specific form provided by DSHS EAIDU to interview salmonellosis cluster cases. See Managing Special Situations.
- **Salmonellosis cases**: If time and resources allow, interview the case to identify potential sources of infection. Take a food history. Note brand and purchase or source information for high risk foods. Ask about potential exposures during at least the 5 days before onset including:
- Any contacts or household members with a similar illness. Obtain the name, phone number or address and clinical information of the ill person.
- Restaurant meals. Obtain the name of the restaurant, date and location of the meal, and food/drinks consumed.
- Public gathering where food was consumed. Obtain the date, location, sponsor of the event, and food/drinks consumed.
- Consumption of raw or undercooked meat, poultry, or eggs.
- Consumption of raw milk or other unpasteurized dairy products.
- Travel within and outside Texas or outside the United States or contact with others who have traveled outside the United States. Determine dates of travel.
- Contact with reptiles or amphibians (snakes, lizards, turtles, frogs, etc.).
- Contact with pets, livestock, or other animals (including farms and petting

zoos).
- Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and animal contact/handling precautions. See Prevention and Control Measures.
- Identify whether there is a public health concern: persons should not work as food handlers, child- care or health care workers, or attend child-care if they have diarrhea. See Exclusions.
- Fax completed forms for cluster related cases to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.
- For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- If case is part of an outbreak or cluster, see Managing Special Situations section.
- All confirmed, probable, and suspect case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures
- Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After handling raw food, especially poultry and other raw meat products.
  - After any contact with an animal, their living area, or their food.
- Avoid consuming raw milk, unpasteurized dairy products, and undercooked eggs.
- Follow food safety principles in the kitchen, especially:
  - Cook meat thoroughly. Poultry should be cooked to an internal temperature of 165°F.
  - Prevent cross-contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after they touch raw meat.
  - Separate uncooked meats, hot dogs and other meat packaging from vegetables, uncooked food and ready to eat foods.
  - Keep the refrigerator at 40°F or lower and the freezer at 0°F or lower.
  - Clean up all spills in your refrigerator right away–especially juices from raw meat, raw poultry, and hot dog and lunch meat packages.

Exclusions

School/child-care: No exclusion specified for salmonellosis but the standard exclusion for diarrhea or fever applies:
- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from

school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employees: Symptomatic food employees infected with non-typhoidal *Salmonella* are to be excluded from work. Asymptomatic food employees diagnosed with an infection from non-typhoidal *Salmonella* are to be restricted from work.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from non-typhoidal *Salmonella* based on test results showing two consecutive, negative stool specimen cultures. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics if antibiotics were given.
- More than 30 days have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) **or**
- The food employee did not develop symptoms and more than 30 days have passed since being diagnosed.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional salmonellosis cases.
- If isolates have not already been submitted to the DSHS laboratory for serotyping and whole genome sequencing (WGS), request hospital/clinical labs submit isolates for serotyping and WGS testing.
  See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
  - Policies on, and adherence to, hand hygiene
  - Storage and preparation of food
  - Procedures for changing diapers and toilet training
  - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child- care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing (WGS) clusters:

- For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- Local/regional health departments with cases in their jurisdiction should:
  - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
    - Fax the completed questionnaire promptly within timeframe designated in the cluster notification to DSHS EAIDU at **512-776-7616** or e-mail securely to an EAIDU foodborne epidemiologist.
  - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
  - If an interview is unattainable or the case is lost to follow-up, fax the completed cover sheet and any case information to DSHS EAIDU.
- Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:

- For cases with raw milk exposure, please email the information about dates of raw milk consumption and place of purchase to the DSHS Milk and Dairy Unit at milk.regulatory@dshs.texas.gov and cc foodbornetexas@dshs.texas.gov

- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed and probable cases are required to be reported **within 1 week** to the local or regional health department or the DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- If investigation forms are requested, they may be faxed to 512-776-7616 or emailed securely to an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676.**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
    - Please put in Subject Line: NORS User Account Request

- Information needed from requestor: name, email address, and agency name
- After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Salmonella isolates are required to be submitted to the DSHS Laboratory for typing and molecular analysis.

Please refer to the Texas Administrative Code (TAC) Title 25, Ch 97, Subchapter A, Rule §97.3 "What Condition to Report and What Isolates to Report or Submit".

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Salmonella* species. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday, or state holiday, unless special arrangements have been pre-arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569 1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Specimen not in correct transport medium

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Salmonella* spp. is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian**. For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

Salmonellosis, TABLE 1:

Guide to Salmonellosis, Paratyphoid Fever, Typhoid Fever Reporting and Surveillance Forms

***Salmonella* serotype**	**Reported in NEDSS as**	**Surveillance Form**
Salmonella Typhi	Typhoid Fever	CDC Typhoid and Paratyphoid Fever Surveillance Report requested
Salmonella Paratyphi A, B*, or C	Salmonellosis	CDC Typhoid and Paratyphoid Fever Surveillance Report requested
all other *Salmonella* serotypes	Salmonellosis	no CDC or DSHS form requested unless part of outbreak investigation

**Salmonella* Paratyphi B var L(+) tartrate + (formerly var. Java) is associated with routine GI illness and is reported as Salmonellosis and no CDC or DSHS form is requested unless part of an outbreak investigation.
A case with isolation of *S.* Paratyphi B (tartrate positive) from a clinical specimen should be reported as a salmonellosis, non-Paratyphi/non-Typhi case. Salmonellosis Paratyphi A, B (tartrate negative), and C is reported as a separate condition

REVISION HISTORY

March 2021

- Updated case definition to match the Epi Case Criteria Guide for 2019

Salmonella Paratyphi

BASIC EPIDEMIOLOGY

Infectious Agent

Salmonella enterica serovars Paratyphi A, B (tartrate negative), and C (*S*. Typhi) are the etiologic agents of *Salmonella* Paratyphi. *Salmonella* Paratyphi B (tartrate negative), previously known as *S*.Java is reported as *Salmonella*, non-Paratyphi/non-Typhi condition.

Transmission

Transmission primarily occurs through ingestion of food or water contaminated with the stool and sometimes urine of a typhoid fever case or an asymptomatic carrier of the organism. Most cases of paratyphoid fever are acquired during international travel. travel-related and involve an exposure that occurred in an endemic region (i.e., primarily Asia, Africa, and Latin America). Humans are the only known reservoir of *S*. Typhi.

Incubation Period

Typically, ranges from 1 to 10 days.

Communicability

This disease is communicable as long as paratyphoid bacilli are present in excreta. Some patients become permanent carriers of *S.*paratyphi.

Clinical Illness

Infections caused by Salmonella enterica serotypes Paratyphi A, B (tartrate negative), and C are often characterized by insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea, and non-productive cough. However, mild and atypical infections may occur. Carriage of S. Paratyphi A, B (tartrate negative), and C may be prolonged.

DEFINITIONS

Clinical Case Definition

An illness caused by *Salmonella* Paratyphi that is often characterized by insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea, and nonproductive cough. However, many mild and atypical infections occur. Carriage of *S*. Paratyphi can be prolonged.

Laboratory Confirmation

- Isolation of *S*. Paratyphi A, B (tartrate negative), or C from blood, stool, or other clinical specimen.

Case Classifications

- **Confirmed:** A clinically compatible case that is laboratory confirmed.
- **Probable:** A clinically compatible case with *S.* Paratyphi A, B (tartrate negative), or C detected by use of culture independent laboratory methods (non-culture based), **OR**
    - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: Both asymptomatic infections and infections at sites other than the

gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.
Carriage of *S.* Paratyphi A, B (tartrate negative), and C can be prolonged and a case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of *Salmonella* Paratyphi. Investigations should include an interview of the case or a surrogate to get a detailed exposure history.

Please use the **CDC Typhoid and Paratyphoid Fever Surveillance Report** available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Contact laboratory to determine if an isolate has been sent to the DSHS laboratory. If an isolate has not been sent, please request a specimen be submitted.
  - Note: The submission of *S.* Paratyphi isolates is not required by state law, but it is critical for the detection and investigation of outbreaks.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
  - Use information from medical records to complete the CDC Typhoid and Paratyphoid Fever Surveillance Report.
  - Interview the case to get travel history and other risk factor information.
  - Make special note of the case's travel history. If the case-patient does not report travel outside of the U.S., ask again about travel. If the answer is still negative, inquire about any visitors from a country where typhoid fever is endemic, especially any who might have stayed in the case-patient's household, prepared food, cared for, or had close contact with the case-patient. Ask about prior cases of typhoid fever among members of the household, extended family, or friends. Ask about consumption of raw or undercooked shellfish or bivalves (oysters, scallops etc.) If no history of travel to an endemic country, exposure to an imported case or history of consumption of raw or undercooked seafood is identified, call an EAIDU epidemiologist immediately to discuss the case.
  - Make special note if the case is a food worker. Food workers who are diagnosed with typhoid fever are subject to work exclusion requirements. See Exclusions.
  - Use the **CDC Typhoid and Paratyphoid Fever Surveillance Report** to record information from the interview.
  - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
  - Provide education to the case or his/her surrogate about effective hand washing and food safety practices. See Prevention and Control Measures.

- Fax completed forms to DSHS EAIDU at 512-776-7616 or email securely to an EAIDU epidemiologist.
  - An EAIDU foodborne epidemiologist will fax the form (de-identified) to the CDC.
  - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
  - For lost to follow-up (LTF) cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on the investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- Hospitalized cases should be followed until discharge and patient's outcome recorded on the Typhoid and Paratyphoid ever Surveillance Report.
  - Initial reports can be sent to DSHS prior to discharge.
- In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU.
- If the case is part of an outbreak or cluster, see Managing Special Situations section.
- All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- For those traveling to an endemic region:
  - Only eat fresh raw fruit and vegetables that can be peeled, peel them yourself, don't eat the peels, and wash your hands before and after handling.
  - Avoid food and drinks sold from street vendors.
  - Avoid ice, frozen drinks, or other items made from an unknown water source.
  - Drink bottled water (or boil non-bottled water for >1min) and avoid swallowing tap water while showering and brushing teeth.
  - Carbonated water is safer to drink than non-carbonated water.
- Practice routine hand washing with soap and warm water, especially:
  - Before preparing or after handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After handling raw food.
- Avoid consuming raw or undercooked shellfish and bivalves (oysters, scallops, mussels etc.), especially in endemic countries.
- Avoid consuming raw milk, unpasteurized dairy products, and undercooked eggs.

Exclusions

School/child-care:

Children with *Salmonella Paratyphi* should be excluded from school/child-care until they are free from fever and diarrhea for 24 hours without the use of fever or diarrhea suppressing medications.

Children must have three consecutive negative stools before being allowed to return to school. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics if antibiotics were given.

Food Employees:
Symptomatic food employees infected with *Salmonella* Paratyphi are to be excluded from work.

Food employees can be reinstated with approval from the Regulatory Authority and if the following condition is met:

- Medical documentation by a health practitioner stating that the food employee is free of infection from *Salmonella* Paratyphi*.*

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks
If a *Salmonella* Paratyphi outbreak is suspected, immediately notify the appropriate regional DSHS office or DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

The local/regional health department should:
- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional Salmonella Paratyphi cases.
- If isolates have not already been submitted to the DSHS laboratory for confirmation and WGS, request hospital/clinical labs submit isolates for confirmation and WGS testing. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and

volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on and adherence to hand hygiene
    - Storage and preparation of food
    - Procedures for changing diapers and toilet training
    - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, per the "Exclusions" portion of the Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

WGS clusters:
- For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- The local/regional health department with cases in their jurisdiction should:
    - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
        - Fax the completed questionnaire promptly within timeframe designated in cluster notification to DSHS EAIDU at **512-776-7616** or email securely to an EAIDB foodborne epidemiologist.
    - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
    - If an interview is unattainable or the case is lost to follow-up, fax/securely email medical records and any case information to DSHS EAIDU.
        - Please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:
- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected

outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases,
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed Typhoid and Paratyphoid Fever Surveillance Report to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to- person, animal contact, environmental contact, or an indeterminate route of transmission.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshstexas.gov
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

Shiga toxin-producing *Escherichia coli*

BASIC EPIDEMIOLOGY

Infectious Agent

Shiga toxin-producing *Escherichia coli* (STEC) bacteria. *E. coli* are Gram-negative, rod-shaped bacteria that naturally exist in the mammalian digestive system. Over a hundred serotypes of exist, however the most common serogroups isolated from person with diarrheal illness in North America are O157, O26, O111, O103, O45, O145, and O121. *E. coli* O157 and other serotypes produce potent cytotoxins called Shiga toxins. Shiga toxin-producing genes commonly identified are *stx1* and *stx2*.

Transmission

Transmission occurs via the fecal-oral route and can occur through the ingestion of food or water that has been contaminated with human and animal feces. Transmission can also occur via direct contact with an infected person, fomite, animal or an animal's environment. Person to person spread is common within households and daycare centers.

Incubation Period

STEC is shed in the stool of an infectious person for a variable amount of time after diarrhea has resolved, however, shedding typically occurs for 1 week or less in adults, but up to 3 weeks in one-third of infected children. Prolonged carriage is uncommon.

Communicability

The duration of excretion of the pathogen is typically 1 week or less in adults, but 3 weeks in one-third of children. Prolonged carriage is uncommon.

Clinical Illness

Symptoms can vary but predominant symptoms include severe abdominal pain and non-bloody diarrhea which can become bloody after 3 to 4 days.

Severity

Hemolytic uremic syndrome (HUS) is a serious complication of STEC infections and can begin as symptoms resolve, usually within 3 weeks of infection. About 15% of young children and a smaller proportion of adults with *E. coli* O157 diarrhea develop HUS. HUS typically requires dialysis and death can occur in 3 to 5% of cases.

DEFINITIONS

Clinical Case Definition

An infection of variable severity characterized by diarrhea (often bloody) and abdominal cramps. Illness can be complicated by hemolytic uremic syndrome (HUS) or thrombotic thrombocytopenic purpura (TTP); asymptomatic infections can also occur, and the organism can cause extra-intestinal infections.

Laboratory Confirmation

- Isolation of *E. coli* from a clinical specimen with detection of Shiga toxin or Shiga toxin genes
- Isolation of *E. coli* O157:H7 from a clinical specimen

Notes:

- As required by *TAC*, all cases of Shiga toxin-producing *E. coli* infections, including *E. coli* O157:H7, and cases where Shiga toxin activity is demonstrated, must submit isolates or specimens to the DSHS laboratory.
- *Escherichia coli* non-O157:H7 isolates must also have Shiga toxin-production verified to qualify for the "confirmed" case status. Shiga toxin can be demonstrated by EIA or PCR testing.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis; when available, O and H antigen serotype characterization should be reported.
- **Probable:**
    - A case with isolation of *E. coli* O157 from a clinical specimen, without confirmation of the H antigen or detection of Shiga toxin or Shiga toxin genes, **OR**
    - A clinically compatible illness in a person with identification of an elevated antibody titer to a known Shiga toxin-producing *E. coli* serotype **OR**
    - A clinically compatible illness in a person with detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen, **OR**
    - A clinically compatible illness in a person with detection of *E. coli* O157 or Shiga toxin- producing *E. coli* in a clinical specimen using a CIDT, **OR**
    - A clinically compatible case that is epidemiologically linked to a confirmed or probable case with laboratory evidence, **OR**
    - A clinically compatible illness in a person that is a person that is a member of a risk group as defined by public health authorities in an outbreak
- **Suspect:**
    - Identification of an elevated antibody titer against a known Shiga toxin-producing serogroup of *E. coli* in a person with no known clinical compatibility **OR**
    - Detection of Shiga toxin or Shiga toxin genes in a clinical specimen using a CIDT and no known isolation of *Shigella* from a clinical specimen in a person with no known clinical compatibility, **OR**
    - Detection of *E. coli* O157 or Shiga toxin-producing *E. coli* in a clinical specimen using a CIDT with no known clinical compatibility, **OR**
    - A person with a diagnosis of post diarrheal HUS/TTP

Notes:

- EIA and/or PCR positive results for Shiga toxin-production, in the absence of an isolate, can only qualify a case as "probable".
- Cases meeting confirmed or probable criteria for both STEC and HUS should be reported separately under each condition.
- A case should not be counted as a new case if a positive laboratory result is reported within 180 days of a previously reported positive laboratory result in the same individual, OR
  When two or more different serogroups are identified in one or more specimens from the same individual each serogroup/serotype should be

reported as a separate case.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of Shiga toxin-producing *E. coli* infections. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the Shiga Toxin-Producing *Escherichia coli* (*E. coli*) and/or Hemolytic Uremic Syndrome (HUS) Investigation Form available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Verify that the laboratory has forwarded an isolate or specimen from cases where Shiga toxin activity is demonstrated to the DSHS laboratory. If an isolate has not been sent, please request a specimen be submitted as required.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to get a detailed exposure history and risk factor information.
    - Use the **Shiga Toxin-Producing *Escherichia coli* (*E. coli*) and/or Hemolytic Uremic Syndrome (HUS) Investigation Form** to record information from the interview.
    - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
    - Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and animal contact/handling precautions. See Prevention and Control Measures.
- ☐ Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to FoodborneTexas@dshs.texas.gov.
    - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU, noting case is LTF.
    - For HUS cases, please also submit the medical record along with the completed form
- ☐ Identify whether the case needs to be excluded based on occupation or attendance in a group setting.
- ☐ Examples include food handlers, child-care or health-care workers, or attend child-care as long as they have diarrhea. See Exclusions.
- ☐ If case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed, probable and suspect case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Suspect cases are not included in the overall case counts but are included for programmatic review. Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.
  - After handling raw food, especially poultry and beef.
  - After any contact with animals, their living areas or their food.
- Avoid consuming raw milk, unpasteurized dairy products, and unpasteurized juices (like fresh apple cider). Prolonged heat treatment is required to destroy Shiga toxin.
- Follow food safety principles in the kitchen, especially:
  - Restrict any food preparation for other individuals until symptoms have resolved
  - Cook ground beef thoroughly. Ground beef and meat that has been needle-tenderized should be cooked to a temperature of at least 160°F (70°C). Use a thermometer to verify the temperature, as color is not a very reliable indicator of how thoroughly meat has been cooked.
  - Prevent cross-contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after handling raw meat and switching to items consuming raw such as vegetables
  - Wash fresh leafy greens, fruits and vegetables thoroughly with water.
- Avoid swallowing water when swimming and playing in lakes, ponds, streams, swimming pools, and backyard "kiddie" pools.
- Avoid participating in recreational water activities such as swimming while diarrhea is present and for two weeks after diarrhea has resolved.

Exclusions

School/child-care: No exclusion specified for Shiga toxin-producing *E. coli* but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employees: Symptomatic food employees infected with Shiga toxin-producing *E. coli* are to be excluded from work. Asymptomatic food employees diagnosed with an infection from Shiga toxin-producing *E. coli* are to be excluded from working in a food establishment serving a highly susceptible population or restricted if they do not serve a highly susceptible population.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from Shiga toxin- producing *E. coli* based on test results showing two consecutive, negative stool specimen cultures. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics if antibiotics were given. (Antibiotics are not recommended

for treating illness due to STEC or asymptomatic carriage of STEC.) OR
- More than 7 days have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) OR
- The food employee did not develop symptoms and more than 7 days have passed since being diagnosed.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676,** or email an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov.

The local/regional health department should:
- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, is lost to follow-up, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional STEC cases.
- If isolates have not already been submitted to the DSHS laboratory for confirmation and whole genome sequencing, request hospital/clinical labs submit isolates for confirmation and whole genome sequencing testing. See Laboratory Procedures.
- Work with regulatory staff to conduct an environmental assessment, if needed.
    - Collect information on the implicated facility including:

        - Food safety practices, operations, anything that was unusual about the time period in question
        - Obtain names and contact information of those present at facility during outbreak time frame, e.g., employees, food workers, customers, residents, students, etc.
    - If food is suspected:
        - Obtain menus
        - Interview food employees for illness history and job duties.
        - Collect food samples or embargo food, if necessary.
            - Decisions about testing implicated food items can be made in consultations with an EAIDU foodborne epidemiologist.
    - Identify and correct any items that may have contributed to the outbreak
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on, and adherence to, hand hygiene
    - Storage and preparation of food
    - Procedures for changing diapers and toilet training
    - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Exclude individuals from handling food, engaging in child-care, healthcare work, or attending child- care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing clusters:

- For clusters of cases that meet the cluster definition based on allele differences detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS Central Office EAIDU foodborne team will notify appropriate DSHS regional and/or local health department epidemiologists.
- Local/regional health departments with cases in their jurisdiction should:
    - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
        - Fax the completed questionnaire promptly within timeframe designated in the cluster notification to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.
    - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
    - If an interview is unattainable or the case is lost to follow-up, fax the completed coversheet and any case information to DSHS EAIDU.
    - Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may

participate, if able.

Notes:

- For cases with raw milk exposure, please email the information about dates of raw milk consumption and place of purchase to the DSHS Milk and Dairy Unit at milk.regulatory@dshs.texas.gov and cc foodbornetexas@dshs.texas.gov.
- If a food item or food establishment is implicated, an EAIDU foodborne epidemiologist will notify appropriate state and/or federal partner agencies regarding the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable, and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed, probable, and suspect** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if a positive laboratory result is reported within 180 days of a previously reported positive laboratory result in the same individual unless additional information is available indicating a separate infection such as different serotypes/serogroups.
  - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed forms to DSHS EAIDU at **512-776-7616** or email securely to FoodborneTexas@dshs.texas.gov.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676.**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness

outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/.
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created, a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

All cases of Shiga toxin-producing *E. coli* infections, including *E. coli* O157:H7, and cases where Shiga toxin activity is demonstrated must be submitted to the DSHS laboratory.
In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for Shiga toxin-producing *E. coli.* Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperatures.
- If a pure culture is not available but Shiga toxin activity is demonstrated,
    - Submit stool specimen in Cary-Blair, Aimes, or Stuarts transport, on wet ice packs, **OR**
    - Submit stool specimens on broth or MacConkey broth, < 7 days old on wet ice packs, > 7 days old on dry ice.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter.

Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday, or public holiday, unless special arrangements have been pre-arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Incorrect source of specimen
- Specimen not in correct transport medium
- Missing or discrepant information on form/specimen
- Transport media was expired
- Specimen too old

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs is available at the DSHS laboratory.

For *E. coli* O157:H7, the DSHS laboratory can test:

- Environmental Swabs
- Foods

For the "Big 6" STECs (O26, O45, O103, O111, O121, and O145), the DSHS laboratory can test:

- Environmental Swabs
- Meat Samples
- Milk Samples
- Other Foods- decisions to test other food samples not listed above would be evaluated a case by case basis

Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- Test only food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).

- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian.**

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

December 2021

- Updated Definitions, Managing Special Situations, and Surveillance and Case Investigation sections

March 2021

- Entire section

Shigellosis

BASIC EPIDEMIOLOGY

Infectious Agent

Shigella species, a Gram negative bacilli. Shigellosis can be caused by four species of *Shigella*: *S. dysenteriae, S. flexneri, S. boydii, and S. sonnei*. *S. sonnei* is the most common cause of shigellosis in the United States.

Transmission

Mainly by direct or indirect fecal-oral transmission from a symptomatic patient or asymptomatic carrier. The infectious dose can be as low as 10–100 organisms. Transmission can occur through ingestion of contaminated food or water, direct contact with a contaminated inanimate object (fomites) or sexual contact, including oral-anal contact. Person-to-person transmission is common within households and child-care facilities or other close contacts, especially when hand washing is inadequate. Care givers are also at risk of infection if there is fecal contamination of hands.

Incubation Period

Usually 1-3 days (ranges 12 to 96 hours).

Communicability

People are infectious as long as bacteria are shed in their stool. Shedding may last 1 to 4 weeks after onset of illness. Rarely, individuals can remain carriers for several months. The period of excretion is usually shortened by appropriate antibiotic therapy.

Clinical Illness

Symptoms include acute onset of diarrhea, usually accompanied by moderate to high fever, abdominal pain, cramping, nausea, and tenesmus. Diarrhea is often watery but may contain blood and mucus (dysentery). Mild and asymptomatic infections also occur.

Severity

Infections can be severe, particularly in young children and the elderly. Complications from shigellosis can include pseudomembranous colitis, toxic megacolon, intestinal perforation, hemolysis, and hemolytic uremic syndrome (HUS).

DEFINITIONS

Clinical Case Definition

An illness of variable severity characterized by diarrhea, fever, nausea, cramps, and tenesmus. Asymptomatic infections can occur.

Laboratory Confirmation

- Isolation of *Shigella* from a clinical specimen.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis. When available, *Shigella* serogroup or species and serotype characterization should be reported.

- **Probable:**
  - A case with *Shigella* spp. or *Shigella*/EIEC detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based), **OR**
  - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis.

Note: Both asymptomatic infections and infections at sites other than the gastrointestinal tract, if laboratory confirmed, are considered confirmed cases that should be reported.

Note: A case should not be counted as a new case if laboratory results were reported within 90 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

It is recommended that local and regional health departments investigate all reported cases of shigellosis to identify potential sources of infection. Sporadic cases of shigellosis do not require an investigation form to be sent to DSHS EAIDU unless they are identified as part of a multi-jurisdictional cluster or outbreak. Any case associated with a cluster or outbreak should be interviewed.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ If time and resources allow or the case is part of an outbreak or cluster, interview the case to identify potential sources of infection. Ask about possible exposures 1–7 days before onset of symptoms, including:
  - Contacts or household members with a diarrheal illness. Obtain the name, phone number or address, and clinical information of the ill person.
  - Attendance or employment at a child-care facility by the case or a household member of the case. If the case or a household member attends or works at a child-care facility, see Managing Special Situations.
  - Restaurant or other food service meals. Obtain the name of the restaurant, and date and location of the meal.
  - Public gathering where food was consumed. Obtain the date, location, and sponsor of the event.
  - Recreational water exposure, including lakes, streams, swimming pools, water parks or wading pools. Obtain the date and location of exposure.
  - Source(s) of drinking water as well as water from streams or lakes (either consumed purposefully or accidentally during work or sports activity). Water used only after boiling need not be included.
  - Travel within Texas, outside Texas or outside the United States, or

contact with others who have traveled outside the United States. Determine dates of travel.
    - Sexual contact involving potential oral-fecal exposure.
    - Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- ☐ Provide education to the case or his/her surrogate about effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. Meticulous hand washing is required to prevent transmission. See Prevention and Control Measures.
- ☐ Identify whether there is a public health concern: persons should not work as food handlers, child- care or health care workers, or attend child-care as long as they have diarrhea. See Exclusions.
- ☐ All confirmed, probable, and suspect case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water especially:
    - Before preparing, handling or eating any food.
    - After going to the bathroom.
    - After changing a diaper.
    - After caring for someone with diarrhea.
- Do not participate in recreational water activities such as swimming while diarrhea is present and for one week after diarrhea has resolved.
- Avoid fecal exposure during sexual contact.
- When traveling, drink only treated or boiled water and eat only cooked hot foods or fruits you peel yourself.

Recommended Control Measures for Schools and Child-Care Centers:

- **Hand Washing**
    - Encourage children and adults to wash their hands frequently, especially before handling or preparing foods and after wiping noses, diapering, using toilets, or handling animals.
    - Wash hands with soap and water long enough to sing the "Happy Birthday" song twice.
    - Sinks, soap, and disposable towels should be easy for children to use.
    - If soap and water are not available, clean hands with gels or wipes with alcohol in them.
- **Diapering**
    - Keep diapering areas near hand washing areas.
    - Keep diapering and food preparation areas physically separate. Keep both areas clean, uncluttered, and dry.
    - The same staff member should not change diapers and prepare food.
    - Cover diapering surfaces with intact (not cracked or torn) plastic pads.
    - If the diapering surface cannot be easily cleaned after each use, use a disposable material such as paper on the changing area and discard the paper after each diaper change.
    - Sanitize the diapering surface after each use and at the end of the day.

  - Wash hands with soap and water or clean with alcohol-based hand cleaner after diapering.
- **Environmental Surfaces and Personal Items**
  - Regularly clean and sanitize all food service utensils, toys, and other items used by children.
  - Discourage the use of stuffed toys or other toys that cannot be easily sanitized.
  - Discourage children and adults from sharing items such as combs, brushes, jackets, and hats.
  - Maintain a separate container to store clothing and other personal items.
  - Keep changes of clothing on hand and store soiled items in a nonabsorbent container that can be sanitized or discarded after use.
  - Provide a separate sleeping area and bedding for each child, and wash bedding frequently.

Exclusions:

School/child-care: No exclusion specified for shigellosis but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications

Food Employees: Symptomatic food employees infected with *Shigella spp.* are to be excluded from work. Asymptomatic food employees diagnosed with an infection from *Shigella spp.* are to be excluded from working in a food establishment serving a highly susceptible population or restricted if they do not serve a highly susceptible population.

Food employees can be reinstated with approval from the Regulatory Authority and if one of the following conditions is met:

- Medical documentation stating that the food employee is free of infection from *Shigella spp.* based on test results showing two consecutive, negative stool specimen cultures. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics if antibiotics were given.
- More than 7 days have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or
- The food employee did not develop symptoms and more than 7 days have passed since being diagnosed.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Case Attends or Works at a Child-Care Facility

- Interview the director and review written attendance records to identify other possible cases among staff or attendees during the previous month.
- Review food handling, hand washing techniques, and diaper changing

practices with the director and staff.
- If other cases are suspected, recommend that they seek medical attention from a healthcare provider.
- Cases should be excluded until free from diarrhea and/or fever. See Exclusions in Case Investigation section.
    - Recommendations can be made to exclude cases until they have two negative stool cultures collected at least 24 hours apart and at least 48 hours after discontinuation of antibiotics
- Parents of children in the same child-care group as a case should be notified of the occurrence of shigellosis in the group. Notification letters should include following elements:
    - Children should be monitored carefully for signs of illness such as diarrhea, abdominal pain, nausea, vomiting and fever.
    - Notify the daycare operator or local health jurisdiction should symptoms occur.
    - A symptomatic child should not be brought to the daycare facility or placed in any other group of children.
    - Information on the illness and how transmission can be prevented.
- If indicated, conduct an inspection of the facility.
- Instruct the facility director to call immediately if new cases of illness occur.
- Follow-up with the child-care center to ensure that surveillance and appropriate prevention measures are being carried out (see Prevention and Control Measures).

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:
- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional shigellosis cases.
- Isolates can be submitted to the DSHS laboratory for serotyping and WGS. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on, and adherence to, hand hygiene
    - Storage and preparation of food
    - Procedures for changing diapers and toilet training
    - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child- care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing clusters:

- For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- Local/regional health departments with cases in their jurisdiction should:
    - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
        - Fax the completed questionnaire promptly within timeframe designated in the cluster notification to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.
    - If the health department having jurisdiction of a case is unable to reach a case-patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
    - If an interview is unattainable or the case is lost to follow-up, fax the completed cover sheet and any case information to DSHS EAIDU.
- Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:

- For cases with raw milk exposure, please email the information about dates of raw milk consumption and place of purchase to the DSHS Milk and Dairy Unit at milk.regulatory@dshs.texas.gov and cc

foodbornetexas@dshs.texas.gov.

- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases.
    - Please refer to the NBS Data Entry Guidelines for disease-specific entry rules.
    - A case should not be counted as a new case if laboratory results were reported within 90 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different serotype A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- If investigation forms are requested, they may be faxed to 512-776-7616 or emailed securely to an EAIDU foodborne epidemiologist at FoodborneTexas@dshs.texas.gov

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512- 776-7676**.
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
        - Outbreaks as indicated above with patients in the same household.
    - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at

http://www.cdc.gov/nors/

- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Testing for shigellosis is widely available from most private laboratories. Isolates are encouraged to be submitted to the DSHS laboratory for serotyping and Whole Genome Sequencing (WGS).

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Shigella* species. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.

- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section,
MC-1947 Texas Department of
State Health Services Attn.
Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Specimen not in correct transport medium
- Transport media was expired

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Shigella* spp. is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian**

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

March 2021

- Minor edits

Smallpox (ComingSoon)

Streptococcus pneumoniae, Invasive (Pneumococcal Disease)

BASIC EPIDEMIOLOGY

Infectious Agent

Streptococcus pneumoniae (*S. pneumoniae*) are beta-hemolytic, Gram-positive cocci.

Transmission

Transmission of *S. pneumoniae* occurs as a result of direct person-to-person contact via respiratory droplets and by autoinoculation in persons carrying the bacteria in their upper respiratory tract.

Incubation Period

The incubation period varies by type of infection and can be as short as 1 to 3 days.

Communicability

The period of communicability is unknown. It may be as long as the organism is present in respiratory tract secretions but is probably less than 24 hours after effective antimicrobial therapy is begun.

Clinical Illness

The major clinical manifestations of invasive pneumococcal disease are bacteremia and meningitis. Pneumonia is the most common clinical presentation of pneumococcal disease among adults.

Symptoms generally include an abrupt onset of fever and chills or rigors. Other common symptoms include:

- pleuritic chest pain,
- productive cough,
- shortness of breath,
- rapid breathing,
- hypoxia,
- rapid heart rate,
- malaise and weakness.

Bacteremia without a known site of infection is the most common invasive clinical presentation of pneumococcal infection among children 2 years of age and younger.

Severity

CDC estimates that 150,000 hospitalizations from pneumococcal pneumonia occur annually. Pneumococci account for up to 30% of adult community-acquired pneumonia. Bacteremia occurs in up to 25-30% of patients with pneumococcal pneumonia. The case fatality rate of pneumococcal pneumonia is 5%-7% and may be much higher among elderly persons. The case fatality rate of pneumococcal bacteremia is about 20% but may be as high as 60% among elderly persons. The case fatality rate of pneumococcal meningitis is about 30% and may be as high as 80% among elderly persons. Patients with asplenia who develop bacteremia may experience a fulminant clinical course.

DEFINITIONS

Clinical Case Definition

Streptococcus pneumoniae cause many clinical syndromes depending on the site of infection (e.g., acute otitis media, pneumonia, bacteremia, or meningitis). Only invasive *Streptococcus pneumoniae* disease is reportable.

Laboratory Criteria for Diagnosis

- Isolation of *S. pneumoniae* from a normally sterile site.

Normally sterile sites do *not* include:

- Anatomical areas of the body that normally harbor either resident or transient flora (bacteria) including mucous membranes (throat, vagina), sputum and skin, or abscesses or localized soft tissue infections.

See the Sterile Site and Invasive Disease Determination Flowchart in Appendix A for confirming that a specimen meets the criteria for sterile site.

Case Classification

- **Confirmed**: A case that is laboratory confirmed
- **Probable**: A case with detection of *S. pneumoniae* from a normally sterile site using a culture independent diagnostic test (CIDT) (e.g., PCR, antigen-based tests) without isolation of the bacteria

See the Streptococcal Infection: Case Status Classification Flowchart in Appendix A for assistance with case classification.

****Note: Cases less than five years of age are required to have an isolate from sterile site submitted to the DSHS laboratory for serotyping, regardless of typing at other facilities.**

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of suspected *Streptococcus pneumoniae.* In-depth investigation involving patient interviews is not required, but **it is necessary to confirm case status and vaccination status**.

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition. Only specimens from sterile sites are accepted as evidence of invasive disease.
  - See the Sterile Site and Invasive Disease Determination Flowchart for confirming that a specimen meets the criteria for sterile site.
- ☐ Review medical records or speak to an infection preventionist or physician to verify that the case meets case definition, identify underlying health conditions and describe the course of illness.
  - The *Streptococcus pneumoniae*, invasive Case Investigation Form is available at http://www.dshs.state.tx.us/eaidu/investigation/ and can be used to record information. **Send completed form to DSHS only for cases <5 years old.**
- ☐ Determine vaccination status of the case. Sources of vaccination status

that should be checked include: case (or parent), ImmTrac2, hospital medical records, school nurse records, primary care provider, etc.

- ☐ **For children <5 years of age, the laboratory is required by the Texas Administrative Code to forward an isolate from sterile site to the DSHS laboratory for serotyping (see Laboratory Procedures below).**
- ☐ If applicable, see the Managing Special Situations section.
- ☐ All confirmed and probable *Streptococcus pneumoniae* case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.
- ☐ Send secure email completed investigation form **only for cases < 5 years old** to EAIDU. (See Reporting and Data Entry Requirements below).

Control Measures

- Provide education on *Streptococcus pneumoniae* as needed.
- Recommend that anyone experiencing symptoms be evaluated by a healthcare provider.
- Promote droplet isolation for all cases, respiratory etiquette, and hand hygiene.
- Encourage vaccination per ACIP guidance.
    - Pneumococcal conjugate vaccine (PCV13) is recommended for all children younger than 5 years old, all adults 65 years or older, and people 6 years or older with certain risk factors.
    - Pneumococcal polysaccharide vaccine (PPSV23) is recommended for all adults 65 years or older. People 2 years through 64 years of age who are at high risk of pneumococcal disease should also receive PPSV23.

Managing Close Contacts

Special management of close contacts has no significant value for routine situations.

Treatment

Certain antibiotics are effective at treating *S. pneumoniae* infection.

Exclusion

Children with a fever from any infectious cause should be excluded from school and daycare for at least 24 hours after fever has subsided without the use of fever-suppressing medications.

MANAGING SPECIAL SITUATIONS

Case is a Suspected Healthcare-Associated (Nosocomial) Infection

If one or more nosocomial (healthcare-associated) cases occur in patients of the same hospital, residential care facility, or other long-term care facility; and the cases have no other identified plausible source of infection; or if other circumstances suggest the possibility of nosocomial infection, notify EAIDU VPD team at **(800) 252-8239 or (512) 776-7676**. The DSHS EAIDU Healthcare-Associated Infections (HAI) Team or the regional HAI epidemiologist should also

be notified and should work with the local health department to investigate the possibility of transmission within the healthcare setting.

Outbreaks
If an outbreak of *S. pneumoniae* is suspected, notify the regional DSHS office or EAIDU at **(800) 252- 8239 or (512) 776-7676**.

The local/regional health department should work with the facility to:

- Review infection prevention practices currently in place.
- Ensure all suspected and confirmed cases follow droplet precautions.
- Ensure everyone gets hand hygiene and respiratory etiquette education.
- Ensure that symptomatic staff members are excluded from work.
- Ensure an adequate supply of personal protective equipment (PPE) (e.g., gowns, masks).
- Ensure that staff members wear PPE for all respiratory illnesses without an identified etiology.
- Cohort ill patients/residents together.
- Encourage anyone with symptoms to be evaluated by a healthcare provider.
- Review vaccination status of exposed persons and recommend vaccination per ACIP guidance.

Note: Treatment of asymptomatic carriers is considered ineffective.

Specimen Collection After Death
Specimens collected during an autopsy must be normally sterile sites and collected within 24 hours of death to be considered confirmatory. If the specimen is collected more than 24 hours after death, even if from a normally sterile site, it is now considered not sterile and will not be considered confirmatory.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School & Child-Care Facilities, and General Public Reporting Requirements Confirmed cases are required to be reported **within 1 week** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** cases to DSHS within 30 days of receiving a report of a confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completion of the investigation.
- Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation for all cases.
    - Investigation forms may be faxed to **512-776-7616**, securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Emerging and Acute Infectious Disease Unit

Texas Department of State Health Services Mail
Code: 1960
PO Box 149347
Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **(800) 252-8239 or 512-776-7676**. Submit a completed **Respiratory Disease Outbreak Summary Form** at the conclusion of the outbreak investigation.
    - The Respiratory Disease Outbreak Summary Form is available at http://www.dshs.state.tx.us/eaidu/investigation/.

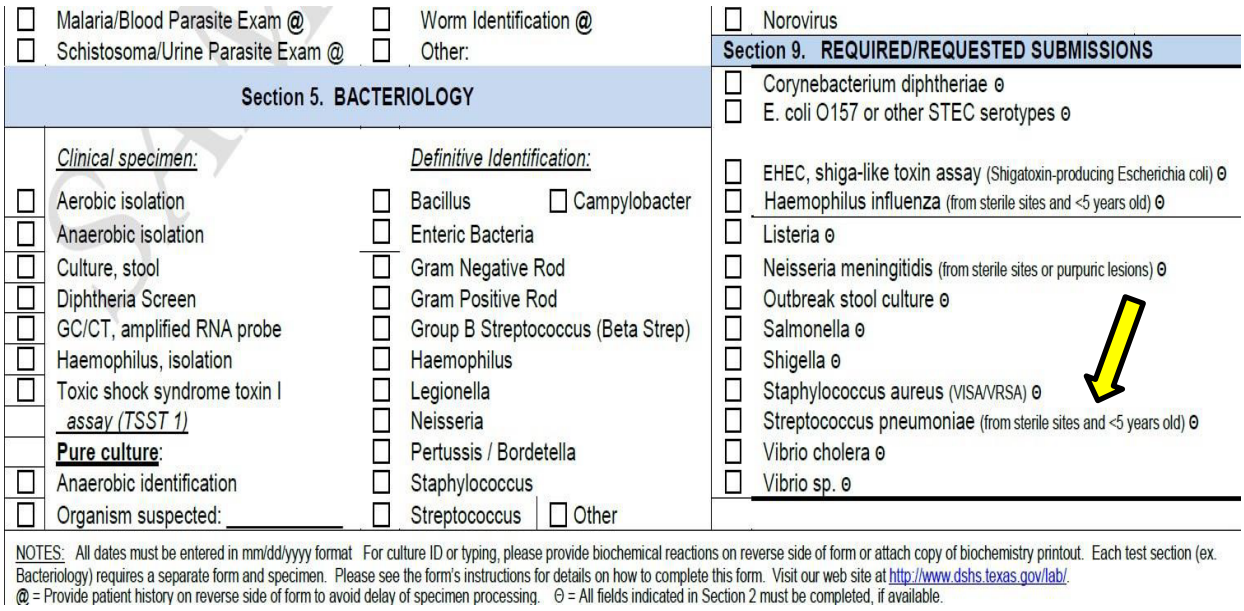
LABORATORY PROCEDURES

Testing for pneumococcal disease is widely available from most hospital or private laboratories.

The only exception is serotyping of isolates to determine if the strain was vaccine-preventable or not. Currently, serotyping of isolates is only available through the DSHS Laboratory and only offered for cases less than five years of age. Isolates must be from a sterile site. Serotyping for cases less than five years of age is required by the TAC.

Isolate Submission

- Submit isolates of *S. pneumoniae* on appropriate media such as blood or chocolate agar slants (or media that has the necessary growth requirements for *S. pneumoniae)* at ambient temperature.
- Ship isolates to the DSHS laboratory via overnight delivery.
- Use Specimen Submission form G-2B.
- For cases <5 years old with isolate from a sterile site, Under Section 49, Required/Requested Submissions select the *Streptococcus pneumoniae* for cases under five years old and from a sterile site.



☐ Malaria/Blood Parasite Exam @ ☐ Worm Identification @
☐ Schistosoma/Urine Parasite Exam @ ☐ Other:

Section 5. BACTERIOLOGY

Clinical specimen:	*Definitive Identification:*
☐ Aerobic isolation	☐ Bacillus ☐ Campylobacter
☐ Anaerobic isolation	☐ Enteric Bacteria
☐ Culture, stool	☐ Gram Negative Rod
☐ Diphtheria Screen	☐ Gram Positive Rod
☐ GC/CT, amplified RNA probe	☐ Group B Streptococcus (Beta Strep)
☐ Haemophilus, isolation	☐ Haemophilus
☐ Toxic shock syndrome toxin I assay (TSST 1)	☐ Legionella
	☐ Neisseria
Pure culture:	☐ Pertussis / Bordetella
☐ Anaerobic identification	☐ Staphylococcus
☐ Organism suspected: _____	☐ Streptococcus ☐ Other

☐ Norovirus

Section 9. REQUIRED/REQUESTED SUBMISSIONS

☐ Corynebacterium diphtheriae ϴ
☐ E. coli O157 or other STEC serotypes ϴ
☐ EHEC, shiga-like toxin assay (Shigatoxin-producing Escherichia coli) ϴ
☐ Haemophilus influenza (from sterile sites and <5 years old) ϴ
☐ Listeria ϴ
☐ Neisseria meningitidis (from sterile sites or purpuric lesions) ϴ
☐ Outbreak stool culture ϴ
☐ Salmonella ϴ
☐ Shigella ϴ
☐ Staphylococcus aureus (VISA/VRSA) ϴ
☐ Streptococcus pneumoniae (from sterile sites and <5 years old) ϴ
☐ Vibrio cholera ϴ
☐ Vibrio sp. ϴ

NOTES: All dates must be entered in mm/dd/yyyy format For culture ID or typing, please provide biochemical reactions on reverse side of form or attach copy of biochemistry printout. Each test section (ex. Bacteriology) requires a separate form and specimen. Please see the form's instructions for details on how to complete this form. Visit our web site at http://www.dshs.texas.gov/lab/.
@ = Provide patient history on reverse side of form to avoid delay of specimen processing. ϴ = All fields indicated in Section 2 must be completed, if available.

Specimen Shipping

- DO NOT mail on a Friday or the day before a state holiday unless special arrangements have been made in advance with the DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health Services
Attn. Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection

- Discrepant or missing information between isolate and paperwork
  - Two identifiers not listed on the isolate such as patient first and last name AND date of birth
- Expired media used.

REVISION HISTORY

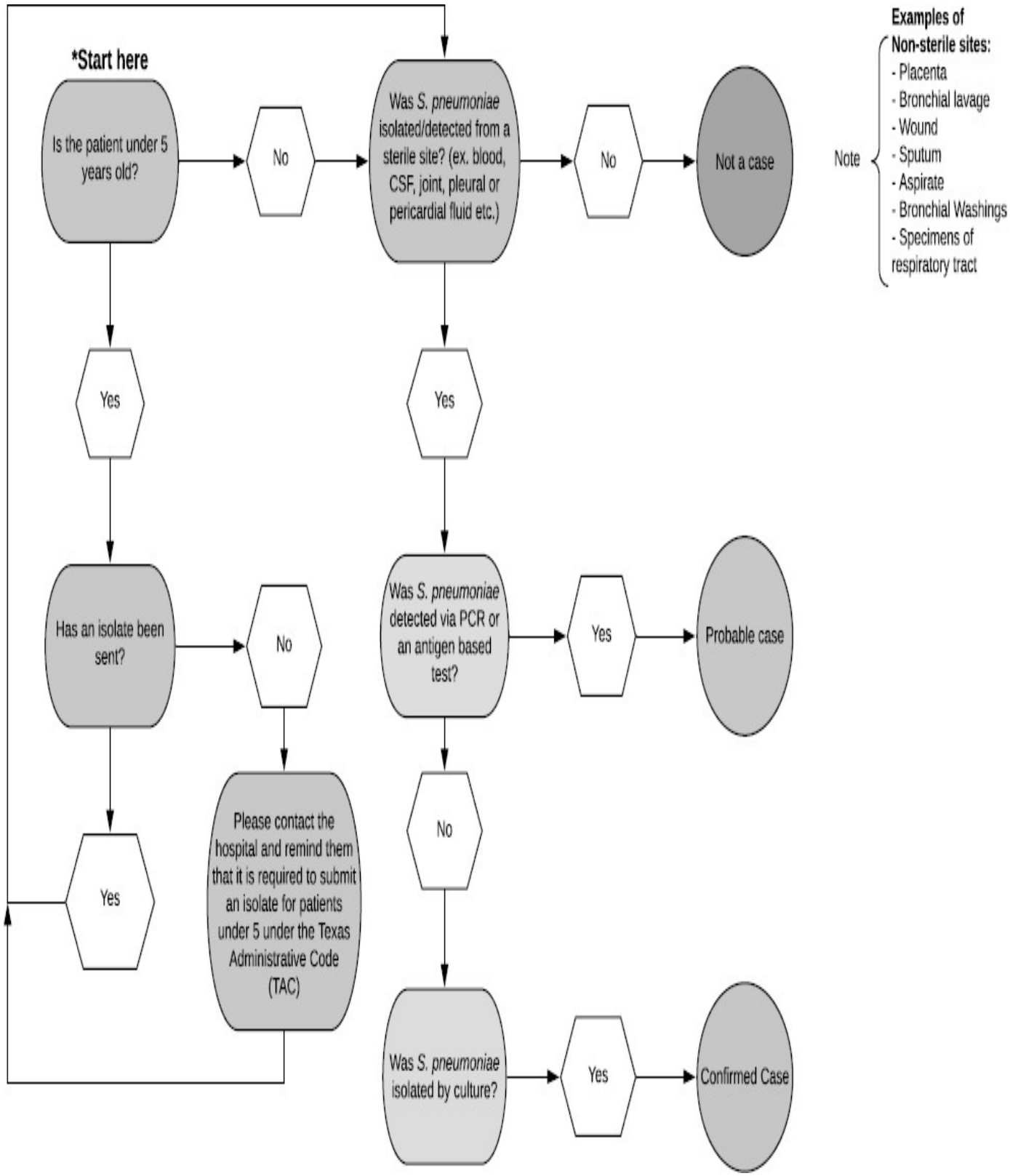
January 2021

- Requirement to submit completed case investigation form for all cases.
- New investigation form and hyperlink to investigation forms updated.
- Updated G-2B Guidance.
- Added flow chart.

December 2022

- Outbreaks
- Special situations
- Only case investigation forms for cases <5 years old need to be submitted to VPD Team

FLOW CHART


*Start here
Is the patient under 5 years old?
No
Was S. pneumoniae isolated/detected from a sterile site? (ex. blood, CSF, joint, pleural or pericardial fluid etc.)
No
Not a case
Yes
Yes
Has an isolate been sent?
No
Was S. pneumoniae detected via PCR or an antigen based test?
Yes
Probable case
Yes
Please contact the hospital and remind them that it is required to submit an isolate for patients under 5 under the Texas Administrative Code (TAC)
No
Was S. pneumoniae isolated by culture?
Yes
Confirmed Case
Note
Examples of Non-sterile sites:
- Placenta
- Bronchial lavage
- Wound
- Sputum
- Aspirate
- Bronchial Washings
- Specimens of respiratory tract

Tetanus

BASIC EPIDEMIOLOGY

Infectious Agent
Clostridium tetani, a Gram-positive, spore-forming drumstick-shaped bacilli

Reservoir
Tetanus spores are found in soil and in the intestines and feces of many domestic animals and fowl. Spores have also been reported in contaminated heroin.

Transmission
Transmission is primarily by contaminated wounds (severe or minor, even those unapparent to the injured). In recent years, however, a higher proportion of patients had minor wounds, probably because severe wounds are more likely to be properly managed. Tetanus may follow elective surgery, burns, deep puncture wounds, crush wounds, otitis media (ear infections), dental infection, animal bites, abortion, and pregnancy.

Incubation Period
Usually 3–21 days, although it may range from 1 day to several months, depending on the type, severity and location of the wound; average 10 days. Most cases occur within 14 days. In general, shorter incubation periods are associated with more heavily contaminated wounds, more severe disease and a worse prognosis.

Communicability
Tetanus is not transmitted from one person to another. A person with tetanus is not infectious to others.

Clinical Illness
Tetanus is a neurological disease caused by tetanus toxin. Three different clinical forms have been described; generalized (~80%), local and cephalic tetanus. Symptoms of generalized tetanus include rigidity and painful spasms of skeletal muscles. Initial muscles affected are often in the jaw and neck (leading to the common name for the disease: "lockjaw") followed by involvement of larger muscles in a descending pattern. Seizures may occur. Less common forms of tetanus are local tetanus which is localized to the anatomic area of injury and cephalic tetanus which involves the cranial nerves. In countries with poor hygiene, neonatal tetanus causes significant mortality when infants born to unimmunized women have infection of the umbilical stump that was contaminated with soil or alternative medical treatment.

Complications of tetanus include fractures, difficulty breathing (due to spasms of the respiratory muscles), and abnormal heart rhythms. In addition, nosocomial infections related to prolonged hospitalization can occur. Death results in approximately 11% of affected persons. The case fatality rate ranges from 10% to over 80%, it is highest in infants and the elderly, and varies inversely with the length of the incubation period and the availability of experienced intensive

care unit personnel and resources.

Attempts at laboratory confirmation are of little help. The organism is rarely recovered from the site of infection, and usually there is no detectable antibody response.

DEFINITIONS

Clinical Case Definition

Acute onset of hypertonia and/or painful muscular contractions (usually of the muscles of the jaw and neck) and generalized muscle spasms without other apparent medical cause

Laboratory Confirmation

- None, there is no laboratory criteria for tetanus

Case Classification

- **Confirmed:** No confirmed case definition
- **Probable:** A clinically compatible case, as reported by a health-care professional.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate all reports of tetanus.

Case Investigation Checklist

- ☐ Confirm that clinical picture meets the case definition.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition, clinical picture, treatment history and vaccination status.
  - The Tetanus Investigation Form should be used to record information collected during the investigation.
- ☐ Tetanus Immune Globulin (TIG) is used to treat tetanus cases (and certain wounds, see Table 1).
  - Hospitals usually have TIG available. DSHS does not stock TIG.
- ○ Contact your regional immunization program manager or EAIDU DSHS VPD team.
- ○ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
  - Case (or parent), ImmTrac2, school nurse records, primary care provider, etc.
- ☐ Follow-up with the status of the case until death or resolution of symptoms (e.g., mechanical ventilation no longer needed).
  - Case can be submitted in NBS prior to symptom resolution if investigation is otherwise complete.
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS EAIDU.
- ☐ Send the complete the Tetanus Investigation Form to DSHS.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- The best method for controlling tetanus is preventing tetanus through active immunization with adsorbed tetanus toxoid; combined Tetanus-diphtheria-pertussis vaccine (Tdap) is recommended.
- Tdap is recommended for universal use above age seven, especially for persons employed in occupations which put them in contact with soil, sewage, or domestic animals; military personnel, policeman, firefighters, and others with greater than usual risk of traumatic injury; the elderly; and international travelers.
- Children under seven should receive DTaP according to current ACIP recommendations.
- Current vaccine schedule
    - Infants and children
        - CDC recommends routine DTaP vaccination for all infants and children younger than 7 years old, with administration of a 5-dose DTaP series, with 1 dose each at 2 months, 4 months, 6 months, 15-18 months, and 4-6 years.
    - Adolescents
        - CDC recommends routine Tdap vaccination for all adolescents, ideally with a single dose of Tdap at 11 to 12 years of age.
    - Adults
        - CDC recommends vaccination every 10 years for all adults to maintain protection against diphtheria.

Figure 1. Summary Guide to Tetanus Prophylaxis in Routine Wound Management

[1]A primary series consists of a minimum of 3 doses of tetanus- and diphtheria-containing vaccine (DTaP/DTP/Tdap/DT/Td).
[2]Age-appropriate vaccine:

- DTaP for infants and children 6 weeks up to 7 years of age.
- Tetanus-diphtheria (Td) toxoid for persons 7 through 9 years of age and 65 years of age and older.
- Tdap for persons 11 through 64 years of age if using Adacel* or 10 years of age and older if using Boostrix*, unless the person has received a prior dose of Tdap.*

[3]No vaccine or TIG is recommended for infants younger than 6 weeks of age with clean, minor wounds. (And no vaccine is licensed for infants younger than 6 weeks of age.)
[4]Tdap* is preferred for persons 11 through 64 years of age if using Adacel* or 10 years of age and older if using Boostrix* who have never received Tdap. Td is preferred to tetanus toxoid (TT) for persons 7 through 9 years, 65 years and older, or who have received a Tdap previously. If TT is administered, and adsorbed TT product is preferred to fluid TT. (All DTaP/DTP/Tdap/Td products contain adsorbed tetanus toxoid.)
[5]Give TIG 250 U IM for all ages. It can and should be given simultaneously with the tetanus-containing vaccine.
[6]For infants younger than 6 weeks of age, TIG (without vaccine) is recommended for ”dirty” wounds (wounds other than clean, minor).

[7]Persons who are HIV positive should receive TIG regardless of tetanus immunization history.
*Brand names are used for the purpose of clarifying product characteristics and are not an endorsement of either product.

Tdap vaccines:

Boostrix (GSK) is licensed for persons 10 years of age and older.
Adacel (sanofi) is licensed for persons 11 through 64 years of age.

Table 1. Guide to Tetanus Prophylaxis in Routine Wound Management

	Clean, Minor Wounds		All Other Wounds[a]	
History of Adsorbed Tetanus Toxoid (Doses)	**Tdap, or Td[b]**	**TIG[c]**	**DTaP, Tdap, or Td[b]**	**TIG[c]**
Fewer than 3 or unknown	Yes	No	Yes	Yes
3 or more	No[d]	No	No[e]	No

Tdap indicates booster tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis vaccine; DTaP, diphtheria and tetanus toxoids and acellular pertussis vaccine; Td, adult-type diphtheria and tetanus toxoids vaccine; TIG, Tetanus Immune Globulin (human).

aSuch as, but not limited to, wounds contaminated with dirt, feces, soil, and saliva; puncture wounds; avulsions; and wounds resulting from missiles, crushing, burns, and frostbite.

bDTaP is used for children younger than 7 years of age. Tdap is preferred over Td for persons 11 years of age and older who have not previously received Tdap. Persons 7 years of age and older who are not fully immunized against pertussis, tetanus, or diphtheria should receive 1 dose of Tdap for wound management and as part of the catch-up series.
Individuals with HIV infection or severed immunodeficiency who have contaminated wounds should also receive TIF, regardless of their history of tetanus immunizations.

[d]Yes, if ≥10 years since the last tetanus toxoid-containing vaccine dose.

[e]Yes, if ≥5 years since the last tetanus toxoid-containing vaccine dose.

Courtesy of the Minnesota Department of Health (www.health.state.mn.us/diseases/tetanus/hcp/tetwdmgmt.html), with modifications.

Note: One Td vaccine (TdVax) has been discontinued, with remaining supplies constrained and priority given to those with a contraindication to receiving pertussis-containing vaccines. Tdap vaccine is an acceptable alternative to Td vaccine.

Source: American Academy of Pediatrics. Tetanus. In: David W. Kimberlin, MD, FAAP, Ritu Banerjee, MD, PhD, FAAP, Elizabeth D. Barnett, MD, FAAP, Ruth Lynfield, MD, FAAP, Mark H. Sawyer, MD, FAAP, eds. *Red Book: 2024–2027 Report of the Committee on Infectious Diseases*. 29th ed. Elk Grove Village, IL: American Academy of Pediatrics; 2024: 851.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Probable and clinically suspected tetanus cases are required to be reported **within 1 week** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **probable** cases to DSHS within 30 days of receiving a report of a confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email, or mail a completed investigation form within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be sent to DSHS EAIDU.**
    - Investigation forms may be faxed to **512-776-7616,** securely emailed to VPDTexas@dshs.texas.gov or mailed to:

Infectious Disease Control Unit
Texas Department of State
Health Services Mail Code: 1960
PO Box 149347
Austin, TX 78714-9347

LABORATORY PROCEDURES

Laboratory confirmation is not necessary for case confirmation.

REVISION HISTORY

January 2021

- Updated Table 1. Guide to Tetanus Prophylaxis in Routine Wound Management
- Updated TIG availability

September 2024

- Updated Case Investigation Checklist and sources of TIG
- Updated Control Measures to include vaccine schedule
- Updated Summary Guide to Tetanus Prophylaxis in Routine Wound Management from a table to a flowchart and added a note about a discontinued vaccine.

Trichuriasis

BASIC EPIDEMIOLOGY

Infectious Agent

Trichuriasis is caused by what are generally called parasitic helminths roundworm, commonly known as whipworms, and are given the scientific classification Trichuris trichiura, a genus in the phylum nematoda Trichuriasis is the second most prevalent worldwide of all soil-transmitted helminths, normally addressed along with hookworm and Ascariasis as a group.

Transmission

Transmission is primarily via ingestion of eggs found in soil contaminated with feces. Eggs are shed in the stool of an infected person but do not become infectious until they have incubated in soil for15-30 days. Once they become infectious they can be transmitted via contaminated water, agricultural products, fingers (especially children), or fomites.

Incubation Period

For trichuriasis, the time from egg ingestion to the development of an egg laying adult resulting in eggs being shed in the feces is 8-10 weeks. Within the human the lifecycle progresses as follows: when a person consumes an infected egg the larvae hatch in the small intestine. Then they migrate to the large intestine, where the anterior end of the parasite lodges within the mucosa. Female worms in the cecum shed between 3,000 and 20,000 eggs per day.

Communicability

Human to human transmission of T. trichuria does NOT occur because part of the worm's life cycle must be completed in soil before becoming infectious. Soil contamination is perpetuated by fecal contamination from infected individuals. An infected person may shed eggs for as long as they are infected with an egg laying adult, which may one to five years.

Clinical Illness

Clinical manifestations of trichuriasis tend to depend on the infection's burden and severity. Light infections may only result in peripheral blood eosinophilia. Individuals with moderate to heavy infections may develop symptoms such as frequent, painful and/or bloody stool, rectal prolapse, or anemia. Asymtomatic and symptomatic infections produce morbidity. Children with prolonged or severe anemia may develop significant growth or mental impairment.

DEFINITIONS

Clinical Case Definition

While most cases are asymptomatic severe cases may develop symptoms similar to inflammatory bowel disease. Dysentery including frequent painful passage of stool that is bloody or with mucus, and rectal prolapse may be present. Children with severe infection may be developmentally impaired and/or anemic.

Laboratory Confirmation

- Microscopic identification of *Trichuria* eggs or worms in stool specimens, **OR**
- Observation during sigmoidoscopy, proctoscopy, or colonoscopy of *Trichuria* worms characterized by a threadlike form with an attenuated, whip-like end, **OR**
- Examination of adult worms and identification of *Trichuria* worms on prolapsed

rectal mucosa

Case Classifications

- **Confirmed:** A case that is laboratory confirmed

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of trichuriasis. Investigations should include an interview of the case or a surrogate to get a detailed exposure and travel history. Please use the Trichuriasis Investigation Form available on the DSHS website:
http://www.dshs.texas.gov/eaidu/investigation/

Note:

- If an imported case (acquired outside of Texas) of Trichuriasis is diagnosed/identified in a refugee with a current Texas address, it should be investigated and counted as a Texas case. If a case currently has an address outside of your jurisdiction or the refugee plans to move to another state or country, fax the available investigation information, with the new address, to DSHS EAIDU. This information will be forwarded to the appropriate jurisdiction.
- Cases include Texans who acquired the disease while traveling out of the county.
- Disease may be acquired within Texas.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
- ☐ Interview the case to get detailed exposure history and risk factor information.
  - Use the **Trichuriasis Investigation Form** to record information from the interview.
  - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
  - If the case did not travel internationally during the previous two years (or during their lifetime if less than two years old) and may have been exposed to a within-jurisdiction soil environment hospitable to helminths, carry out an in-person investigation at the exposure site. If applicable, interview others exposed at the site such as household members about their exposure and travel histories. Arrange for specimen collection from other exposed individuals. Contact DSHS Central Office at the Emerging and Acute Infectious Disease Unit to arrange environmental sampling if warranted.
  - Provide education to the case or his/her surrogate about effective hand washing, food safety practices, and the possibility of transmission if soil is contaminated. See Prevention and Control Measures.
- ☐ Please upload a copy of the investigation form to NBS or if another surveillance system is used, send the form via secure file transfer protocol or email an encrypted copy of the investigation form to Central Office and the Regional Office.

- Make three attempts to contact a case on different days and at different times of day before classifying the case as lost to follow-up (LTF). If the case may have acquired the disease locally, call the case LTF after attempting to contact them in-person, when resources permit.
- For LTF cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and indicate the reason for any missing information.

☐ If case is part of an outbreak or cluster, see Managing Special Situations section.
☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water
- Proper disposal of human waste products such as feces is necessary to prevent contamination of soil.
- Avoid areas where human waste contamination of soil or water is likely.
- Thoroughly wash fruits and vegetables to remove soil/fertilizer residue.
- Thoroughly cook all fruits and vegetables that may have been in contact with soil produced from human and animal waste.
- Provide information about services for testing and treating exposed persons.

Exclusions

There is no human-to-human transmission of trichuriasis therefore no exclusion from work, school or daycare is required for disease control purposes unless the individual has diarrhea. If the individual has diarrhea, the standard exclusion until diarrhea free for 24 hours without the use of diarrhea suppressing medications applies. Diarrhea is defined as 3 or more episodes of loose stools in a 24-hour period.

MANAGING SPECIAL SITUATIONS

Outbreaks/Clusters

If an outbreak or cluster is suspected, notify the DSHS Emerging and Acute Infectious Disease Unit (EAIDU) at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, race/ethnicity, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and exposures, such as to a soil environment hospitable to helminths and where the exposure occurred (e.g., farm, ranch, domicile lacking adequate plumbing, recreational area, or another occupational site), possible zoonotic

transmission (e.g., exposure to pig manure), and the patient's travel history (e.g., travel location, duration, household members who traveled).

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Risks	Notes
1	NT	34	F	White/non - Hispanic	12/4/16	Diarrhea, Anemia	Travel to Vietnam, lives in same neighborhood as ID 2	Brother ill
2	PR	4	M	Unknown	11/30/16	Anemia, bloody stool	Poor sanitation near home, lives in same neighborhood as ID 1	Lost to follow up (LTF)

- If the outbreak was reported in association with an apparent common risk factor (e.g., work or live near a possible site of soil contamination, members of the same household with similar travel), recommend that anyone displaying symptoms seek medical attention from a healthcare provider.
- If several cases in the same family or geographic area are identified and there is a possibility for similar exposures (e.g., travel to the same country, poor sanitation), testing of potentially exposed persons or treatment may be warranted.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements

Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities

Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed** cases.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Please upload a copy of the investigation form to NBS or if another surveillance system is used, send the form via secure file transfer protocol, or email an encrypted copy of the investigation form to Central Office and the Regional Office.

When an outbreak is being investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office

or to EAIDU at **512- 776-7676.**

LABORATORY PROCEDURES

Fecal Ova and Parasite testing for helminth eggs (fecal O&P examination) is widely available from most private laboratories, and if needed, DSHS laboratory is available for specimen submission. Adult worm specimen identification may not be available at private laboratories therefore, submission to the DSHS laboratory is available and highly recommended. Contact an EAIDU epidemiologist to discuss further if needed.

Specimen Collection

- Submit a stool specimen in an O&P stool collection kit (5-10 % formalin & Zn-PVA fixatives).
    - Required volume: Stool 5 g solid or 5 mL liquid.
- Adult worms should be submitted in either 5-10% formalin or 70% ethanol.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name and date of birth or medical record number match exactly what is written on the transport tubes.
- Fill in the date of collection, date of onset, diagnosis/symptoms, and all required fields.

Specimen Shipping

- Transport temperature: May be shipped at ambient temperature.
- Ship specimens via overnight delivery.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947 Texas Department of State Health Services 1100 West 49th Street
Austin, TX 78756-3199
Attn. Walter Douglass (512) 776-7569

Possible Causes for Rejection:

- Specimen not in correct transport medium.
- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Unpreserved specimen received greater than 24 hours after collection. (Specimen may still be submitted as an attempt will be made to complete testing on compromised material.)
- Call Medical Parasitology Lab (512) 776-7560 with specific questions about specimen acceptance criteria.

REVISION HISTORY

March 2021

- Minor updates throughout

Typhoid Fever (Salmonella Typhi)

BASIC EPIDEMIOLOGY

Infectious Agent

Salmonella enterica serovar Typhi (*S*. Typhi) is the etiologic agent of typhoid fever.

Transmission

Transmission primarily occurs through ingestion of food or water contaminated with the stool and sometimes urine of a typhoid fever case or an asymptomatic carrier of the organism. It has been documented that typhoid fever has been transmitted sexually from an asymptomatic carrier. Most cases of typhoid fever are travel-related and involve an exposure that occurred in an endemic region (i.e., primarily Asia, Africa, and Latin America). Humans are the only known reservoir of *S*. Typhi.

Incubation Period

Typically, ranges from 8 to 14 days. However, incubation can range from 3 to 60 days.

Communicability

Humans are infectious as long as bacteria are shed in their stool and/or urine. Shedding in stool occurs throughout the course of infection, usually lasting several days to several weeks, with 2-5% of cases becoming chronic carriers capable of excreting the organism for many months. Urinary shedding is less common than fecal shedding. Antibiotic use during the acute illness can prolong the carrier state. Both treated and untreated patients may become chronic carriers of the organism. The most common population for chronic carriers are middle-aged women with a history of biliary duct abnormalities, such as gallstones.

Clinical Illness

Symptoms typically include sustained fever (may reach 103-104 °F), headache, and malaise. Most adults experience constipation, rather than diarrhea. Additional symptoms include anorexia, bradycardia, splenomegaly, non-productive cough, rose spots on the trunk, mental dullness, slight deafness, parotitis, or the development of Peyer patches in the ileum, which may ulcerate and result in intestinal hemorrhage or perforation in 3% of cases. Despite antimicrobial treatment, relapses causing milder illness can occur in 15-20% of cases.

Severity

The severity of Typhoid Fever is dependent on multiple factors; e.g., age, prior exposure (via illness or vaccination), number of organisms ingested, virulence of the strain ingested, duration of illness (including time until treatment is initiated). Cases with mental or neurological symptoms have been associated with higher mortality rates. Mortality rates range from 10%-20% without treatment to 1% with access to antimicrobials.

DEFINITIONS

Clinical Case Definition

An illness caused by *Salmonella* Typhi that is often characterized by insidious onset of sustained fever, headache, malaise, anorexia, relative bradycardia, constipation or diarrhea, and nonproductive cough. However, many mild and atypical infections occur. Carriage of *S*. Typhi can be prolonged.

Laboratory Confirmation

- Isolation of *S*. Typhi from blood, stool, or other clinical specimen.

Case Classifications

- **Confirmed:** A clinically compatible case that is laboratory confirmed.
- **Probable:** A clinically compatible case with *S.* Typhi detected by use of culture independent laboratory methods (non-culture based), **OR**
- A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: a case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of *Salmonella* Typhi. Investigations should include an interview of the case or a surrogate to get a detailed exposure history.
Please use the **CDC Typhoid and Paratyphoid Fever Surveillance Report** available on the DSHS website:
http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Contact laboratory to determine if an isolate has been sent to the DSHS laboratory. If an isolate has not been sent, please request a specimen be submitted.
  - Note: The submission of *S.* Typhi isolates is not required by state law, but it is critical for the detection and investigation of outbreaks.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
  - Use information from medical records to complete the CDC Typhoid and Paratyphoid Fever Surveillance Report.
- ☐ Interview the case to get travel history and other risk factor information.
  - Make special note of the case's travel history. If the case-patient does not report travel outside of the U.S., ask again about travel. If the answer is still negative, inquire about any visitors from a country where typhoid fever is endemic, especially any who might have stayed in the case-patient's household, prepared food, cared for, or had close contact with the case-patient. Ask about prior cases of typhoid fever among members

of the household, extended family, or friends. Ask about consumption of raw or undercooked shellfish or bivalves (oysters, scallops etc.) If no history of travel to an endemic country, exposure to an imported case or history of consumption of raw or undercooked seafood is identified, call an EAIDU epidemiologist immediately to discuss the case.
    - Make special note if the case is a food worker. Food workers who are diagnosed with typhoid fever are subject to work exclusion requirements. See Exclusions.
    - Use the **CDC Typhoid and Paratyphoid Fever Surveillance Report** to record information from the interview.
    - If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
    - Provide education to the case or his/her surrogate about effective hand washing and food safety practices. See Prevention and Control Measures.
- ☐ Fax completed forms to DSHS EAIDU at 512-776-7616 or email securely to an EAIDU epidemiologist at FOODBORNETEXAS@dshs.texas.gov.
    - An EAIDU foodborne epidemiologist will fax the form (de-identified) to the CDC.
    - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
    - For lost to follow-up (LTF) cases, please complete as much information as possible obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on the investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- ☐ Hospitalized cases should be followed until discharge and patient's outcome recorded on the:
    - Typhoid and Paratyphoid Fever Surveillance Report.
    - Initial reports can be sent to DSHS prior to discharge.
- ☐ In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU or emailed to FOODBORNETEXAS@dshs.texas.gov.
- ☐ If the case is part of an outbreak or cluster, see Managing Special Situations section.
- ☐ All confirmed case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- For those traveling to an endemic region:
    - Receive the Typhoid Fever immunization (1 to 2 weeks prior to travel, timeframe varies based on type of vaccine).
    - Only eat fresh raw fruit and vegetables that can be peeled, peel them yourself, don't eat the peels, and wash your hands before and after handling.
    - Avoid food and drinks sold from street vendors.
    - Avoid ice, frozen drinks, or other items made from an unknown water source.
    - Drink bottled water (or boil non-bottled water for >1min) and avoid

swallowing tap water while showering and brushing teeth.
    - Carbonated water is safer to drink than non-carbonated water.
- Practice routine hand washing with soap and warm water, especially:
    - Before preparing or after handling or eating any food.
    - After going to the bathroom.
    - After changing a diaper.
    - After caring for someone with diarrhea.
    - After handling raw food.
- Avoid consuming raw or undercooked shellfish and bivalves (oysters, scallops, mussels etc.), especially in endemic countries.
- Avoid consuming raw milk, unpasteurized dairy products, and undercooked eggs

Exclusions

School/child-care:
Children with *Salmonella* Typhi should be excluded from school/child-care until they are free from fever and diarrhea for 24 hours without the use of fever or diarrhea suppressing medications.
Children must have three consecutive negative stools before being allowed to return to school. The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics if antibiotics were given.

Food Employees:
Symptomatic food employees infected with *Salmonella* Typhi are to be excluded from work.
Food employees can be reinstated with approval from the Regulatory Authority and if the following condition is met:

- Medical documentation by a health practitioner stating that the food employee is free of infection from *Salmonella* Typhi.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks
If a *Salmonella* Typhi outbreak is suspected, immediately notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and

outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Travel to India
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional *Salmonella* Typhi cases.
- If isolates have not already been submitted to the DSHS laboratory for confirmation and whole genome sequencing (WGS), request hospital/clinical labs submit isolates for confirmation and WGS testing. See Laboratory Procedures.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on and adherence to hand hygiene
    - Storage and preparation of food
    - Procedures for changing diapers and toilet training
    - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, per the "Exclusions" portion of the Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing (WGS) clusters:

- For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- The local/regional health department with cases in their jurisdiction should:
    - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
        - Fax the completed questionnaire promptly within timeframe designated in cluster notification to DSHS EAIDU at **512-776-**

7616 or email securely to an EAIDU foodborne epidemiologist.
    - If the health department having jurisdiction of a case is unable to reach a case- patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
    - If an interview is unattainable or the case is lost to follow-up, fax/securely email medical records and any case information to DSHS EAIDU.
        - Please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.
- Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:
- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:
- Enter the case into NBS and submit an NBS notification on all **confirmed** and **probable** cases,
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed Typhoid and Paratyphoid Fever Surveillance Report to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist at FOODBORNETEXAS@dshs.texas.gov.

When an outbreak is investigated, local and regional health departments should:
- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**

- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
    - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
    - The following should be reported to NORS:
        - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.texas.gov
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:

Submission of *Salmonella* isolates for serotyping and whole genome sequence analysis (WGS) is available through the DSHS Laboratory and is highly encouraged but not required.

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Salmonella* Typhi. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.

All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday, or state holiday, unless special arrangements have been pre- arranged with an EAIDU foodborne epidemiologist or DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Specimen not in correct transport medium
- Transport media was expired

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Salmonella* Typhi is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from

facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian**

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

Table 1: Guide to Salmonellosis, Paratyphoid Fever, Typhoid Fever Reporting and Surveillance Forms

***Salmonella* serotype**	**Reported in NEDSS as**	**Surveillance Form**
Salmonella Typhi	Typhoid Fever	CDC Typhoid and Paratyphoid Fever Surveillance Report requested
Salmonella Paratyphi A, B*, or C	Salmonella Paratyphi	CDC Typhoid and Paratyphoid Fever Surveillance Report requested
all other *Salmonella* serotypes	Salmonella, non-Paratyphi/non-Typhi	no CDC or DSHS form requested unless part of outbreak investigation

**Salmonella* Paratyphi B var L(+) tartrate + (formerly var. Java) is associated with routine GI illness and is reported as Salmonellosis and no CDC or DSHS form is requested unless part of an outbreak investigation.

REVISION HISTORY

March 2021
- Updated Case Classifications under Definition section and lab information to replace PFGE with current WGS analysis.

Varicella

BASIC EPIDEMIOLOGY

Infectious Agent

Human (alpha) herpesvirus 3 (varicella-zoster virus, VZV) a member of the *Herpesvirus* group

Transmission

Direct contact with patient with varicella (chickenpox) or zoster (shingles); droplet or airborne spread of vesicle fluid (chickenpox and zoster) or secretions of the respiratory tract (chickenpox); indirectly by contaminated fomites. Scabs are not infectious.

Incubation Period

Usually 14-16 days (range 10-21 days). May be prolonged after receipt of Varicella-Zoster Immune Globulin (VariZIG) and in the immunodeficient.

Communicability

Communicable 5 days before rash onset (especially 1-2 days before rash onset) and for up to 5 days after onset of lesions (until crusting). Communicability may be prolonged in persons with altered immunity.

Clinical Illness

Varicella, the primary infection with VZV, is an acute, generalized disease that occurs most commonly in children and is characterized by a maculopapular rash (few hours), then vesicular rash (3-4 days), often accompanied by fever. Lesions are typically more abundant on trunk; but sometimes present on scalp, mucous membranes of mouth and upper respiratory tract. Lesions commonly occur in successive crops, with several stages of maturity present at the same time. Lesions are discrete, scattered and pruritic. Mild, atypical and unapparent infections also occur.

Vaccinated persons with varicella may not have fever and may only have a few lesions that may resemble bug bites. Successive crops of lesions are unusual in vaccinated individuals. "Breakthrough" varicella which can be seen in previously vaccinated persons more than 42 days after varicella vaccination, is usually a mild illness characterized by few lesions (<50), most of which are maculopapular or rather than vesicular.

Severity

Acute varicella infections are typically self-limiting and mild, particularly with vaccinated persons. Complications often require hospitalization and mostly occur in vulnerable populations, such as infants, adolescents, pregnant women, persons with conditions such as cancer or HIV/AIDS, person taking immunosuppressive medications or long-term steroids, and organ transplant recipients.

However, healthy adults can develop complications from infections in their unvaccinated children. Common complications include secondary bacterial infections from *Staphylococcus* or *Streptococcus* (primarily invasive group A), sepsis, and dehydration. Complications more frequent among infants and children include secondary bacterial pneumonia, encephalitis, and cerebellar

ataxia; whereas complications more frequent in adults include primary viral pneumonia, diffuse cerebral involvement, and hemorrhagic, multiple organ system involvement. These complications can lead to permanent disability or death; however, since the introduction of the varicella vaccine in 1996, hospitalizations due to varicella have decreased 93% and deaths 94%.

Varicella infections in special situations:

Varicella-like rash in vaccine recipients: A varicella-like rash in a recently vaccinated person may be caused by either wild- or vaccine-type virus. Approximately 4% of children receiving varicella vaccine develop a generalized rash with a median of 5 lesions, 5–26 days postvaccination, and 4% develop a localized rash at the injection site with a median of 2 lesions, 8–19 days postvaccination. The rash may be atypical in appearance (maculopapular with no vesicles).

Breakthrough disease: refers to a case of wild-type varicella infection occurring more than 42 days after vaccination. Such disease is usually mild with a shorter duration of illness, fewer constitutional symptoms, and fewer than 50 skin lesions. Breakthrough cases with fewer than 50 lesions have been found to be one-third as contagious as varicella in unvaccinated persons, but breakthrough cases with 50 or more lesions can be just as contagious as cases in unvaccinated persons. Though generally mild, about 25%–30% of breakthrough cases among 1-dose vaccinated children have clinical features more like those in unvaccinated children even though rare, severe presentations with visceral dissemination have been reported. Persons who received 2 doses of vaccine are less likely to have breakthrough disease than those who received 1 dose. Additionally, breakthrough varicella may be further attenuated among 2-dose vaccine recipients though the difference was not always statistically significant. No cases of breakthrough varicella with visceral dissemination have been reported.

Secondary transmission of vaccine virus refers to a varicella-like rash due to Oka-VZV (i.e., the vaccine-strain variant of VZV) occurring in a non-vaccinated contact of a person who received varicella vaccine. Secondary transmission can occur within 10–21 days after exposure either to a person recently vaccinated or to a person who develops herpes zoster due to vaccine-strain virus. It is extremely rare. All secondary transmissions occurred from vaccine recipients who developed at least a limited rash illness.

Varicella infections during pregnancy:
For pre- and postpartum women and potentially their newborns, onset of a maternal varicella infection between 5 days before to 2 days after delivery may result in a lethal infection in the neonate, as antibodies had less time to pass from mother to fetus, with a fatality ratio up to 30% if VariZIG is not given.

For pregnant women in the first 20 weeks of gestation, congenital VZV infection, while rare, is an infection in the fetus that can cause abnormalities in the neonate, such as hypoplasia of an extremity, skin scarring, localized muscular atrophy, encephalitis, cortical atrophy, chorioretinitis, microcephaly, and low birth weight. Additionally, children infected with VZV in utero may develop

herpes zoster early in life without any additional, external exposures.

DEFINITIONS

Clinical Case Definition

In the absence of a more likely alternative diagnosis, an illness with acute onset of a generalized rash with vesicles (maculopapulovesicular rash) OR without vesicles (maculopapular rash).

Epidemiologic Linkage Criteria for Diagnosis

- Confirmatory Epidemiologic Linkage Evidence:
  - Exposure to or contact with a laboratory-confirmed varicella case, **OR**
  - Linked to a varicella cluster or outbreak containing ≥1 laboratory-confirmed case, **OR**
  - Exposure to or contact with a person with herpes zoster (regardless of laboratory confirmation).
- Presumptive Epidemiologic Linkage Evidence:
  - Exposure to or contact with a probable varicella case that had a generalized rash with vesicles.

Laboratory Criteria for Diagnosis

- Confirmatory Laboratory Evidence:
  - Isolation of VZV from a clinical specimen, **OR**
  - Varicella antigen detected by direct fluorescent antibody (DFA), **OR**
  - Varicella-specific nucleic acid detected by polymerase chain reaction (PCR), **OR**
  - Significant rise in serum varicella immunoglobulin G (IgG) antibody level by any standard serologic assay.
- Supportive Laboratory Evidence:
  - Positive test for serum VZV immunoglobulin M (IgM) antibody

Case Classification

- **Confirmed**: A case that:
  - Meets clinical definition AND confirmatory laboratory evidence OR
  - Meets clinical definition with a generalized rash with vesicles AND confirmatory epidemiologic linkage evidence.
- **Probable**: A case that:
  - Meets clinical definition with a generalized rash with vesicles, **OR**
  - Meets clinical definition with a generalized rash without vesicles **AND**
    - Confirmatory or presumptive epidemiologic linkage evidence, OR
    - Supportive laboratory evidence,

  OR
  - Meets provider diagnosis of varicella or chickenpox but no rash description, AND
    - Confirmatory or presumptive epidemiologic linkage evidence, OR
    - Confirmatory or supportive laboratory evidence

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should investigate most laboratory reports of varicella. Confirmation of clinical case definition and ascertainment of vaccine history is needed for patients reported via lab result only. However, the following lab results do not require any follow up as they are almost always indicative of immunity or shingles:

- Any VZV lab result for people over 50 years of age.
- VZV IgG results for patients over 20 years of age.

Note:

- Any non-U.S. residents diagnosed with varicella in the state of Texas, regardless of citizenship or immigration status, should be submitted by the jurisdiction that is handling the investigation. If the exposure was outside of the jurisdiction, under "Disease Acquisition," the investigator should select "imported" and any additional information available. Appropriate control measures will still need to be implemented regardless of the case's origin.

Reports made via the varicella reporting form generally do not need investigation, unless the jurisdiction chooses to do so. **There are some exceptions,** however.

- Investigation into vaccination status should be done for any patients that are reported without vaccination history, especially for those that are school age.
- Outbreaks of varicella should be investigated.
- Hospitalized cases of varicella should be investigated.
    - Medical records for varicella hospitalizations should be faxed or emailed along with varicella investigation form.
- Deaths from varicella should be investigated**.**

Providing education to patients to prevent further spread of disease and encouraging timely vaccinations are also worthwhile activities. Discussing reporting requirements and exclusion criteria with healthcare providers, schools, and daycares is always encouraged.

Case Investigation Checklist

- ☐ Confirm that laboratory results meet the case definition.
- ☐ Confirm clinical case definition.
- ☐ Review medical records or speak to an infection preventionist or physician to verify case definition and vaccination status.
    - The Varicella (Chickenpox) Reporting Form can be used to record information collected during the investigation.
- ☐ Determine vaccination status of the case. Sources of vaccination status that should be checked include:
    - Case (or parent), ImmTrac, school nurse records, primary care provider, etc.
- ☐ Identify close contacts and ensure appropriate control measures are implemented (see control measures below).
- ☐ Ensure all suspected, probable, and confirmed cases follow airborne *and* contact precautions until all lesions are crusted over.
- ☐ In the event of an outbreak, the Varicella Outbreak Report Form must also be completed and submitted to EAIDU.

- ☐ In the event of a varicella hospitalization, copies of the medical record, physician notes, admission summary, H&P, and discharge diagnosis should be faxed or emailed to DSHS EAIDU.
- ☐ In the event of a death, copies of the hospital discharge summary, death certificate, and autopsy report should also be faxed to DSHS EAIDU.
  - The Varicella Death Investigation Form must also be completed and submitted to EAIDU.
- ☐ The Varicella (Chickenpox) Reporting Form generally does not need to be submitted to EAIDU, except in these circumstances:
  - Varicella outbreak
  - Hospitalization due to varicella
  - Varicella death
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Control Measures

- Isolate or exclude the case from the setting immediately.
- Identify close contacts and verify immunity.
  - Evidence of immunity to varicella includes:
    - Documentation of age-appropriate vaccination
    - Laboratory evidence of immunity
    - Born in the United States before 1980
      - Fort healthcare personnel, pregnant women, and immunocompromised persons, birth before 1980 should not be considered evidence of immunity; in such cases, the other criteria of evidence of immunity should be sought.
    - Diagnosis or verification of a history of varicella disease by a healthcare provider.
    - Diagnosis or verification of a history of herpes zoster by a healthcare provider.
- Identify high risk contacts:
  - Immunocompromised persons (including people with HIV or AIDS)
  - Cancer patients
  - Pregnant women
  - Neonates whose mothers are not immune
- Provide post-exposure vaccination as appropriate (see Prophylaxis Guidelines). A notification letter can be sent to those that may have been exposed to the case.
- Note: Contacts to a single case (not an outbreak) do not require exclusion, regardless of immunization status.

Prophylaxis Guidelines

- **Varicella Vaccine for Healthy Persons**
  - Varicella vaccine is recommended for post-exposure administration for unvaccinated persons, 12 months of age or older, without other evidence of immunity.
    - The varicella vaccine should be administered within five days after exposure in order to be most effective.
      - However, vaccination six or more days after exposure

is still recommended because it induces protection against subsequent exposures (Prevention of Varicella).

- Persons who have not received 2 doses should be brought up to date.
- VariZIG is not recommended for healthy, full-term infants who are exposed post-natally, even if their mothers have no history of varicella.
- Child-care facility setting:
  - Varicella vaccine (or history of prior disease) is required for all children (≥ 12 months of age) to enroll in any licensed child-care facility in Texas, and vaccine is recommended for all susceptible children (≥ 12 months of age).

- **VariZIG for Persons Who Have Contraindications to Vaccination:**
  - **Pregnant women—**
    - Women known to be pregnant or attempting to become pregnant should not receive a varicella-containing vaccine.
    - Evidence of varicella immunity should be obtained as soon as possible. If no varicella antibody is detectable, VariZIG should be strongly considered for pregnant women who have been exposed.
    - VariZIG should ideally be given with 96 hours but up to 10 days of exposure.
    - Administration of VariZIG to these women has not been found to prevent viremia, fetal infection, congenital varicella syndrome, or neonatal varicella.
    - The primary indication for VariZIG in pregnant women is to prevent complications of varicella in the pregnant mother rather than to protect the fetus. Susceptible pregnant women are at risk for associated complications when they contract varicella. Varicella causes severe maternal morbidity, and 10%-20% of infected women develop varicella pneumonia, with mortality reported as high as 40%. Their babies may also develop Congenital Varicella Syndrome, which may lead to severe complications, even death of the newborn.
  - **Immunocompromised patients—**
    - This category is comprised of persons who have primary and acquired immune-deficiency disorders, neoplastic diseases and those who are receiving immunosuppressive treatment. Most immunocompromised persons should not receive varicella vaccine.
    - Patients receiving monthly high-dose (≥ 400 mg/kg) Immune Globulin Intravenous (IGIV) are likely to be protected and probably do not require VariZIG if the most recent dose of IGIV was administered ≤ 3 weeks before exposure.
    - CDC recommends VariZIG to immunocompromised patients without evidence of immunity ideally be given with 96 hours but up to 10 days of exposure.
  - **Newborn infants:**
    - CDC recommends VariZIG to newborns infants whose mothers

develop chickenpox with 5 days before delivery up to 48 hours after delivery.

- **Premature neonates exposed post-natally:**
  - CDC recommends VariZIG to hospitalized premature infants born at greater or equal to 28 weeks of gestation, whose mothers do not have evidence of immunity to varicella.
  - VariZIG is also recommended for hospitalized premature infants born less than 28 weeks of gestation or who weigh ≤ 1,000g at birth, regardless of their mother's evidence of immunity to varicella.

- **Health-Care Personnel (HCP):**
  - Nosocomial transmission of varicella is well recognized. To prevent disease and nosocomial spread, vaccination is recommended routinely for all health care personnel without evidence of immunity and is the preferred method for preventing varicella in health-care settings. Preferably, HCP should be vaccinated when they begin employment. Routine testing for varicella immunity after 2 doses of vaccine is not recommended for the management of those fully vaccinated.
  - HCP who have received 2 doses of vaccine and who are exposed should be monitored daily during days 10-21 after exposure through the employee health program or by an infection control nurse to determine clinical status.
  - HCP who have received 1 dose of vaccine and who are exposed should receive the second dose with single-antigen varicella vaccine within 3-5 days after exposure.
  - Unvaccinated HCP who have no other evidence of immunity who are exposed to VZV are potentially infective from days 10-21 after exposure and should not have patient contact during this period. They should receive post-exposure vaccination as soon as possible.
- **Persons Who Should Not be Vaccinated**
  - **Persons Allergic to the Vaccine**
    - Persons with a severe allergic reaction to a vaccine component or following a prior dose of vaccine should not receive varicella vaccine.
  - **Persons with Acute Illness**
    - Vaccinations of persons with moderate or severe acute illness should be postponed until the condition has improved.

CDC Recommendations for VariZIG:

- The most recent guidelines for VariZIG can be found in the MMWR article on Updated Recommendations for Use of VariZIG – United States, 2013

  If VariZIG is indicated, it will need to be purchased by the provider. VariZIG can be ordered from FFF Enterprises (California), 800-843-7477 or online at www.fffenterprises.com. DSHS does not stock VariZIG.

Exclusion

- According to the Texas Administrative Code (TAC), cases in children in school and childcare settings shall be excluded until vesicles become dry OR, if lesions are not vesicular, until 24 hours have passed without new

lesions.

- Additionally, and only during outbreaks, the Centers for Disease Control and Prevention (CDC) encourages unimmunized individuals (regardless if a known contact to a case) or those who lack evidence of immunity from attending school from the start of a varicella outbreak through 21 days after rash onset of the last identified case.
- In Texas, 2 doses of a varicella vaccine are required for K-12th grades; therefore, for those with only one dose on record, the health department can choose to recommend excluding those individuals as well and recommend they receive the second dose from their healthcare provider.
- In the hospital, strict isolation is appropriate because of the risk of serious varicella complications in immunocompromised susceptible patients.

MANAGING SPECIAL SITUATIONS

Immigration and Customs Enforcement (ICE) Facilities

- Single cases in ICE facilities should be treated as any other singular case investigation.
- The ICE facility may lead the investigation; local and regional health departments should communicate with the facility about notifying all persons exposed and next steps, as able.
- Follow-up with cases after leaving ICE facilities can be difficult due to inaccurate information.
- Some ICE facility residents may have received one varicella-containing vaccine upon entry into the United States, as part of the immigration process; however, communication with the ICE facility may provide other information.

Outbreaks

- In general, the threshold for an outbreak investigation should be 3 or more cases related in location (e.g., school, church, etc.) within a 3-week period. In the presence of nosocomial varicella of known or suspected concurrent streptococcal infections, or among populations at high risk for complications (e.g., immunocompromised or susceptible adolescents or adults), the threshold for response should be 2 cases.
    - Three or more cases in a household does not meet the threshold for an outbreak. name in NBS. However, there should still be an appropriate investigation initiated.
- Notification of an outbreak in the affected setting or community is recommended.
- For outbreaks in school settings:
    - All parents should be sent a letter notifying them of the outbreak and includes recommendations on vaccination and exclusion.
    - If vaccinated is contraindicated or refused, refer to the Exclusion section.
    - One dose of the varicella vaccine has been used successfully for outbreak prevention and control in school settings. A second dose is now recommended for outbreak control.
    - During a preschool-aged children outbreak, a second dose of varicella vaccine is also recommended for children 1-4 years of age to assist with outbreak control.
    - Children who are vaccinated with a first or second dose during an outbreak may immediately return to school after vaccination.

    - Active identification of persons with immunocompromising conditions who do not have evidence of immunity to varicella is also recommended.
- For outbreaks in residential institutions and healthcare settings:
    - Residents and staff are at high risk for exposure. Risk of severe disease and complications may be higher among persons without evidence of immunity because of age or immune status.
    - Refer to Health Care Personnel (HCP) section above for vaccination guidelines.
    - Refer to Exclusion section above for managing cases and contacts in residents.
- Ask the VPD Team if letters are needed.

If an outbreak of varicella is suspected, notify the regional DSHS office or EAIDU at **(800) 252-8239 or (512) 776-7676**.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or to DSHS EAIDU at **(800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable**
  cases to DSHS within 30 days of receiving a report of confirmed case.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax, send a secure email, or mail a completed investigation form (ONLY if part of an outbreak, hospitalized, or death due to varicella) within 30 days of completing the investigation.
    - **In the event of a death, copies of the hospital discharge summary, death certificate, autopsy report and death investigation form should also be sent to DSHS EAIDU. Please notify EAIDU when the death is reported.**
    - Investigation forms may be faxed to **512-776-7616,** securely emailed to VPDTexas@dshs.texas.gov or mailed to:

      Infectious Disease Control Unit
      Texas Department of State Health Services
      Mail Code: 1960
      PO Box 149347
      Austin, TX 78714-9347

When an outbreak is investigated, local and regional health departments should:
Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at (800) 252-8239 or 512-776-7676.

LABORATORY PROCEDURES

Specimens associated with varicella cases are not routinely submitted to the DSHS laboratory in Austin. However, PCR (preferred) and viral testing (not preferred) are available through the DSHS laboratory. Serology testing is not currently available at DSHS. Before shipping specimens, be sure to notify DSHS EAIDU VPD staff at **(512) 776-7676.**

The CDC also does varicella PCR testing and providers can usually ship directly to CDC for varicella (unlike other diseases). Information about submitting to CDC can be found here: Specimen Collection for Varicella-Zoster Virus (VZV) Testing | Chickenpox (Varicella) | CDC

PCR Specimen Collection and Submission (preferred)

Specimen Collection

- The preferred specimens are scabs, vesicle fluids or skin scrapings.
- Specimens should be collected as close to onset date as possible and no later than 1 week from onset date.
- Do NOT use any media. Specimens should be submitted in a dry tube.
- Synthetic swabs should be used. Do not use cotton swabs for specimen collection. Instructions for how to collect different types of varicella specimens for PCR can be found here: http://www.cdc.gov/chickenpox/lab-testing/collecting-specimens.html

Submission Form

- Use Specimen Submission Form G-2V.
- Make sure the patient's name and date of birth/social security number match exactly what is written on the container.
- Mark the date of onset and date of collection. Write in VZV PCR as the test to be performed.

Specimen Shipping

- Specimens should be sent at ambient temperature.
- Specimens can be sent regular mail, but ensure they will not arrive on a weekend or holiday.

- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Specimen submitted on a preservative such as formalin or submitted in viral transport media.
- Missing two patient identifiers on tube
- Discrepancy between name on tube and name on form

Viral Isolation Specimen Collection and Submission (not preferred)
Specimen Collection

- The preferred specimens are vesicle fluids or skin scrapings.
- Specimens should be collected as close to onset date as possible and no later than 1 week from onset date.
- Place swab in 1-2 mL of viral transport media. Synthetic swabs should be used. Do not use cotton swabs for specimen collection.

Submission Form

- Use Specimen Submission Form G-2V.
- Make sure the patient's name and date of birth/social security number match exactly what is written on the container.
- Mark the laboratory test requested (viral isolation), date of onset, and date of collection. List the suspected virus or disease in the Virology section.

Specimen Shipping

- Maintain specimens at 2-8°C immediately after collection. Specimens not received at the lab within 12 hours of collection should be frozen at -70ºC. Specimens should be shipped on dry ice.
- DO NOT mail on a Friday unless special arrangements have been pre-arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Specimen submitted on a preservative such as formalin or submitted in viral transport media.

REVISION HISTORY

January 2021

- Updated the investigation checklist and reporting and data entry requirements section to match each other in regard to faxing varicella reporting forms and medical records
- Added a Severity section
- Updated Control Measures section
- Updated the Prophylaxis section
- Updated Exclusion recommendations
- Updated the Outbreaks section of Managing Special Situations
- Updated the outbreak requirements
- Updated the Causes for Rejection for specimen submission
- Updated flow chart

December 2022

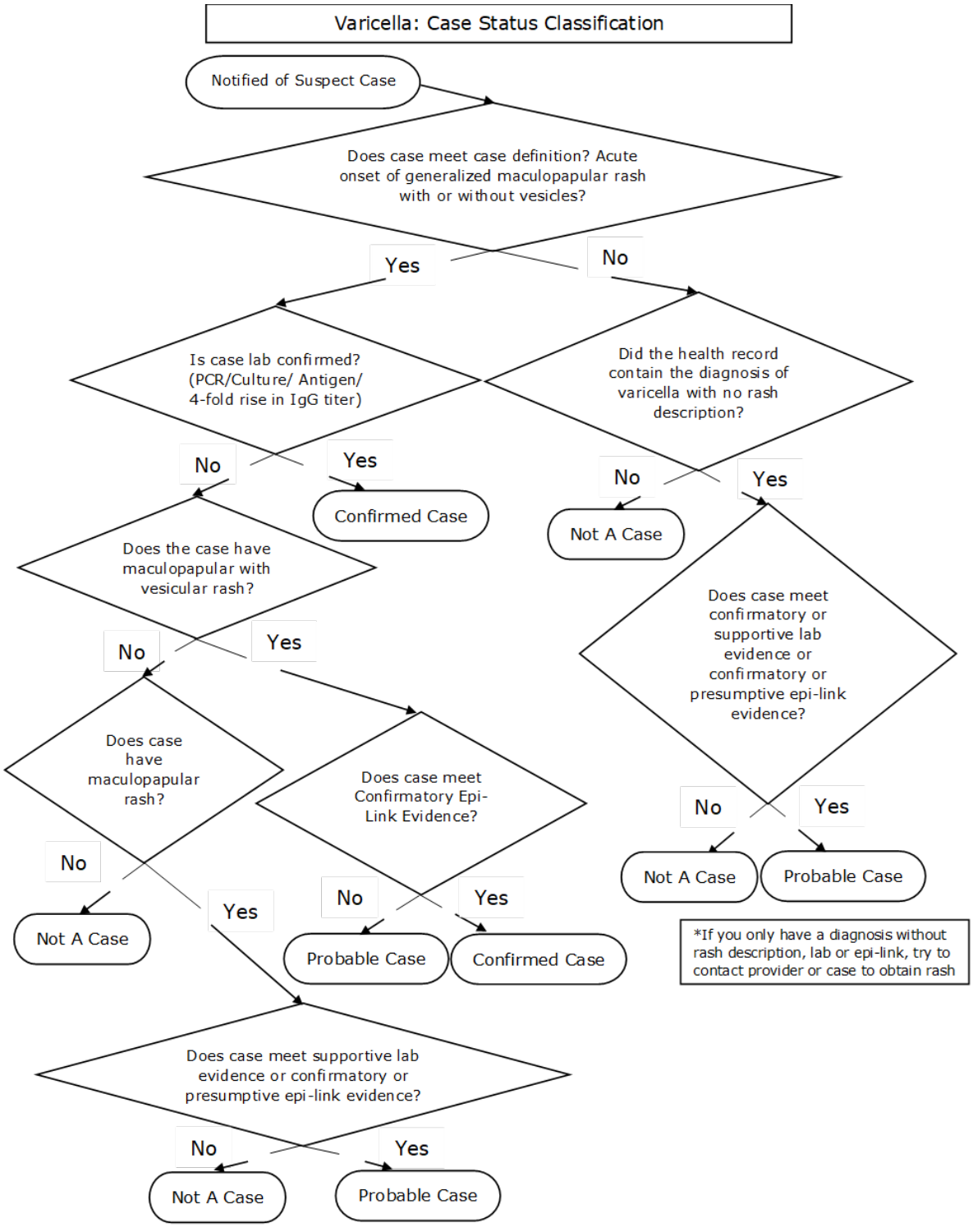
- Added Varicella Infections in Special Situations section

September 2024

- Updated case definition section to address shingles cases

- Updated case status definitions for epi-linked probable cases
- Updated Control Measures section for evidence of immunity to varicella regarding birth year and nationality
- Updated Prophylaxis Guidelines section for Varicella Vaccine for Healthy Persons with new timelines and vaccine considerations
- Updated Prophylaxis Guidelines section for the Pregnant women section of the VariZIG for Persons Who Have Contraindications to Vaccination.
- Updated varicella case status classification flowchart to align with case definition

FLOW CHART


Varicella: Case Status Classification
Notified of Suspect Case
Does case meet case definition? Acute onset of generalized maculopapular rash with or without vesicles?
Yes
No
Is case lab confirmed? (PCR/Culture/ Antigen/ 4-fold rise in IgG titer)
Did the health record contain the diagnosis of varicella with no rash description?
No
Yes
Confirmed Case
No
Yes
Not A Case
Does the case have maculopapular with vesicular rash?
Does case meet confirmatory or supportive lab evidence or confirmatory or presumptive epi-link evidence?
No
Yes
Does case have maculopapular rash?
Does case meet Confirmatory Epi-Link Evidence?
No
Yes
Not A Case
No
Yes
Probable Case
Confirmed Case
No
Yes
Not A Case
Probable Case
*If you only have a diagnosis without rash description, lab or epi-link, try to contact provider or case to obtain rash
Does case meet supportive lab evidence or confirmatory or presumptive epi-link evidence?
No
Yes
Not A Case
Probable Case

Vibrio Infections including Cholera

BASIC EPIDEMIOLOGY

Infectious Agent
Vibrio species, a Gram-negative, curve-shaped bacterium.

Transmission
Transmission occurs through the ingestion of food or water contaminated with feces, ingestion of raw/undercooked seafood, or exposure of wounds to contaminated water.

Incubation Period
- *V. cholerae* serogroups O1 and O139:
  - Usually 2 to 3 days (ranges from a few hours to 5 days)
- *V. cholerae* serogroups other than O1 and O139:
  - Usually 12 to 24 hours (range 5.5 to 96 hours)
- *V. parahaemolyticus*:
  - Usually 12 to 24 hours (range 4 to 96 hours)
- *V. vulnificus*:
  - Usually 12 to 72 hours

Communicability
There is no evidence of person-to-person transmission; fecal contamination of food or water is possible.

Clinical Illness
Symptoms and severity of illness may vary. Illness can range from: a mild ear infection (*V. alginolyticus*), gastrointestinal infections of varying severity (*V. parahaemolyticus* and other species), life- threatening invasive disease (*V. vulnificus*), and profuse watery diarrhea (cholera toxin-producing strains of *V. cholerae*).

DEFINITIONS

Note: There are 2 different categories of vibriosis used in NEDSS: Cholera (toxin-producing only), and Vibriosis (non-cholera Vibrio species infection).

CHOLERA (toxigenic *Vibrio cholerae* O1 or O139)

Clinical Case Definition
An illness characterized by diarrhea and/or vomiting; severity is variable.

Laboratory Confirmation
- Isolation of toxigenic (i.e., cholera toxin-producing) *Vibrio cholerae* O1 or O139 from stool or vomitus
- Serologic evidence of recent infection (of cholera)

Case Classifications
- **Confirmed:** A clinically compatible illness that is laboratory confirmed

Note: Illnesses caused by strains of ***V. cholerae*** other than toxigenic ***V. cholerae*** O1 or O139 should not be reported as cases of cholera.

VIBRIOSIS (non-cholera Vibrio species infections)

Clinical Case Definition

An intestinal disorder characterized by watery diarrhea and abdominal cramps in most cases, and sometimes with nausea, vomiting, fever, headache, and wound infection. Occasionally, a dysentery-like illness is observed with bloody or mucoid stools, high fever and high WBC count. Typically, it is a disease of moderate severity lasting 1-7 days; systemic infection and death rarely occur. Infection with *Vibrio vulnificus* produces septicemia in persons with chronic liver disease, chronic alcoholism or hemochromatosis, or those who are immunosuppressed. The disease appears 12 hours to 3 days after eating raw or undercooked seafood, especially oysters. One third of patients are in shock when they present for care or develop hypotension within 12 hours after hospital admission. Three quarters of patients have distinctive bullous skin lesions; thrombocytopenia is common and there is often evidence of disseminated intravascular coagulation. *V. vulnificus* can also infect wounds sustained in coastal or estuarine waters; wounds range from mild, self-limited lesions to rapidly progressive cellulitis and myositis that can mimic clostridial myonecrosis in the rapidity of spread and destructiveness. Asymptomatic infections can occur, and the organism can cause extraintestinal infections.

Laboratory Confirmation

- Isolation of a species of the family *Vibrionaceae* (other than toxigenic *Vibrio cholerae* O1 and O139) from a clinical specimen
    - Genera in the family *Vibrionaceae* currently include *Aliivibrio, Allomonas, Catenococcus, Enterovibrio, Grimontia, Listonella, Photobacterium, Salinivibrio*, and *Vibrio*.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis
- **Probable:**
    - A case with a species of the family *Vibrionaceae* (other than toxigenic *Vibrio cholerae* O1 or O139) detected, in a clinical specimen, by use of culture independent laboratory methods (non-culture based),
      OR
    - A clinically compatible case that is epidemiologically linked to a case that meets the probable or confirmed laboratory criteria for diagnosis

Note: A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species

Note: as required by TAC all *Vibrio* species isolates must be submitted to the DSHS laboratory.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should promptly investigate all reports of *Vibrio* infections. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Please use the **Cholera and Other *Vibrio* Illnesses Surveillance (COVIS) Report** form. The form is available on the DSHS website http://www.dshs.state.tx.us/eaidu/investigation/.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Verify that the laboratory has forwarded the isolate to the DSHS laboratory, as required. If an isolate has not been sent, please request a specimen be submitted.
    - Note: *Vibrio* bacteria are difficult to speciate, and it is not uncommon for the DSHS laboratory to identify a different species from an isolate than a hospital laboratory. EAIDU consider speciation conducted by the DSHS laboratory to be definitive.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition, identify possible risk factors and describe course of illness.
    - Use information from medical records to complete the Clinical Information section of the COVIS form.
- ☐ Interview the case to identify potential sources of infection and risk factor information.
    - Use the **Cholera and Other *Vibrio* Illnesses Surveillance (COVIS) Report** form to record information from the interview.
    - Provide education on effective hand washing, food safety, and the risk of consuming raw/undercooked shellfish. See Prevention and Control Measures.
- ☐ If the case consumed any raw oysters during his/her incubation period, contact any restaurants or points of service where the case reported consuming this food item.
    - Obtain, or have a sanitarian obtain, oyster tags from all restaurants or points of service for the dates appropriate for the case's consumption dates.
    - If the restaurant is out of your jurisdiction, please contact an EAIDU foodborne epidemiologist and they will request oyster tags from the health department with jurisdiction.
    - Complete Section IV: Seafood Investigation Section of the COVIS form
- ☐ Fax or email securely the COVIS form and if applicable, copies of the oyster tag (both sides) information to the EAIDU foodborne epidemiology team at 512-776-7616 or FOODBORNETEXAS@dshs.texas.gov.
    - A member of the EAIDU foodborne team will fax this information to the DSHS Seafood Safety office and the regional office of the FDA for follow-up.
    - An EAIDU foodborne epidemiologist will fax the form (deidentified) to the CDC.
    - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.

- For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.

☐ Hospitalized cases should be followed until discharge and patient's outcome recorded on the COVIS form.
- Initial reports can be sent to DSHS prior to discharge.

☐ In the event of a death, copies of the hospital discharge or death summary should also be faxed to DSHS EAIDU.

☐ If case is part of an outbreak or cluster, see Managing Special Situations section.

☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Do not eat raw oysters or other raw shellfish, particularly if you are immunocompromised or have chronic liver disease.
- Cook shellfish (oysters, clams, mussels) thoroughly. Do not eat shellfish that do not open during cooking.
  - For shellfish in the shell either:
    - boil until the shells open and continue boiling for five more minutes, or
    - steam until the shells open and continue cooking for nine minutes;
  - For shucked oysters, boil for at least three minutes or fry them in oil for at least 10 minutes at 350°F degrees.
- Avoid cross-contamination between cooked seafood and other foods with raw seafood and their juices.
- Eat shellfish promptly after cooking and immediately refrigerate leftovers.
  - Eat refrigerated left-over cooked shellfish within 2 days.
- Wear protective clothing (e.g., gloves) when handling raw shellfish.
- Avoid exposure of open wounds or broken skin to warm salt or brackish water, or to raw shellfish harvested from such waters.
- When traveling internationally to areas with poor sanitary conditions:
  - Drink bottled water or water that has been boiled for at least 1 minute.
  - Don't drink fountain drinks or drinks with ice.
  - Don't eat fruits or vegetables that you don't peel yourself.
  - Avoid uncooked foods.
- Routine hand washing with soap and warm water, especially:
  - Before preparing, handling or eating any food.
  - After going to the bathroom.
  - After changing a diaper.
  - After caring for someone with diarrhea.

Exclusions

School/child-care: No exclusions are specified for *Vibrio* infections but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea

suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for *Vibrio* infections but the standard exclusion for vomiting or diarrhea applies:
- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
  - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
  - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(512) 776-7676**.

The local/regional health department should:
- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional vibriosis cases.
- If isolates have not already been submitted to the DSHS laboratory for confirmation and Whole Genome Sequencing (WGS), request

hospital/clinical labs submit isolates for confirmation and WGS analysis. See Laboratory Procedures.

- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on and adherence to hand hygiene.
    - Storage and preparation of food.
    - Procedures for changing diapers and toilet training.
    - Procedures for environmental cleaning.
- If shellfish is identified as a possible source of infection, determine the source of shellfish and how the shellfish were handled prior to consumption.
    - Obtain, or have a sanitarian obtain, oyster tags from all points of service for the appropriate time frame.
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, if they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Whole Genome Sequencing clusters:

- For clusters of cases with indistinguishable WGS patterns detected by CDC/PulseNet and/or the DSHS laboratory, a member of the DSHS EAIDU foodborne team will notify appropriate DSHS regional epidemiologists, usually by email, who will then notify appropriate local health departments of cases within their jurisdiction.
- Local/regional health departments with cases in their jurisdiction should:
    - Interview the case patient, even if they have already been interviewed as part of a routine disease investigation, using the cluster specific questionnaire attached in the email notification.
        - Fax the completed questionnaire promptly within timeframe designated in cluster notification to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist.
    - If the health department having jurisdiction of a case is unable to reach a case- patient after 3 attempts during normal working hours, and they are not able to call after hours, please call the DSHS regional office or DSHS EAIDU to discuss further.
    - If an interview is unattainable or the case is lost to follow-up, fax medical records and any case information to DSHS EAIDU.
- Local/regional health department with cases will be notified by the EAIDU foodborne team of any CDC or DSHS conference calls and may participate, if able.

Note:

- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.

- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 work day** to the local or regional health department or DSHS EAIDU at **(512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases to DSHS.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if laboratory results were reported within 30 days of a previously reported infection in the same individual, unless additional information is available indicating a separate infection, e.g., different species. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- Fax completed COVIS forms to DSHS EAIDU at **512-776-7616** or email securely to an EAIDU foodborne epidemiologist at FOODBORNETEXAS@dshs.texas.gov.
  - An EAIDU foodborne epidemiologist will fax the form (de-identified) to the CDC.
  - Please note that the CDC measures the proportion of interviews reported to CDC within 7 days of interview date, so please send the form as soon as possible.
  - For lost to follow-up (LTF) cases, please complete as much information obtained from medical/laboratory records (e.g., demographics, symptomology, onset date, etc.) on investigation form and fax/email securely to DSHS EAIDU noting case is LTF.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Outbreaks as indicated above with patients in the same

household.
    - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
    - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/
- To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
    - Please put in Subject Line: NORS User Account Request
    - Information needed from requestor: name, email address, and agency name
    - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

CLINICAL SPECIMENS:
All *Vibrio* species isolates must be submitted to the DSHS laboratory.

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Vibrio* species. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection
- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	**Transport time to lab from time of collection**	**Transport temperature**
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.
** For suspected *Vibrio* species submit at room temperature.

Submission Form

- Use DSHS Laboratory G-2B form for specimen submission.
- Make sure the patient's name, date of birth and/or other identifier match exactly what is written on the transport tubes and on the G-2B form.
- Fill in the date of collection and select the appropriate test.
- If submitting as part of an outbreak investigation, check "Outbreak association" and write in name of outbreak.
- Payor source:
    - Check "IDEAS" to avoid bill for submitter

Specimen Shipping

- Ship specimens via overnight delivery.
- DO NOT mail on Friday, or state holidays unless special arrangements have been pre- arranged with DSHS Laboratory.
- Ship specimens to:

Laboratory Services Section, MC-1947
Texas Department of State Health
Services Attn. Walter Douglass (512)
776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Specimen not in correct transport medium
- Transport media was expired

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Vibrio cholera, Vibrio parahaemolyticus* and *Vibrio vulnificus* is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian.**

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

March 2021

- Minor edits

January 2022

- Entire section

Viral Hemorrhagic Fever (non-Ebola)

BASIC EPIDEMIOLOGY

Infectious Agent

There are multiple types of viral hemorrhagic fever (VHF), including Ebola, Crimean-Congo, Lassa, Lujo, Marburg, and New World Arenaviruses: Chapare, Guanarito, Junin, Machupo, and Sabia. This chapter will cover VHFs in general but will NOT cover VHFs caused by Ebola (see Ebola chapter), Yellow Fever, Dengue or Hantavirus. There are four families of viruses that cause VHFs: arenaviruses, bunyaviruses, filoviruses, and flaviviruses. Even though most viruses in these families cause different VHFs, they also cause other diseases that are not hemorrhagic in nature.

Transmission

Transmission of VHFs are specific to each disease. Most are zoonotic illnesses, spread by contact with infected animals (e.g., rats) or animal vectors (e.g., mosquitos). Human to human transmission is possible, however, usually through direct contact (through a mucous membrane or non-intact skin) with the body fluids of an infected individual.

Incubation Period

Variable. See: Viral Hemorrhagic Fever Incubation Period for more specific information.

Communicability

Variable. Unknown for some diseases. See Viral Hemorrhagic Fever Communicability for more specific information.

Clinical Illness

Variable. See Viral Hemorrhagic Fever Clinical Illness for more specific information.

DEFINITIONS

The following case definition applies to Crimean-Congo Hemorrhagic Fever virus, Lassa virus, Lujo virus, Marburg virus, and New World Arenaviruses: Chapare virus, Guanarito virus, Junin virus, Machupo virus, and Sabia virus.

Clinical Case Definition

An illness with acute onset with the following clinical findings:

- A fever **AND**
- One or more of the following clinical findings:
    - Severe headache
    - Muscle pain
    - Erythematous maculopapular rash on the trunk with fine desquamation 3–4 days after rash onset
    - Vomiting
    - Diarrhea
    - Abdominal pain
    - Bleeding not related to injury
    - Thrombocytopenia
    - Pharyngitis (arenavirus only)

- Retrosternal chest pain (arenavirus only)
- Proteinuria (arenavirus only)

Laboratory Confirmation

- Detection of VHF* viral antigens in blood by enzyme-linked immunosorbent assay (ELISA) antigen detection, **OR**
- Isolation of VHF virus in cell culture from blood or tissues, **OR**
- Detection of VHF specific genetic sequence by Reverse Transcription Polymerase Chain Reaction (RT-PCR) from blood or tissues, **OR**
- Detection of VHF viral antigen in tissues by IHC

*Viral hemorrhagic fever (VHF) agents include:

- Crimean-Congo hemorrhagic fever viruses
- Ebola virus (see Ebola case definition)
- Lassa virus
- Lujo virus
- Marburg virus
- New world arenaviruses (Chapare, Guanarito, Machupo, Junin, Sabia viruses)

Case Classifications

- **Confirmed**: A person that meets laboratory criteria
- Suspect: A person that meets clinical criteria **AND** meets one or more of the following exposures within 21-days before onset of symptoms:
  - Contact with blood or other body fluids of a patient with VHF, **OR**
  - Residence in - or travel to - a VHF endemic area or area with active transmission, **OR**
  - Work in a laboratory that handles VHF specimens, **OR**
  - Work in a laboratory that handles, or contact with primates, bats, or rodents infected with VHF or from an endemic area or area of active transmission, **OR**
  - Sexual exposure to semen of a confirmed acute or clinically recovered case of VHF, or breast- milk of an individual who had VHF.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments should IMMEDIATELY investigate all reports of viral hemorrhagic fever. Investigations should include an interview of the case or a surrogate to get a detailed exposure history. Initial investigation of a VHF can be conducted in alignment with the recommendations for investigating a suspected case of Ebola (see Ebola Virus Disease guidelines)."

The likelihood of a VHF diagnosis depends on the epidemiology of that disease. Cases of VHF will most likely be imported from a country with endemic VHFs or outbreaks of VHFs. Exposures in laboratories may also occur in the US but are rare.

Case Investigation Checklist

- ☐ Isolate patient in a single patient room containing a private bathroom with the door closed.
- ☐ Implement standard, contact, and droplet precautions.
- ☐ Assess exposure history (see bullets in Suspect under Case Classification).

- ☐ Contact EAIDU for consultation on symptoms, epidemiologic risk factors, and preliminary lab findings to consider lab testing for VHF viruses. EAIDU will coordinate the required consultation with CDC for testing approval.
- ☐ Identify contacts for monitoring

Exclusion
Patients with VHF will not be released from isolation until they are no longer considered infectious. A PUI may be released from isolation, in certain circumstances, after consultation with public health.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed or clinically suspected cases of viral hemorrhagic fever are required to be reported **immediately** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) **at (800) 252-8239 or (512) 776-7676.**

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Call DSHS EAIDU immediately when a VHF investigation is being conducted or considered.
- Enter the case into NBS and submit an NBS notification on all **confirmed** and **suspect** cases who are laboratory tested for VHF.
    - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
    - A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.

LABORATORY PROCEDURES

Testing for VHF will most likely need to be done at the CDC. Approval from CDC is required BEFORE submitting specimens for testing. Contact EAIDU to arrange for testing.

Specimen collection and submission information will be provided based on the individual case presentation.

REVISION HISTORY

December 2021

- Edits to Basic Epidemiology and Definitions

March 2021

- Minor edits throughout

VISA/VRSA

BASIC EPIDEMIOLOGY

Infectious Agent

Vancomycin Intermediate *Staphylococcus aureus* (VISA) and Vancomycin Resistant *Staphylococcus aureus*
(VRSA) are *Staphylococcus aureus* that have reduced susceptibility to the antibiotic vancomycin**.** These *Staphylococcus aureus (S. aureus)* bacteria are classified as VISA or VRSA based on laboratory tests of the minimum inhibitory concentration (MIC) of the antibiotic resistance. VISA and VRSA differ in the amount of resistance they possess to vancomycin.

S. aureus can infect or colonize any site of the body but it is one of the most common causes of skin infections in the United States. These skin infections can look like pimples, boils, or other skin conditions and most are able to be treated. In rare circumstances, the *S.aureus* bacteria can cause serious infections and even be fatal. Serious *S. aureus* infections are usually treated with vancomycin, thus infections with VISA and VRSA are usually more difficult to treat. However, as of October 2010, all VISA and VRSA isolates have been susceptible to other Food and Drug Administration (FDA)-approved drugs.

Although anyone can be susceptible to VISA and VRSA, individuals that are infected or colonized with VISA/VRSA are more likely to have several underlying health conditions (such as diabetes and kidney disease), previous infections with Methicillin-Resistant *Staphylococcus aureus* (MRSA), medical devices (such as intravenous [IV] catheters, ventilators, etc.), recent hospitalizations, or recent exposure to vancomycin or other antimicrobial agents.

Transmission

Transmission of this organism can occur via direct person-to-person contact or secondary contact with contaminated environmental surfaces, medical devices, or equipment. Additionally, the hands of healthcare workers who frequently touch these objects in patient care environments often become vectors of transmission. Adherence to standard precautions, including hand hygiene, and transmission-based precautions can reduce the risk of transmission.

Incubation Period

There is no set incubation period for exposure-to-illness onset.

Communicability

The period of communicability is unknown and may be as long as the organism is present in the individual.

Clinical Illness

VISA/VRSA can cause infections in any body site. Types of infections include: bloodstream infections, ventilator-associated pneumonia, intra-abdominal abscesses, osteomyelitis (bone infection), and endocarditis (infection of the heart valves). Symptoms associated with VISA and VRSA infections generally vary based on the site that is infected (e.g., cough if in the lungs, urinary symptoms if in the bladder) but can also include general symptoms like fever or chills.

Severity
A confirmed VRSA case has not yet been identified in Texas. Per CDC, as of 2022, there have been 146 VRSA cases reported in the USA since 2002. Thus, identification of a VRSA is extremely rare and should be treated as a highly unusual event.

DEFINITIONS

Clinical Case Definition
When identified in a clinical culture, VISA and/or VRSA can represent an infection or a colonization. There is no set clinical case definition for *S. aureus* as it can cause many different types of symptoms.

Laboratory Confirmation

VISA

- **Confirmed:**
  - Isolation of *S. aureus* from any body site.
    AND
  - Intermediate-level resistance (MIC: 4-8 µg/ml) of the *S. aureus* isolate to vancomycin, detected and defined according to Clinical and Laboratory Standards Institute (CLSI) approved standards and recommendations.
    AND
  - Confirmed by the DSHS Laboratory

VRSA

- **Confirmed:**
  - Isolation of *S. aureus* from any body site.
    AND
  - High-level resistance of the *S. aureus* isolate to vancomycin (MIC: ≥16µg/ml), detected and defined according to CLSI approved standards and recommendations.
    AND
  - Confirmed by the DSHS Laboratory.

Case Classification

Vancomycin Intermediate *Staphylococcus aureus* (VISA):

- A vancomycin- intermediate *Staphylococcus aureus* from any body site that is laboratory confirmed. (MIC: 4-8 µg/ml)

Note: The DSHS Laboratory uses the Etest for confirmation of resistance. Etest generates MIC values from a continuous scale and can give results in-between conventional two-fold dilutions. According to manufacturer's protocol, a value which falls between standard two-fold dilutions is rounded up to the next upper two-fold value before categorization so that a MIC of 3µg/ml is reported as intermediate resistance.

Vancomycin Resistant *Staphylococcus aureus* (VRSA):

- A vancomycin-resistant *S. aureus* from any body site that is laboratory confirmed. (MIC: ≥ 16 µg/ml).

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

Local and regional health departments will address all reports of VISA/VRSA immediately. The jurisdiction where the healthcare facility is located conducts the investigation and ensures control measures are promptly taken. The investigation steps below describe the public health activities to be completed when a suspected or confirmed VISA/VRSA case is reported. Investigations and control measures are required for infection or colonization by VISA/VRSA.

Case Investigation Checklist

- ☐ The jurisdiction that conducts the investigation is according to the location where the patient tested positive for VISA/VRSA. (ex: patient tested positive for VISA and is in a hospital in jurisdiction A but the patient resides in jurisdiction B, jurisdiction A would conduct the investigation).
- ☐ Review susceptibility report to confirm that the laboratory results meet the initial case definition
    - If it is unclear, call a DSHS HAI Epidemiologist for assistance.
- ☐ Immediately ensure contact precautions and additional control measures have been implemented if the patient is still receiving care in any healthcare setting (see "control measures" section below).
- ☐ Immediately notify a DSHS HAI Epidemiologist by phone.
- ☐ Immediately verify that the healthcare facility laboratory has sent the VISA/VRSA isolate to the DSHS Laboratory for confirmation testing (see laboratory procedures below).
- ☐ Review the medical records. If needed, speak to an Infection Preventionist (IP) at the healthcare facility to verify demographics, symptoms, and course of illness.
- ☐ Verify that the treating physician has been made aware of these susceptibility results.
- ☐ If the patient has been discharged from the reporting healthcare facility and the receiving healthcare facility is known, the investigator ensures that the receiving healthcare facility is informed of the VISA/VRSA case and ensures contact precautions and additional control measures are in place.
- ☐ Refer to the VISA/VRSA Investigation form for additional questions to address.
    - The VISA/VRSA Investigation form is available on the DSHS Website: http://www.dshs.texas.gov/eaidu/investigation/
- ☐ All confirmed cases of VISA/VRSA require the investigation form to be completed.
- ☐ Enter all case investigations and submit a notification in NBS within 30 days of the initial report.
    - The jurisdiction that conducted the investigation enters the case in NBS.
    - The jurisdiction entered in NBS is the jurisdiction who conducted the investigation and not the jurisdiction of residency.
    - The jurisdiction that is entering the case should add a note to DSHS central office as described in the NBS Data Entry Guide to request jurisdiction change upon case approval. Once the case is reviewed and approved, the approver will update the jurisdiction to the jurisdiction of residency for aggregate reporting purposes.

NOTE: If a case is multi-jurisdictional, it is the responsibility of the investigator

to notify other jurisdictions of the case.

Prevention and Control Measures

To prevent the spread of VISA/VRSA in a healthcare facility, it is imperative that control measures are implemented. The investigator should communicate with the IP or the person responsible for the infection control program to ensure control measures are in place.

Control Measures

Note: Not all control measures may be necessary for all cases. If you need assistance in determining which control measures are needed, call a DSHS HAI Epidemiologist.

- Facilities are responsible for ensuring that healthcare personnel perform hand hygiene - use alcohol-based hand rub or wash hand with soap and water before and after contact with patient or their environment.
- Ensure the patient is on contact precautions. Contact precautions include but are not limited to:
    - Donning (putting on) gown and gloves either before or upon immediate entry into the patient's room; (note some facilities might require more PPE).
    - Doffing (removing) gown, gloves and any other PPE before exiting or immediately upon exiting the patient's room.
    - No recommendation currently exists for when to discontinue contact precautions. A facility should consult with an infectious disease physician, the IP, or the other provider that initiated the precautions. The facility may also call a DSHS HAI Epidemiologist for assistance.
- Ensure the facility is using disposable noncritical patient-care equipment (e.g., blood pressure cuffs) or implement patient-dedicated use of such equipment. If common use of equipment for multiple patients is unavoidable, clean and disinfect such equipment with an EPA approved disinfection before use on another patient.
- Recommend single occupancy rooms if available.
    - If single rooms are not feasible, recommend cohorting like patients (e.g., a patient with VISA and another patient with VISA).
- Recommend staff cohorting if possible.
- Recommend reducing the use of invasive medical devices for patients on the unit where the case was cared for, as invasive devices increase patient's risk of infection.
- Increase the frequency of cleaning of high touch areas.
- Provide education on VISA/VRSA as needed, with specific emphasis on contact precaution and the above control measures.
    - If additional help is needed regarding providing education, contact a DSHS HAI Epidemiologist (education could be provided to the patient, family members, visitors and/or facility's staff).
- Specifically, for VRSA cases: during the investigation there might be a need to identify other contacts to the VRSA patient. See the CDC's: "Investigation and Control of Vancomycin-Resistant Staphylococcus aureus". Work with a DSHS HAI Epidemiologist.

Treatment
Each case will have a unique treatment option. It is recommended that the reporting facility collaborate with a clinical pharmacist, an infectious disease physician, and/or an antibiotic stewardship resource for an individualized treatment plan.

Exclusions
Students (K-12) and daycare age children with VISA/VRSA wound infection need to be excluded from attendance until drainage from wounds or skin and soft tissue infections is contained and maintained in a clean dry bandage; restrict from situations that could result in the infected area becoming exposed, wet, soiled, or otherwise compromised. No other exclusions apply.

MANAGING SPECIAL SITUATIONS

Outbreaks
If an outbreak is suspected, immediately notify a DSHS HAI Epidemiologist. The DSHS HAI Epidemiologist will notify central office and work with central office as needed.

Outbreak Definition
At this time there is no defined criteria for an outbreak of VISA. If your health department believes they have detected an outbreak, it is recommended to speak with the DSHS HAI Epidemiologist.

One case of VRSA would be considered an outbreak and should be reported immediately by phone to the DSHS HAI Epidemiologist.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School and Child-care Facilities, and General Public Reporting Requirements Cases of VISA and VRSA should be reported **immediately** to the local or regional health department. If the health department jurisdiction is unclear or you do not have the contact information, search the health department in the DSHS list of Texas local public health organizations: https://www.dshs.texas.gov/regional-local-health-operations/public-health-regions/texas-local-public-health.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Immediately investigate any suspect or confirmed cases.
- Immediately notify a DSHS HAI Epidemiologist by phone. All cases of VISA/VRSA should be reported by the DSHS HAI Epidemiologist to central office.
- Ensure control measures are in place and provide education to prevent further transmission
  (see "Control Measures" section located above in this document).
- Complete the VRSA/VISA Case Report Form, enter the case into NBS and create the NBS notification to DSHS on all confirmed cases of VISA/VRSA (DSHS Laboratory must provide confirmatory testing) within 30 days of initial report.
    - Please refer to the NBS Data Entry Guide for specific details on how to properly complete an NBS investigation and submit a NBS

notification.
- When a cluster or an outbreak is investigated, local and regional health departments should: Report suspected outbreaks within 24 hours of identification to a DSHS HAI Epidemiologist.
    - If a case is part of an outbreak, a NEDSS outbreak name must be requested through the NEDSS office by going to the NEDSS Help button on the NEDSS home screen and completing the form.

DISEASE REPORTING

Purpose of Reporting and Surveillance
- To improve the detection, monitoring and epidemiological characterization of VISA/VRSA in Texas.
- To prevent the transmission of VISA/VRSA in healthcare facilities by ensuring implementation of contact precautions and control measures.
- To conduct investigations and support epidemiological studies to identify outbreaks and potential sources of ongoing transmission of VISA/VRSA in the community.

Requested Reporting
- VISA/VRSA is **immediately reportable** to the local health department**.**

LABORATORY PROCEDURES

As required by the Texas Administrative Code (TAC), all *S. aureus* isolates with a vancomycin MIC greater than 2 µg/ml must be submitted to the DSHS Laboratory (the laboratory can be reached at 512-776-7318)

The DSHS Laboratory uses the E-test for confirmation of resistance. E-test generates MIC values from a continuous scale and can give results in-between conventional twofold dilutions. According to manufacturer's protocol, a value which falls between standard two-fold dilutions is rounded up to the next upper two-fold value before categorization so that a MIC of 3µg/ml is reported as intermediate resistance. These protocols are also in accordance with CLIA defined protocols.
If you are suspecting a possible outbreak situation and need molecular testing, prior approval from a DSHS HAI Epidemiologist is required.

REVISION HISTORY

January 2018
- Minor grammatical corrections
- Corrections to improve flow of information
- Added information to these sections
    - Infectious Agent
    - Prevention and Control
- Under Definition
    - Switched Case Classification and Laboratory Confirmation headings
    - Added requirement that must be "Confirmed by the DSHS laboratory"
- Changed Surveillance and Case Investigation Section – to state that **only**

confirmed cases of VISA/VRSA will require completion of the investigation form.
- No requirement to fax forms to Central Office

October 2023
- Minor grammatical corrections

Yersiniosis

BASIC EPIDEMIOLOGY

Infectious Agent

Yersinia species, a Gram negative bacilli. *Y. enterocolitica* is the species most commonly associated with human infection. *Y. pseudotuberculosis* infection is much less common.
Note *Y. pestis* is separately notifiable as Plague.

Transmission

Transmission is fecal-oral and occurs through ingestion of contaminated food or water. Transmission may also occur via direct contact with an animal and less commonly with an infected person.

Incubation Period

Probably 3 to 7 days, generally under 10 days.

Communicability

Although fecal shedding occurs with diarrhea and may persist for a prolonged period after symptoms resolve, secondary transmission is rare.

Clinical Illness

Fever with diarrhea (which may or may not contain blood, leukocytes, or mucus) is common in young children. Older children and adults can have fever, abdominal pain, and tenderness in the right lower quadrant of the abdomen (often mistaken with appendicitis) and leukocytosis.
Extra-intestinal manifestations may also be present, such as abscess, which could be a source for testing, and reactive arthritis and erythema nodosum, which are often immunologic phenomena not directly caused by the infection. These manifestations are not required as part of the clinical criteria.

DEFINITIONS

Clinical Case Definition

An illness characterized by diarrhea (sometimes bloody), fever, and abdominal pain; appendicitis-like syndrome and systemic infections can occur

Laboratory Confirmation

- Isolation of any non-pestis* *Yersini*a spp. by culture in a clinical specimen.

*For *Yersinia pestis* isolates, see Plague.

Case Classifications

- **Confirmed:** A case that meets the laboratory criteria for diagnosis.
- **Probable:**
    - Detection of non-*pestis Yersinia* spp, in a clinical specimen using NAAT or other molecular testing method, such as PCR, **OR**
    - A clinically compatible case that is epidemiologically linked to a laboratory confirmed case.

Note: a case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection.

SURVEILLANCE AND CASE INVESTIGATION

Case Investigation

It is recommended that local and regional health departments investigate all reported cases of yersiniosis to identify potential sources of infection. The Yersiniosis Case Investigation Form can be used to record information from the interview. The form is available on the DSHS website: http://www.dshs.state.tx.us/eaidu/investigation/. Sporadic cases of yersiniosis do not require an investigation form be sent to DSHS EAIDU unless they are identified as part of a multi-jurisdictional cluster or outbreak. Any case associated with a cluster or outbreak should be interviewed.

Case Investigation Checklist

- ☐ Confirm laboratory results meet the case definition.
- ☐ Review medical records or speak to an infection preventionist or healthcare provider to verify case definition and describe course of illness.
- ☐ Interview the case to get detailed food history and risk factor information.
    - Use the Yersiniosis Case Investigation Form to record information from the interview.
    - Note: If the case is not available or is a child, conduct the interview with a surrogate who would have the most reliable information on the case, such as a parent or guardian.
- ☐ Provide education to the case or his/her surrogate about effective hand washing, particularly after using the toilet, changing diapers, and before preparing or eating food. Meticulous hand washing is required to prevent transmission. See Prevention and Control Measures.
- ☐ Identify whether there is a public health concern: persons should not work as food handlers, child-care or health care workers, or attend child-care as long as they have diarrhea. See Exclusions.
- ☐ All confirmed and probable case investigations must be entered and submitted for notification in the NEDSS Base System (NBS). Please refer to the *NBS Data Entry Guidelines* for disease specific entry rules.

Prevention and Control Measures

- Routine hand washing with soap and warm water especially:
    - Before preparing, handling or eating any food.
    - After going to the bathroom.
    - After changing a diaper.
    - After caring for someone with diarrhea.
    - After handling raw food, especially pork.
    - After any contact with animals or their living areas.
- Avoid consuming raw milk or unpasteurized products.
- Follow food safety principles in the kitchen, especially:
    - Cook meat thoroughly
    - Prevent cross-contamination in food preparation areas by thoroughly washing hands, counters, cutting boards, and utensils after they touch raw meat.
        - Separate uncooked meats, hot dogs and other meat packaging from vegetables, uncooked food, and ready to eat foods.
        - Keep the refrigerator at 40°F or lower and the freezer at 0°F or

lower.
    - Clean up all spills in your refrigerator right away, especially juices from meat packages, raw meat, and raw poultry.

Exclusions

School/child-care: No exclusions are specified for yersiniosis but the standard exclusion for diarrhea or fever applies:

- Children with diarrhea should be excluded from school/child-care until they are free from diarrhea for 24 hours without the use of diarrhea suppressing medications.
- Children with a fever from any infection should be excluded from school/child-care for at least 24 hours after fever has subsided without the use of fever suppressing medications.

Food Employee: No exclusions are specified for yersiniosis but the standard exclusion for vomiting or diarrhea applies:

- Food employees are to be excluded if symptomatic with vomiting or diarrhea until:
    - Asymptomatic for at least 24 hours without the use of diarrhea suppressing medications OR
    - Medical documentation is provided stating that symptoms are from a noninfectious condition.

Please see Guide to Excluding and Restricting Food Employees in Appendix A.

MANAGING SPECIAL SITUATIONS

Outbreaks

If an outbreak is suspected, notify the appropriate regional DSHS office or DSHS EAIDU at **(800) 252-8239 or (512) 776-7676**.

The local/regional health department should:

- Interview all cases suspected as being part of the outbreak or cluster.
- Request medical records for any case in your jurisdiction that died, was too ill to be interviewed, or for whom there are no appropriate surrogates to interview.
- Prepare a line list of cases in your jurisdiction. Minimal information needed for the line list might include patient name or other identifier, DSHS or laboratory specimen identification number, specimen source, date of specimen collection, date of birth, county of residence, date of onset (if known), symptoms, underlying conditions, treatments and outcome of case, and risky foods eaten, foods eaten leading up to illness, or other risky exposures, such as animal contact and travel, reported by the case or surrogate.

Line list example:

ID	Name	Age	Sex	Ethnicity	Onset	Symptoms	Food	Animal	Notes
1	NT	34	F	W/N	2/4/23	Bl. D, F	Chicken, eggs	Dog	Dog food
2	PR	2	M	U/U	1/30/23	V,D,F	Chicken, spinach	None	Brother ill

- If the outbreak was reported in association with an apparent common local event (e.g., party, conference, rodeo), a restaurant/caterer/home, or other possible local exposure (e.g., pet store, camp), contact hospitals in your jurisdiction to alert them to the possibility of additional cases.
- Work with any implicated facilities to ensure staff, students, residents, and volunteers receive hand hygiene education, and review hygiene and sanitary practices currently in place including:
    - Policies on and adherence to hand hygiene
    - Storage and preparation of food
    - Procedures for changing diapers and toilet training
    - Procedures for environmental cleaning
- Recommend that anyone displaying symptoms seeks medical attention from a healthcare provider.
- Restrict individuals from handling food, engaging in child-care, healthcare work, or attending child-care, as long as they are symptomatic. See Exclusions in Case Investigation section.
- Enter outbreak into NORS at the conclusion of the outbreak investigation. See Reporting and Data Entry Requirements section.

Note:

- For cases with raw milk exposure, please email the information about dates of raw milk consumption and place of purchase to the DSHS Milk and Dairy Unit at milk.regulatory@dshs.texas.gov and cc foodbornetexas@dshs.texas.gov.
- If a food item or food establishment is implicated, the lead epidemiologist for foodborne diseases will notify the DSHS Division of Regulatory Services about the outbreak and the possibility of a common contaminated food source for the cases.
- Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory. The general policy is to test only food samples implicated in suspected outbreaks, not in single cases.

REPORTING AND DATA ENTRY REQUIREMENTS

Provider, School, Child-Care Facility, and General Public Reporting Requirements Confirmed, probable and clinically suspected cases are required to be reported **within 1 week** to the local or regional health department or the Texas Department of State Health Services (DSHS), Emerging and Acute Infectious Disease Branch (EAIDU) at **(800) 252-8239 or (512) 776-7676**.

Local and Regional Reporting and Follow-up Responsibilities
Local and regional health departments should:

- Enter the case into NBS and submit an NBS notification on all **confirmed and probable** cases.
  - Please refer to the *NBS Data Entry Guidelines* for disease-specific entry rules.
  - A case should not be counted as a new case if laboratory results were reported within 365 days of a previously reported infection in the same individual unless additional information is available indicating a separate infection. A notification can be sent as soon as the case criteria have been met. Additional information from the investigation may be entered upon completing the investigation.
- If investigation forms are requested, they may be faxed to 512-776-7616 or emailed securely to an EAIDU foodborne epidemiologist.

When an outbreak is investigated, local and regional health departments should:

- Report outbreaks within 24 hours of identification to the regional DSHS office or to EAIDU at **512-776-7676**
- Enter outbreak information into the **National Outbreak Reporting System (NORS)** at the conclusion of the outbreak investigation.
  - For NORS reporting, the definition of an outbreak is two or more cases of similar illness associated with a common exposure.
  - The following should be reported to NORS:
    - Foodborne disease, waterborne disease, and enteric illness outbreaks with person-to-person, animal contact, environmental contact, or an indeterminate route of transmission.
    - Outbreaks as indicated above with patients in the same household.
  - Enter outbreaks into NORS online reporting system at Login Sign In - NORS (cdc.gov)
  - Forms, training materials, and other resources are available at http://www.cdc.gov/nors/

- To request a NORS account, please email FoodborneTexas@dshs.state.tx.us
  - Please put in Subject Line: NORS User Account Request
  - Information needed from requestor: name, email address, and agency name
  - After an account has been created a reply email will be sent with a username, password, and instructions for logging in.

LABORATORY PROCEDURES

Testing for Yersiniosis is widely available from most private laboratories.

In an outbreak or other special situation, the DSHS Laboratory can culture raw stool or stool in transport medium (e.g., Cary-Blair media) for *Yersinia* species. Contact an EAIDU foodborne epidemiologist prior to submitting raw stool or stool in transport medium for culture.

Specimen Collection

- Submit pure cultures on an agar slant at ambient temperature or 2-8ºC *(ice pack)* as soon as possible to ensure viability.
- For raw stool or stool in transport medium, please refer to table below:

Specimen type	Transport time to lab from time of collection	Transport temperature
Raw stool	≤24 hours	4ºC (ice pack)
Raw stool	>24 hours	Freeze immediately at ≤-70ºC. Ship on dry ice.
Stool in transport solution/medium	Time of collection to ≤3 Days	Room temp or 4ºC (ice pack)
Stool in transport solution/medium	>3 days	Freeze immediately at ≤-70ºC. Ship on dry ice.
All	*The above transport times are optimal for recovery of pathogenic organisms. In the interest of public health, specimens will be accepted up to 30 days from date of collection.	*The above transport temperatures are optimal for the recovery of pathogenic organisms. In the interest of public health, specimens will be accepted at non-optimal temperature transport.

* Note: Pathogen recovery rates decrease over time. For best results, submit ASAP.

Specimen Shipping

- Ship specimens to:

Laboratory Services Section,
MC-1947 Texas Department of
State Health Services Attn.
Walter Douglass (512) 776-7569
1100 West 49th Street
Austin, TX 78756-3199

Causes for Rejection:

- Missing or discrepant information on form/specimen.
- Transport media was expired.
- Specimen not in correct transport medium.

FOOD SAMPLES AND ENVIRONMENTAL SWABS:

Testing of food and environmental swabs for *Yersinia enterocolitica*. is available at the DSHS laboratory. Decisions about testing implicated food items can be made after consultation with an EAIDU foodborne epidemiologist and the DSHS Laboratory.

General policy

- The DSHS lab will only test food samples or environmental swabs from facilities implicated in a suspected outbreak (not associated with single cases).
- In outbreaks, the DSHS lab will not test food samples or environmental swabs unless a pathogen has been identified in a clinical specimen.
- Food samples or environmental swabs must be **collected by a registered sanitarian**.

For further questions, please contact an EAIDU foodborne epidemiologist to discuss further.

REVISION HISTORY

April 2017

- Updated statement regarding how often to count a case, only counting a case once per 365 days, in the Definitions and Reporting and Data Entry Requirements section.
- Updated table regarding the submission of raw stool or stool in transport medium in the Laboratory Procedures section.

Appendix A: Additional Flowcharts and Tables

Table of Contents:

NORMALLY STERILE SITES

Normally sterile site: Invasive diseases typically cause significant morbidity and mortality. Sterile sites include:

- Blood (excluding cord blood)
- Bone or bone marrow
- Cerebrospinal fluid (CSF)
- Pericardial fluid
- Peritoneal fluid
- Pleural fluid

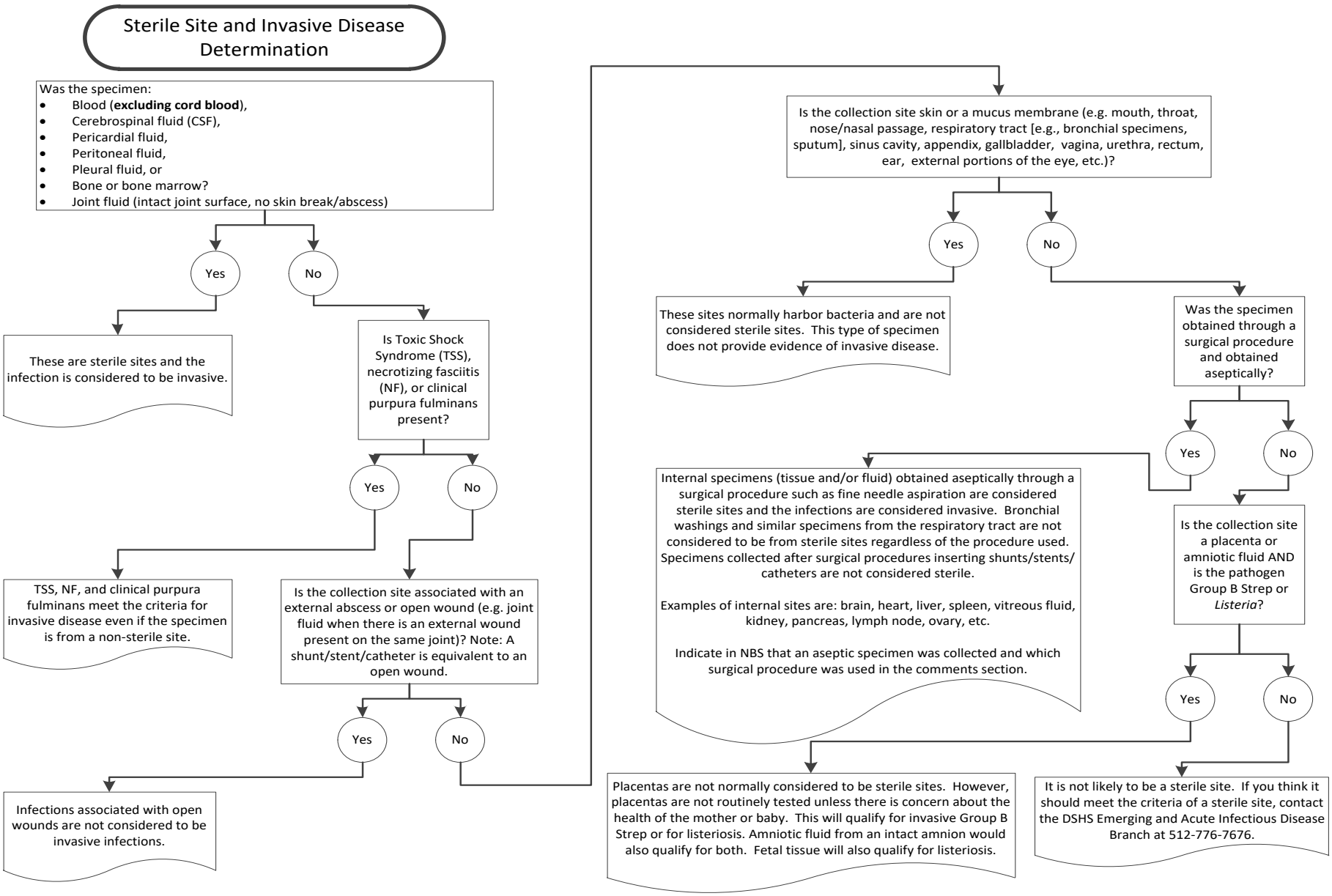
The following are also considered sterile sites when certain other criteria are met:

- Internal body sites (brain, heart, liver, spleen, vitreous fluid, kidney, pancreas, lymph node or ovary) when the specimen is collected aseptically during a surgical procedure
- Joint fluid when the joint surface is intact (no abscess or significant break in the skin)

Although placentas and amniotic fluid from an intact amnion are not considered sterile sites, isolation of Group B streptococci or *Listeria* from these sites may qualify as invasive disease. Consult the Sterile Site and Invasive Disease Determination flowchart on the next page for more information.

Normally sterile sites do not include:

- Anatomical areas of the body that normally harbor either resident or transient flora (bacteria) including mucous membranes (e.g., throat, vagina), sputum, and skin; abscesses; or localized soft tissue infections



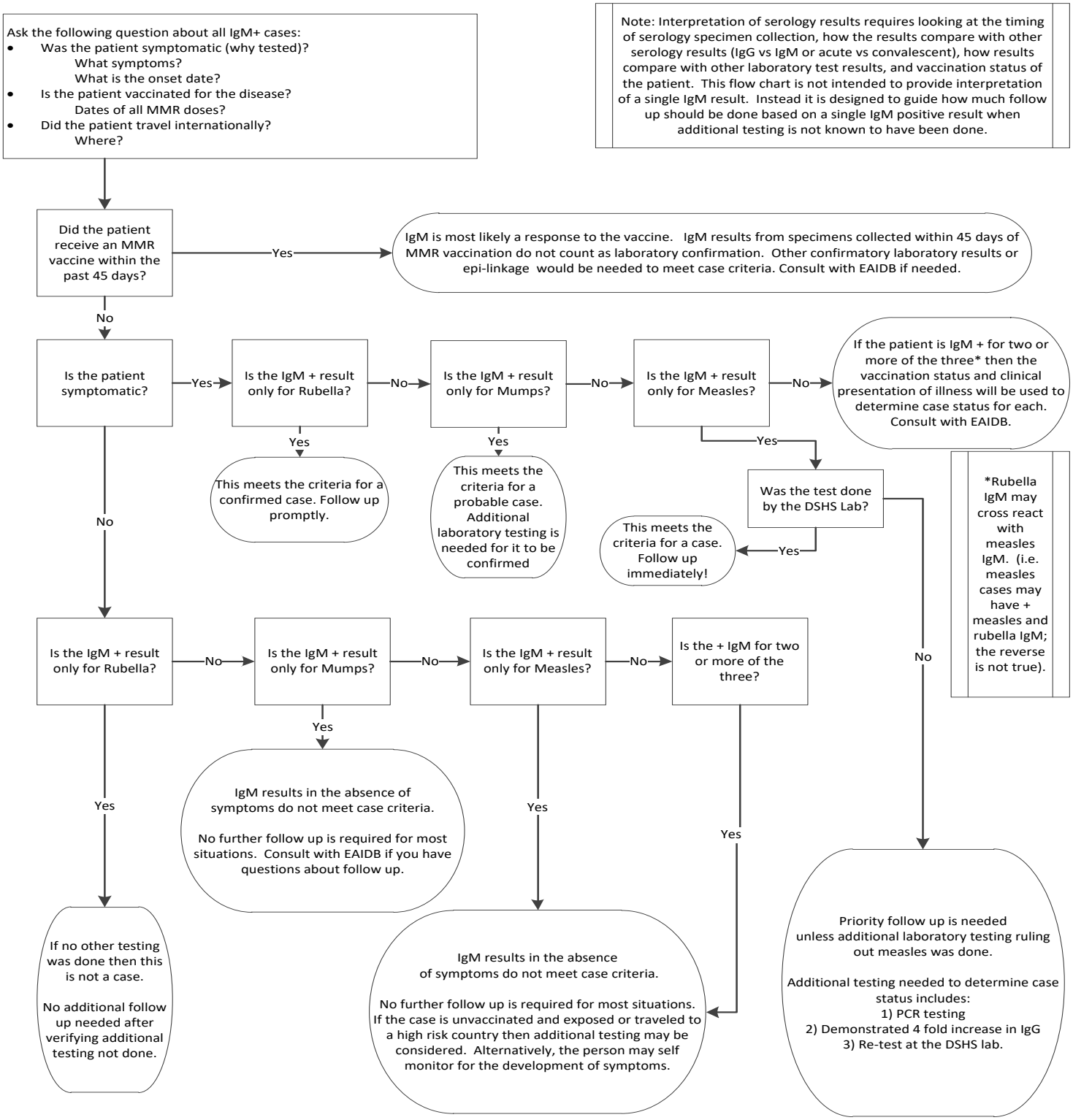
Flow chart for use with *Streptococcus pneumoniae,* Group A Strep (*S. pyogenes*), Group B Strep (*S. agalactiae*), *Neisseria meningitidis*, *Listeria monocytogenes* and *Haemophilus influenzae*. See "Normally Sterile Sites" definition on previous page.

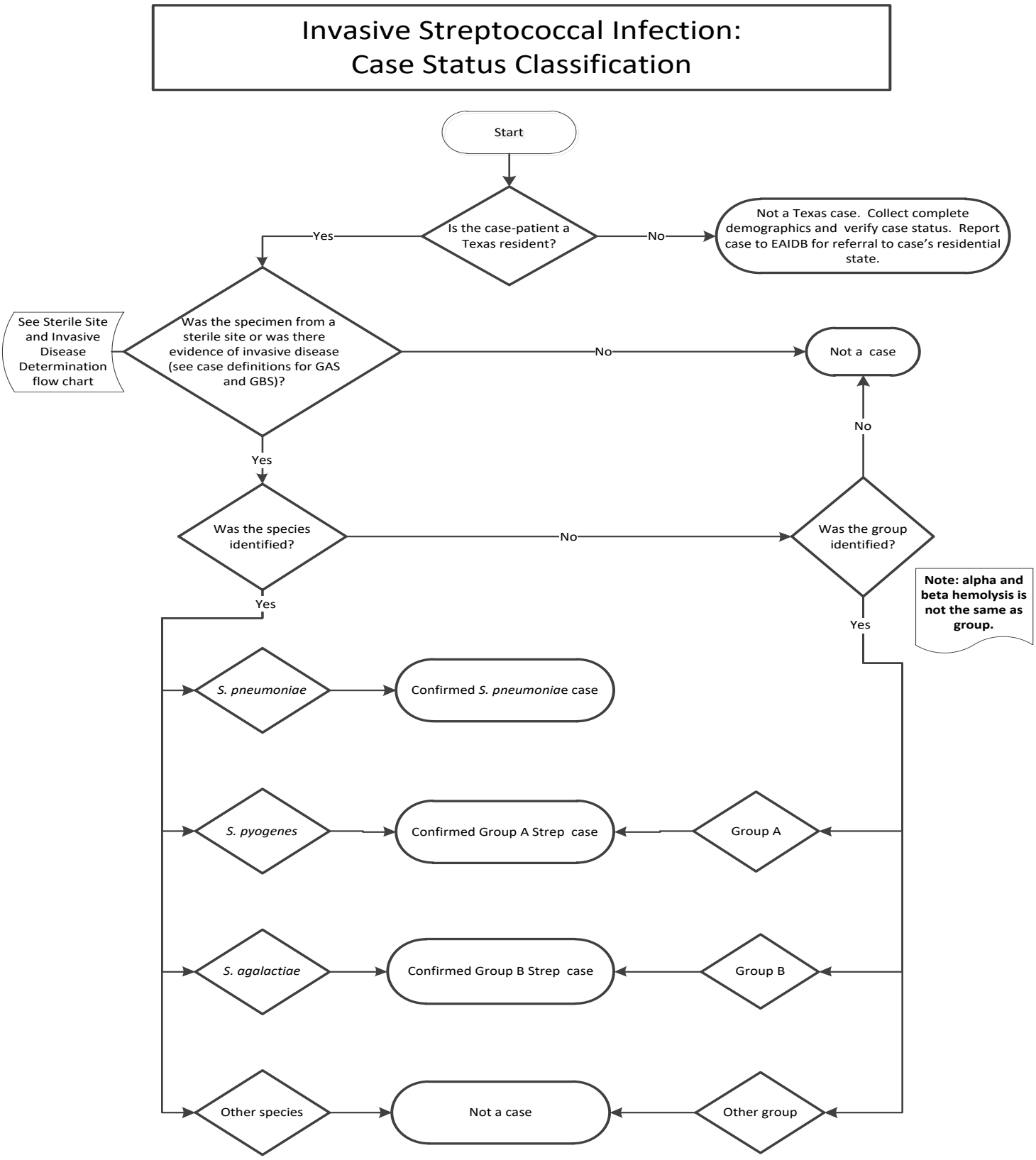
Last updated Jan 2016

Appendix A: Additional Flowcharts and Tables

Responding to Positive IgM results for Mumps, Measles, and Rubella
When More Confirmatory Testing is Not Yet Available or Known

Not for use in evaluating IgM results when testing was requested by public health for contact or outbreak investigations or when more confirmatory testing has been done.




Invasive Streptococcal Infection:
Case Status Classification
Start
Is the case-patient a Texas resident?
Yes
No
Not a Texas case. Collect complete demographics and verify case status. Report case to EAIDB for referral to case's residential state.
See Sterile Site and Invasive Disease Determination flow chart
Was the specimen from a sterile site or was there evidence of invasive disease (see case definitions for GAS and GBS)?
No
Not a case
Yes
Was the species identified?
No
Was the group identified?
No
Yes
Note: alpha and beta hemolysis is not the same as group.
Yes
S. pneumoniae
Confirmed S. pneumoniae case
S. pyogenes
Confirmed Group A Strep case
Group A
S. agalactiae
Confirmed Group B Strep case
Group B
Other species
Not a case
Other group

GUIDE TO FOOD EMPLOYEE EXCLUSIONS AND RESTRICTIONS

- The following guide (pages 440-443) summarizes food employee exclusions and restrictions of interest and serves as a resource for local and regional health departments and accompanies the EAIDU Investigation Guidelines.

- For the complete Texas Food and Establishment Rules (TFER), go to: https://www.dshs.state.tx.us/foodestablishments/laws-rules.aspx

Condition	Health Status of Food Employee	Food Establishment	Exclude or Restrict?	Return-to-Work Criteria for Food Employee
Norovirus	Symptomatic	Any food establishment	Exclude	Food employee can be reinstated with approval from the Regulatory Authority **and** if one of the following conditions is met: • Medical documentation stating that the food employee is **free of infection from Norovirus;** • More than **48 hours** have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or • The food employee did not develop symptoms and more than **48 hours** have passed since being diagnosed.
	Asymptomatic	Serves a highly susceptible population	Exclude	
		Does NOT serve a highly susceptible population	Restrict	
Salmonellosis (non-typhoidal *Salmonella* sp.)	Symptomatic	Any food establishment	Exclude	Food employee can be reinstated with approval from the Regulatory Authority **and** if one of the following conditions is met: • Medical documentation stating that the food employee is free of infection from non-typhoidal *Salmonella* based on test results showing **two consecutive, negative stool specimen cultures.** The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics, if antibiotics were given; • More than **30 days** have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or • The food employee did not develop symptoms and more than **30 days** have passed since being diagnosed.
	Asymptomatic	any food establishment	Restrict	

Condition	Health Status of Food Employee	Food Establishment	Exclude or Restrict?	Return-to-Work Criteria for Food Employee
Shigellosis *(Shigella* spp.*)*	Symptomatic	Any food establishment	Exclude	Food employee can be reinstated with approval from the Regulatory Authority **and** if one of the following conditions is met: • Medical documentation stating that the food employee is free of infection from *Shigella* sp. based on test results showing **two consecutive, negative stool specimen cultures.** The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics, if antibiotics were given; • More than **7 days** have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or • The food employee did not develop symptoms and more than **7 days** have passed since being diagnosed.
	Asymptomatic	Serves a highly susceptible population	Exclude	
		Does NOT serve a highly susceptible population	Restrict	
STEC (Shiga toxin-producing *E. coli*)	Symptomatic	Any food establishment	Exclude	Food employee can be reinstated with approval from the Regulatory Authority **and** if one of the following conditions is met: • Medical documentation stating that the food employee is free of infection from Shiga toxin-producing *E. coli* based on test results showing **two consecutive, negative stool specimen cultures.** The stool specimens should be collected at least 24 hours apart and not sooner than 48 hours after the last dose of antibiotics, if antibiotics were given;
	Asymptomatic	Serves a highly susceptible population	Exclude	

Condition	Health Status of Food Employee	Food Establishment	Exclude or Restrict?	Return-to-Work Criteria for Food Employee
		Does NOT serve a highly susceptible population	Restrict	• More than **7 days** have passed since the food employee became asymptomatic (without the use of diarrhea suppressing medications) or • The food employee did not develop symptoms and more than **7 days** have passed since being diagnosed.
Typhoid Fever *(Salmonella* Typhi)	Symptomatic or Asymptomatic	Any food establishment	Exclude	Food employee can be reinstated with approval from the Regulatory Authority **and** if one of the following conditions is met: • Medical documentation by a health practitioner stating that the food employee is **free of *S.* Typhi infection**.
Hepatitis A or jaundiced (the onset of jaundice occurred within the last 7 calendar days)	Symptomatic or Asymptomatic	Any food establishment	Exclude	Food employee can be reinstated with approval from the Regulatory Authority **and** if one of the following conditions is met: • The food employee has been jaundiced for more than 7 calendar days; • The anicteric food employee has been symptomatic with symptoms other than jaundice for more than 14 calendar days or • Medical documentation by a health practitioner stating that the food employee is **free of hepatitis A infection**.

Condition	Health Status of Food Employee	Food Establishment	Exclude or Restrict?	Return-to-Work Criteria for Food Employee
Below are Criteria for Reportable Symptoms with No Diagnosis				
	Vomiting or diarrhea	any food establishment	Exclude	Food employee can be reinstated if one of the following conditions is met: • Is asymptomatic for at least 24 hours (without the use of diarrhea suppressing medications) or • Medical documentation that states symptom is from a noninfectious condition
	Sore throat with fever (acute onset)	serves a highly susceptible population	Exclude	Food employee can be reinstated with medical documentation stating one of the following conditions has been met: • Antibiotic therapy for *Streptococcus pyogenes* infection for more than 24 hours; • at least one negative throat specimen culture for *S. pyogenes* infection or • determined free of a *S. pyogenes* infection by a health practitioner
		does NOT serve a highly susceptible population	Restrict	
	Uncovered infected wound or pustular boil	any food establishment	Restrict	Food employee can be reinstated if the wound or boil is properly covered with one of the following: • An impermeable cover such as a finger cot or stall and a single-use glove over the impermeable cover if the wound or boil is on the hand, finger, or wrist; • And impermeable cover on the arm if the wound or boil is on the arm or • A dry, durable, tight-fitting bandage if the wound or boil is on another part of the body

Definitions of Interest from the Texas Food Establishment Rules (TFER):

Food employee--An individual working with unpackaged food, food equipment or utensils, or food-contact surfaces.

Asymptomatic--Not showing obvious symptoms, not producing indications of a disease or other medical condition. An individual infected with a pathogen but not exhibiting or producing any signs or symptoms of vomiting, diarrhea, or jaundice. Symptoms are not shown because the symptoms have been resolved or have subsided, or because the symptoms never manifested.

Exclude--To prevent a person from working as a food employee or entering a food establishment except for those areas open to the general public.

Restrict--To limit the activities of a food employee so that there is no risk of transmitting a disease that is transmissible through food and the food employee does not work with exposed food, clean equipment, utensils, linens; and unwrapped single-service or single-use articles.

Highly susceptible population--Persons who are more likely than other people in the general population to experience foodborne disease because they are immunocompromised, preschool aged children, or older adults and are obtaining food at a facility that provides services such as custodial care, health care, or assisted living. Examples of custodial or health care facilities or of assisted living facilities include but are not limited to child or adult day care centers, kidney dialysis centers, hospitals, nursing homes, or senior centers providing nutritional or socialization services.

Food establishment--A food establishment means an operation that stores, prepares, packages, serves, vends, or otherwise provides food for human consumption as follows:

- a restaurant, retail food store, satellite or catered feeding location, catering operation if the operation provides food directly to a consumer or to a conveyance used to transport people, market, vending location, (machine), self-service food market, conveyance used to transport people, institution, or food bank;
- an establishment that relinquishes possession of food to a consumer directly, or indirectly through a delivery service such as home delivery of grocery orders or restaurant takeout orders, or delivery service that is provided by common carriers; and
- includes an element of the operation such as a transportation vehicle or a central preparation facility that supplies a vending location or satellite feeding location unless the vending or feeding location is permitted by the regulatory authority and an operation that is conducted in a mobile, stationary, temporary, or permanent facility or location; where consumption is on or off the premises; and regardless of whether there is a charge for the food.

- food establishment does not include an establishment that offers only prepackaged foods that are not time / temperature controlled for safety food, a produce stand that only offers whole, uncut fresh fruits and vegetables, a food processing plant, a cottage food industry, an area where cottage food is prepared, sold or offered for human consumption, a Bed and Breakfast Limited facility as defined in this chapter, or a private home that receives catered or home-delivered food.

Regulatory authority--The local, state, or federal enforcement body or authorized representative having jurisdiction over the food establishment.

REVISION HISTORY

January 2022

- 'Invasive Streptococcal Infection: Case Status Classification' flow chart deleted due to Group A and Group B Streptococcal Infections no longer classified as reportable conditions in Texas.

Appendix B:
CDC Division of Global Migration and Quarantine (DGMQ)
Out of State Exposure Notifications

Table of Contents:

BACKGROUND

Out of state exposure notifications include identification of passengers on airlines, ships, buses, or trains who were exposed to selected infectious diseases. These types of exposure notifications are typically received through the Centers for Disease Control and Prevention (CDC) Division of Global Migration and Quarantine (DGMQ) to the Texas Department of State Health Services (DSHS) via special Epi-X DGMQ reports. DSHS Emerging and Acute Infectious Disease Branch (EAIDU) staff in Central Office primarily receives these alerts and notifies the appropriate regional and local health departments. Some local or regional health departments may also receive the Epi-X DGMQ reports directly.

In addition to the formal notifications described above, other exposure notifications can include attendees at conferences, guests of hotels, or participants of group gatherings. These other exposure lists are usually generated by a state health department or a specific disease program within CDC and are distributed to the applicable disease leads in EAIDU. Distribution from EAIDU to the regional and local health departments is the same.

The contact information available is often limited. Sometimes full address is not known, but the city in which they live is known. There is a data engine which can assist PH workers with identifying where a person is likely to live to facilitate timeliness of investigation.

Diseases for which exposure notifications have occurred in the past:

- Contaminated healthcare products/devices
- COVID-19
- Ebola
- Healthcare associated infections
- Hepatitis A
- Hepatitis B and C (usually healthcare associated)
- HIV* (usually healthcare associated)**
- Legionellosis
- Measles
- Meningococcal meningitis
- Mpox
- Novel coronavirus
- Novel/variant influenza
- Rubella
- Syphilis
- Tuberculosis*
- Zoonosis*

*HIV, STI, and Tuberculosis notifications are handled through the TB/HIV/STI section and the Zoonosis Control Branch handles zoonoses-related exposures. These do not follow the process outlined here. EAIDU is not involved in these investigations, except in instances when hepatitis B or C exposure may have also occurred with HIV exposure. In those instances, EAIDU and DSHS HIV staff will attempt to coordinate response.

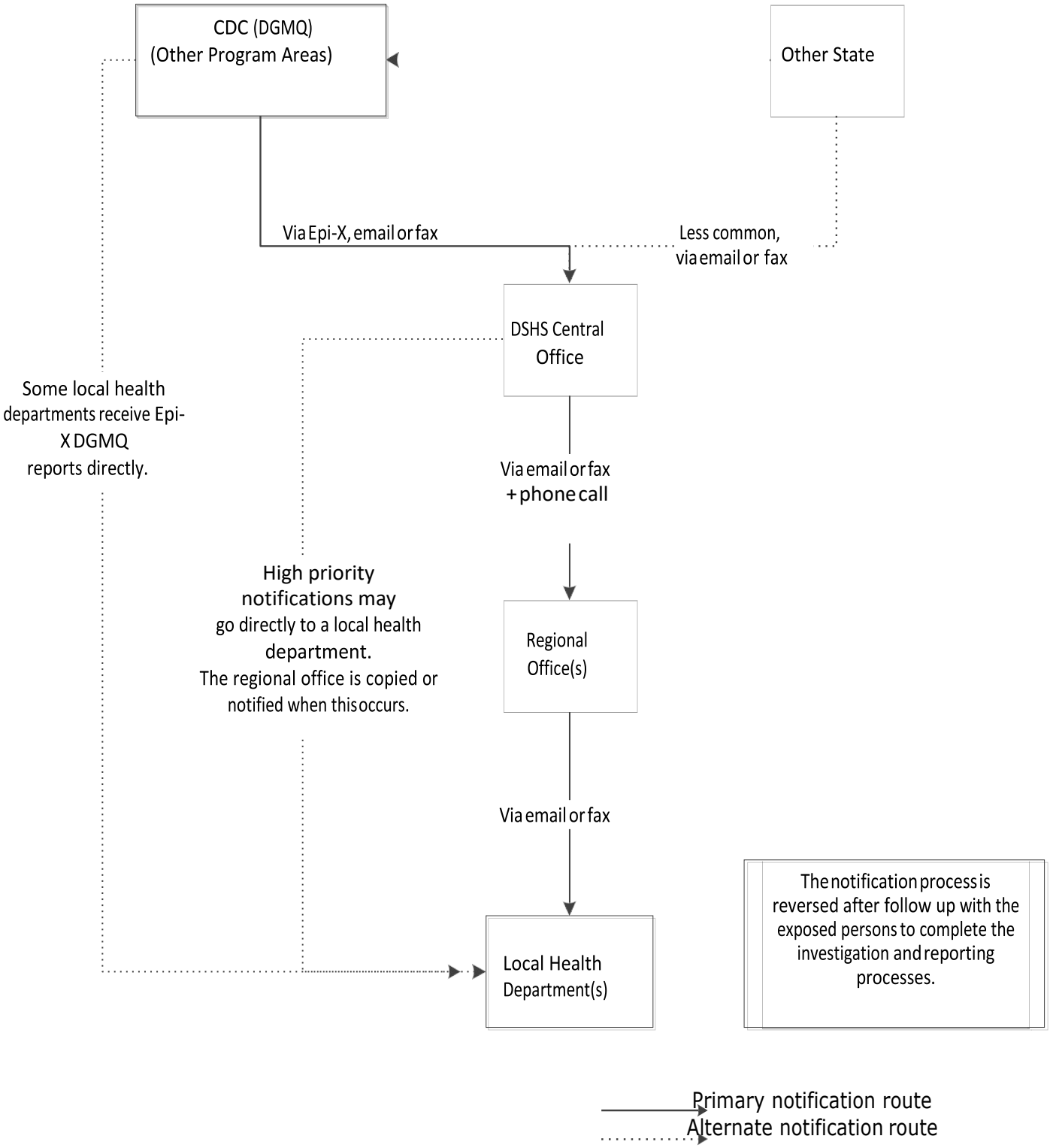
**Notification of exposure happens for non-healthcare related exposures too through the ICCR process with TB, HIV, STI section. ICCR is Interstate Communication Control Records.

Information on the CDC DGMQ: Protecting Travelers' Health from Airport to Community: Investigating Contagious Diseases on Flights | Port Health | CDC

NOTIFICATION PROCESS

- The CDC or other state/local health department collates a list of people (e.g., passengers on a flight, patients at a medical practice) exposed to selected infectious diseases by presumed state of residence. The list is shared via Epi-X DGMQ reports or via phone, email or fax from selected infectious disease program areas.
- EAIDU reviews the list and subdivides it based on health jurisdictions. The list is forwarded to appropriate jurisdictions by email or fax along with instructions for response and follow- up.
- If applicable, the regional office will further subdivide the list and share with their local health departments.
- See flow chart next page.

NOTIFICATION PROCESS FLOWCHART



REGIONAL AND LOCAL HEALTH DEPARTMENT EXPECTATIONS

When an exposure notification is received, the regional and local health departments should:

- Review the instructions and guidance provided by DSHS, CDC and/or the reporting jurisdiction (e.g., another state).
    - Instructions and guidance will include
        - Timeframe and priority level for follow-up
        - Contact management instructions and recommended actions such as: testing, medical assessment, prophylaxis, quarantine, symptom monitoring.
        - When an interview form must be completed
        - If prophylaxis is indicated
        - Other recommended necessary actions
- Identify resources available in the jurisdiction to assist with exposure/disease management
- Expect that multiple lists may be received, or multiple (updated) versions of the same list
- Attempt to contact every person on the provided list within the timeframe provided by DSHS, CDC and/or the reporting jurisdiction.
    - Multiple call attempts should be made at different times of the day.
    - A wide variety of contact information may be provided. All phone numbers and emails should be tried at least once.
    - Some diseases may require home visits.
    - If the health department is unable to contact the persons on the list or would like to request assistance for any other reason (e.g., staffing shortage), the health department should request assistance from their regional office or DSHS EAIDU.
    - For some diseases, additional assistance, such as wellness checks by police or other agency, may be required to ensure the contact is okay if the contact cannot be reached by telephone and does not answer the door.
    - If the health department reaches a contact that turns out to live in another jurisdiction, this process should still be completed. Once the notification is complete, the information should be returned to DSHS for transfer to the appropriate jurisdiction.
- Document the outcome of all the attempts to communicate with the contact. Documentation should include: date, time, activity (phone call, field visit, provider call) and result of the communication attempts (e.g., specify correct phone number, address of field visit), and control measures implemented (if any).
- Assess if the person is currently symptomatic. Symptomatic individuals should be managed according to the investigation guidelines for that disease.
- Provide basic education on the condition to all exposed persons.
    - Assess patient disease comprehension
    - Education should include signs/symptoms, prevention strategies, evaluation, testing, treatment, opportunities.
    - Basic education should be provided even if the person resides outside of the health jurisdiction performing the follow-up.

- Ask about additional exposed persons (e.g., an unticketed baby sitting on exposed airline passenger's lap)
- If applicable, interview the person using a provided interview form.
    - The interview should be completed even if the person resides outside of the health jurisdiction performing the follow-up. When the interview is complete, notify DSHS about the contact, so appropriate transfer can occur.
- If applicable, recommend or provide prophylaxis.
    - Notify DSHS immediately of out-of-jurisdiction contacts who need prophylaxis.
- If applicable, monitor for development of symptoms.
    - For some diseases, monitoring may be passive (e.g., tell the person to call their health care provider and/or the health department if they develop symptoms).
    - For some diseases, monitoring may be active (e.g., daily calling/video chat to assess symptoms or home visits).
    - Notify DSHS immediately of out-of-jurisdiction contacts who need to be monitored for symptoms.
- Notify DSHS of the outcome of the contacts before the deadline or within 1 work day of completion, whichever is shorter.
    - Notifications of out-of-jurisdiction persons or of persons developing symptoms should be done as soon as possible.
    - If an interview form was completed, return the form to DSHS before the deadline or within 1 work day of completion, whichever is shorter.

REVISION HISTORY

May 2021

- Minor updates throughout section

January 2018

- Updated 'Background' and 'Basic Notification Process' sections

Appendix C:
DSHS Laboratory Resources

Table of Contents:

HEALTH DEPARTMENT RECOMMENDATIONS

Health departments should be prepared to collect or to assist with the collection of specimens to support public health investigations and outbreak response. While large hospitals and clinic systems may have supplies on hand and experience with shipping specimens, many small clinics and private provider offices do not. It can also take 24 to 72 hours to coordinate and ship specimen collection materials to a health department. Given the short time period for collecting certain priority specimens (e.g., measles, suspected variant/novel flu, etc.), it is essential for health departments to maintain at least a handful of supplies that can be used while additional supplies are being ordered.

If your local or regional health department is in need of specimen collection supplies, DSHS EAIDU can coordinate for specimen collection kits to be sent to your location.

Health Department Checklist

- Have a DSHS Laboratory submitter ID.
    - See 'Getting a Lab Submitter ID and Submission Forms' section.
- Have an electronic copy of each of the DSHS Laboratory submission forms with the health department's submitter ID pre-filled (especially the G-2A, G-2B and G-2V).
    - Make sure you have the most up-to-date DSHS Laboratory Submission Form
    - See 'Getting a Lab Submitter ID and Submission Forms' section.
- Have at least 2 specimen shipping boxes on hand.
- Maintain a stock of viral transport media (VTM) and swabs for use in viral respiratory or VPD outbreaks.
    - Small health departments with a history of using little to no VTM should keep at least 2 unexpired VTM tubes on hand.
    - Larger health departments or health departments with a history of using the VTM should consider keeping more unexpired VTM tubes on hand.
    - Health departments with sub-offices should consider keeping at least 2 unexpired VTM tubes on hand at each sub-office unless the sub-office is located within 1 to2 hours of another location with access to VTM.
- Maintain a stock of stool collection kits and transfer media (e.g., Cary-Blair transport media) for use in enteric pathogen outbreaks.
- Know how to ship specimens overnight using FedEx, Lone Star Overnight, or an approved courier.
- Know how to request specimen collection kits.
    - See 'How to Order Specimen Collection Supplies' section.
- For health departments with a Laboratory Response Network (LRN) laboratory (other than the DSHS Lab in Austin) in their area:
    - Keep copies of the LRN-specific laboratory submission forms on hand in addition to the DSHS lab submission forms.
    - Know if your LRN can assist with shipping specimens that need to go to the DSHS laboratory in Austin or to the CDC.
    - Check with your LRN or EAIDU to see if certain specimens

can be sent to the LRN or should be sent directly to the DSHS Laboratory in Austin.

GETTING A LAB SUBMITTER ID AND SUBMISSION FORMS

The procedure for getting a DSHS lab submitter ID is the same for healthcare providers/facilities and for health departments. Any entity that may need to submit a specimen to the DSHS Laboratory will need to have a submitter ID.

How to get a DSHS submitter ID

- Complete the Submitter Identification (ID) Number Request Form found at: Submitter ID Request February 2022.
- Fax the completed form to Lab Reporting at 512-776-7533 or email it to LabInfo@dshs.texas.gov.
- If you are not sure if your agency has a submitter ID number, call DSHS Lab Reporting at 512-776-7578 (toll free at 1-888-963-7111 X 7578) to find out.

How to get electronic copies of your DSHS submission forms

- Contact Lab Reporting to request electronic copies of the forms by calling 512-776-7578 (toll free at 1-888-963-7111 X 7578) or emailing LabInfo@dshs.texas.gov.
- A list of forms used by the DSHS lab is available at: Laboratory Testing Services Manual - Forms and Laboratory Fee Schedule | Texas DSHS
- Please note that new forms are usually distributed each September. Each fall, you should check that you have the most current form.

Most frequently used DSHS submission forms

- G-2A: Used for submitting serology specimens
- G-2B: Used for submitting bacteriology and parasitology specimens (also includes some molecular tests for bacterial and viral diseases)
- G-2E: Used for submitting MDRO isolates to the ARLN
- G-2V: Used for submitting virology specimens
- G-23: Used for submitting food samples
- G-27A: Used for submitting emergency preparedness specimens, including *Clostridium botulinum* and Ebola

HOW TO ORDER SPECIMEN COLLECTION SUPPLIES

The following specimen collection kits are available to be ordered:

- Influenza/Influenza-like illness
- Pertussis (PCR)
- Mumps/Measles/Rubella

Influenza/Influenza-like illness

- These supplies should be used for collecting specimens from someone suspected of having influenza. These supplies may also be used for collecting specimens from someone suspected of infection with parainfluenza virus, rhinovirus/enterovirus, respiratory syncytial virus, adenovirus, or human metapneumovirus.
- The provided supplies include:
    - Commercially prepared viral transport media (VTM)
    - Nasopharyngeal (NP) swab

    - Plastic cylindrical tube with black screw cap (secondary container)
- The following supplies are optional and can be included if requested:
    - Specimen shipping boxes (cold boxes)
    - Cold packs
    - DSHS Influenza Laboratory Surveillance Protocol
- Influenza collection supplies should be ordered by contacting the EAIDU Flu Team by email at flutexas@dshs.texas.gov. An order form will be provided upon request.
- Note: Regional Influenza Surveillance Coordinators can assist with ordering supplies.

Pertussis (PCR)

- These supplies should be used for collecting specimens from someone suspected of having pertussis.
- The provided supplies include:
    - Nasopharyngeal (NP) swab (may be a urethral swab which can be used as an NP swab)
    - Medium plastic bag
    - G-2B laboratory submission form
    - Collection information sheet
    - Face mask
- The following supplies are optional and can be included if requested:
    - Specimen shipping boxes (cold boxes)
    - Cold packs
- Collection supplies should be ordered by contacting the EAIDU VPD Team at 512-776- 7676.

Notes:

- Pertussis testing only in outbreak situations or by request.
- No media is used for specimens submitted for pertussis PCR at DSHS.
- Pertussis testing is not provided free of charge. Contact EAIDU for approval for DSHS payment.

Mumps/Measles/Rubella

- These supplies should be used for collecting viral specimens from someone suspected of having mumps, measles or rubella.
- The provided supplies include:
    - DSHS or commercially prepared viral transport media (VTM)
    - Throat or nasopharyngeal (NP) swab
        - Mumps (buccal) testing uses a throat swab
        - A throat swab is preferred over an NP swab for rubella and measles but an NP swab is acceptable
    - Plastic tube with screw cap (secondary container)
    - Instruction sheet
- The following supplies are optional and can be included if requested:
    - Specimen shipping boxes (cold boxes)
    - Cold packs
- Collection supplies should be ordered by contacting the EAIDU VPD Team at 512-776- 7676.
- Serology kits can be sent from DSHS, but only under specific circumstances.

STEPS TO SHIP SPECIMENS

Make sure to review the disease-specific specimen submission guidance in each disease section. The disease-specific guidance covers which form to use, temperature requirements for storage and shipping, timeframes for submission and specimen types that are acceptable for submission. The following steps are basic and apply to most specimens submitted to the DSHS laboratory.
More detailed information is available at:
http://www.dshs.texas.gov/lab/mrs_shipping.shtm.

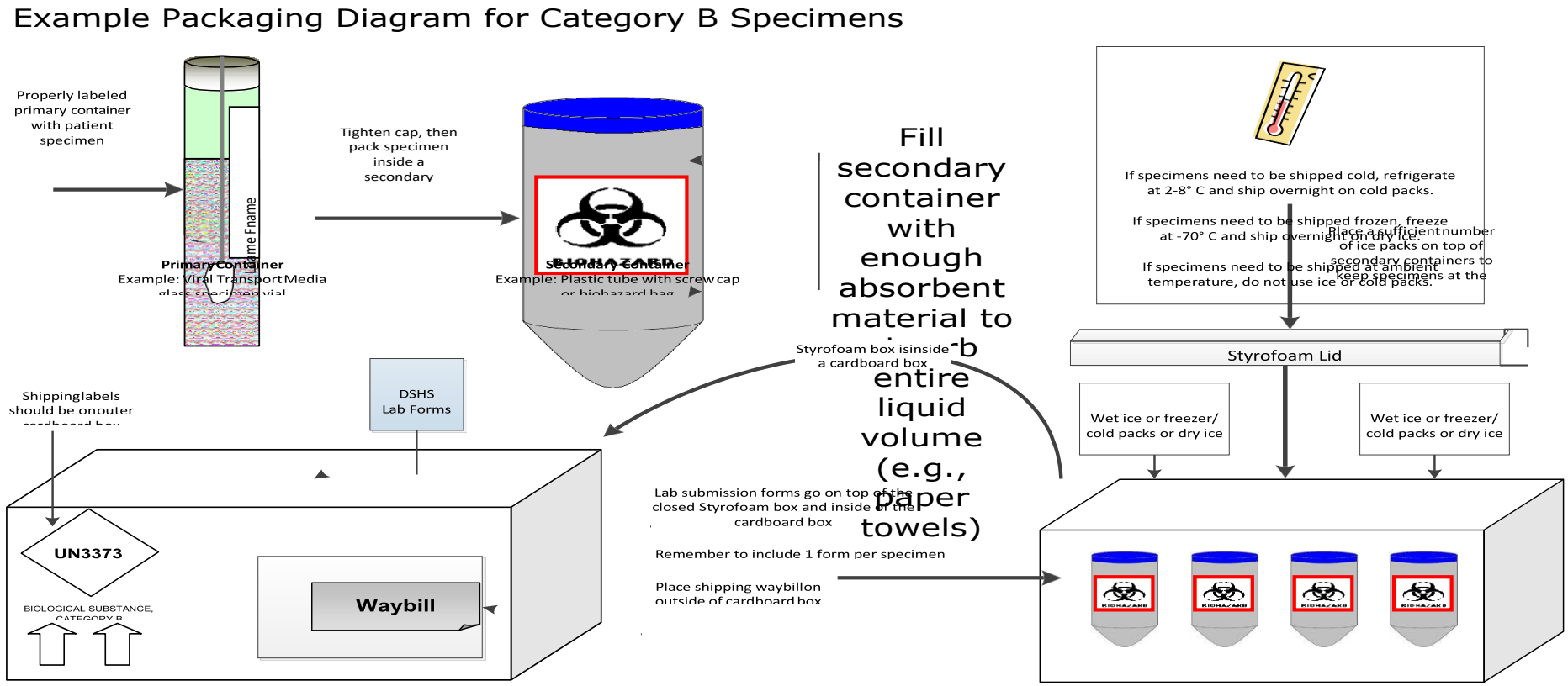
Basic Steps to Ship Specimens

- Verify that the correct transport media was used for the specimen/pathogen you want tested.
    - Verify the transport media is not expired.
    - Check the disease-specific guidance for approved transport media.
- Verify that all specimens are labeled correctly.
    - All specimens require at least two identifiers on the specimen tube/container such as patient name and date of birth.
    - Multiple specimen types from the same person may also require the tube to be labeled with the specimen type or time of collection.
- Verify that one specimen submission form is completed for each specimen submitted.
    - If 5 specimens are collected from the same person then complete 5 forms.
    - Make sure that the forms are completely filled out. Specimens could be rejected if key information is missing such as date of collection.
    - Make sure that the information on the form exactly matches the information on the specimen.
- Verify whether the specimens need to be shipped at room temperature, cold or frozen.
    - Check the disease-specific guidance for approved transport temperatures.
    - If a specimen needs to be cold upon arrival at the DSHS Laboratory, make sure that a sufficient amount of wet ice or cold packs is included especially during the summer.
    - If a specimen needs to be frozen upon arrival at the DSHS Laboratory, make sure dry ice is used. Use as much as will fit but no more than 5 pounds. Blocks are better than pellets. Check with the shipping company to verify dry ice limits.
- Specimens should be triple contained.
    - The primary container is typically the tube or bottle in which the specimen is placed (e.g., the VTM tube for influenza specimens). It must be leak proof. It must also be labeled with patient identifiers (name and date of birth).
    - The secondary container may be a larger plastic tube with a screw cap or even a zipper storage bag. The secondary container should be filled with absorbent material (e.g., paper towels or absorbent pads) to fully absorb the contents of the primary container if it leaks. The secondary container should

have a biohazard sticker on it and must be leak proof.
    - The tertiary container is the shipping box which must be clearly labeled for shipping biological substances.
- Specimens should be shipped according to International Air Transport Association (IATA) standards.
    - Most specimens that a health department will ship are considered Category B (infectious substance that does not meet criteria for Category A) and will need the following on the outside of the shipping box:
        - UN 3373/Category B Biological Substances label
        - Directional arrows labels
        - Submitter's address and contact person's information
        - Shipping address and contact person's information
        - Dry ice label (if applicable)
    - Isolates (pure cultures) or specimens from patients suspected of having an exotic, newly emerging or extremely rare pathogen may be classified as Category A agents. Check with the DSHS Laboratory directly for shipping Category A agents.
- Most specimens should be shipped overnight to arrive at DSHS Monday through Friday.
    - Do not ship a specimen to arrive on Saturday, Sunday or a Federal holiday.
    - If testing outside of normal business hours is needed, approval from EAIDU or the DSHS lab must be obtained before the specimen is shipped.
- Notify EAIDU and/or the DSHS lab when specimens for these diseases are being shipped:
    - Acute Flaccid Myelitis (AFM)
    - Botulism
    - Coronavirus, Novel (MERS)
    - Diphtheria
    - Ebola, Marburg or other VHF
    - Gastroenteritis outbreaks
    - Influenza, Novel/variant
    - Measles
    - Mumps
    - Polio
    - Rubella
    - Varicella
    - VISA/VRSA
    - Other rare pathogens
- See next page for Example Packing Diagram for Category B Specimens

Appendix C: DSHS Laboratory Resources

EXAMPLE PACKAGING DIAGRAM FOR CATEGORY B SPECIMENS



Cardboard Shipping Box **Styrofoam Box**

PREFERRED SPECIMEN SUMMARY TABLE

Table Notes:

- This table includes only the preferred specimen. Additional specimens may also be acceptable. Check the disease-specific sections for additional acceptable specimens and the appropriate media, transport temperature and timeframe for those specimens.
- The timeframe for receipt by the lab is for the preferred specimen shipped as recommended. Some specimens may be received after the recommended time period if **shipped on different media or shipped frozen. Refer to the disease-specific sections** to see if that is possible.

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Acute Flaccid Myelitis (AFM)	DSHS will forward specimen to CDC. Do not ship directly to CDC.	Yes	CSF, Serum, Whole Blood, and Stool	Depends on specimen Type	Depends on specimen Type	Depends on specimen type	G-2V	Call EAIDU VPD team at 512-776-7676 See AFM section for additional details
Amebiasis	Outbreaks or by request only	Yes	Raw stool	PVA & Formalin	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See amebiasis section for additional details

Ascariasis	Yes	Yes – Stool	Raw stool or Adult Worm	Raw Stool - PVA & Formalin Adult Worm - Formalin or Ethanol	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See ascariasis section for additional details
Botulism	Isolate required by law	No	Raw stool (>10g) (and serum or wound, if appropriate)	None	Cold		G-27A	Require epi approval before submitting. See botulism section for additional details

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Campylobacteriosis	Outbreaks or by request only	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2B	See campylobacteriosis section for additional details
Candida auris	Yes	Only for surveillance studies directed by DSHS EAIDG	Isolate	Sabouraud Dextrose agar slants	Ambient	As soon as possible	G-2E	Notifiable Condition as of 1/5/2021
Carbapenem-resistant *Enterobacterales* (CRE) and Pseudomonas aeruginosa (CRPA)	No	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2E	Lab confirmation is not necessary; however, submission is appreciate.
Cryptosporidiosis	Outbreaks or by request only	Yes	Raw stool	PVA & Formalin	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See cryptosporidiosis section for additional details

Cyclosporiasis	Yes	Yes	Raw stool	PVA, Formalin, & Cary Blair	Ambient	Not specified; within expiration date of PVA, Formalin, & Cary Blair vials	G-2B	See cyclosporiasis section for additional details
Diphtheria	Isolate required by law	Yes	Swab beneath membrane or isolate	Amies or Stuart's transport or Loeffler's Slant	2 – 25°C	Within 48 hours of collection	G-2B	Call EAIDU VPD team at 512-776-7676

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Ebola	DSHS/LRN Pre-approval required.	No	Blood	Two **plastic** EDTA purple tops with ≥ 4 ml	Cold	Send by courier for over-night or more rapid delivery	G-27A	Testing must be approved by EAIDU and CDC prior to shipping. Call 512-221-6852
Fascioliasis	Yes	Yes	Raw stool	PVA & Formalin	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See fasciolia sis section for additional details
Haemophilus Influenzae, invasive disease	Isolate required by law on patients under 5 years Old	No	Isolate	Chocolate agar slant	Ambient temp	Within 48 hours of subcultu re	G-2B	Isolates from sterile sites only
HAV	No	N/A	N/A	N/A	N/A	N/A	N/A	Widely available commercially
HBV	No	N/A	N/A	N/A	N/A	N/A	N/A	Widely available commerciall y

HCV	No	N/A	N/A	N/A	N/A	N/A	N/A	Widely available commercially
Hookworm	Yes	Yes – Stool	Raw stool or Adult Worm	Raw Stool - PVA & Formalin Adult Worm - Formalin or Ethanol	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See hookworm (ancylostomiasis) section for additional details

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Influenza	Specimens of interest or surveillance specimens only	Yes	NP swab	Viral Transport Media approved for influenza Viruses	Cold	Within 72 hours of Collection	G-2V	See Flu Lab Surveillance Protocol for list of specimens of interest, additional specimens acceptable, and for specimens >72 hours after collection
Legionellosis	Outbreaks or by request only	No	Isolate	BCYE slant	Ambient	Not specified; within expiration date of media	G-2B	See Legionellosis section for other acceptable specimen types
Listeriosis	Isolate required by law	No	Isolate	Non-glucose containing agar slants	Ambient	Not specified; within expiration date of media	G-2B	See listeriosis section for additional details

Measles - PCR	Yes	Yes	Pharyngeal swab (throat swab is preferred)	Viral Transport Media	Cold	Within 48 hours of collection	G-2V	See measles section for additional acceptable specimens and for specimens > 48 after collection
Measles - Serology	Yes	No	Spun down serum	Red or tiger top tube	Cold	Within 48 hours of collection	G-2A	
Meningitis/ Encephalitis, Amebic	Testing done by CDC	No	Multiple	Varies	Varies	Varies	Call 512-776-7560	See amebic meningitis section for details

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Meningococcal (Neisseria meningitidis)	Isolate required by law	No	Isolate	Blood or chocolate agar	Ambient temp	Not specified; within expiration date of media	G-2B	Isolates from sterile sites or purpuric lesions required to be sent; if isolate not available, EAIDU requests specimen from sterile site for PCR at CDC
Multidrug-resistant Acinetobacter (MDR-A)	No	No	Isolate	Agar Slant	Ambient temp	Not specified; within expiration date of media	G-2E	Lab confirmation is not necessary. Test not performed at DSHS, specimens will be submitted to Regional ARLN for testing.

Mumps - Serology	No	N/A	N/A	N/A	N/A	N/A	N/A	DSHS no longer offers mumps IgM testing. Commercially available.
Mumps - PCR	If needed	Yes	Buccal swab (use throat swab on cheek)	Viral Transport Media	Cold	Within 48 hours of collection	G-2V	Preferred method of specimen submission
Norovirus	Yes	No	Raw Stool	None	Cold	As soon as possible	G-2B	Only raw stool accepted; do not freeze; See norovirus section for details

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Paragonimiasis	Yes	Yes	Raw stool	PVA & Formalin	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See paragonimiasis section for additional details
Pertussis - PCR	Outbreaks or by request only	Yes	NP swab	Dry tube/no Media	Cold	Within 48 hours of Collection	G-2B	See pertussis section for additional details
Polio	Testing done by CDC	No	Multiple	Varies	Cold	Within 48 hours of Collection	G-2V	Call EAIDU VPD team at 512-776-7676
Rubella PCR	Yes	Yes	Pharyngeal swab (throat swab is preferred)	Viral Transport Media	Cold	Within 48 hours of collection	G-2V	Specimens will be forwarded to CDC or another state public health lab for PCR

Rubella - Serology	No	N/A	N/A	N/A	N/A	N/A	N/A	Specimens may be submitted for IgG testing if not available from a commercial lab. Rubella IgM testing is no longer offered, effective 1/1/21. Commercially available.

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Salmonellosis	Isolate required by law	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2B	Clinical specimen requested, if isolate not available. See Salmonellosis section for additional details
Shiga toxin-producing E. coli	Isolate required by law	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2B	Clinical specimen requested, if isolate not available. See STEC section for additional details
Shigellosis	Yes	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2B	See shigellosis section for additional details

Smallpox suspects	DSHS/LRN Pre-approval required	No	Collect all specimens listed by disease stage at https://www.cdc.gov/smallpox/lab-personnel/specimen-collection/specimen-collection-transport.html. Instructions include collection methods and materials for each type of specimen.	Cold	Send by courier for over-night or more rapid delivery	G-27A	Testing must be approved by EAIDU and CDC prior to shipping. Call 512-221-6852

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Streptococcus, Group A (S. pyogenes)	Clusters/ outbreaks (if pre-approved) or by request only	No	Isolate	Agar slant	Ambient		G-2B	Commercial testing widely available for initial ID; PFGE testing at DSHS requires pre-approval from EAIDU IRID Team at 512-776-7676
Streptococcus, Group B (S. agalactiae)	Clusters/ outbreaks (if pre-approved) or by request only	No	Isolate	Agar slant	Ambient		G-2B	Commercial testing widely available for initial ID; PFGE testing at DSHS requires pre-approval from EAIDU IRID Team at 512-776-7676

Streptococcus pneumoniae, invasive disease	Isolate required by law on patients under 5 years old	No	Isolate	Agar slant	Ambient		G-2B	Isolates from sterile sites only
Tetanus	No	N/A	N/A	N/A	N/A	N/A	N/A	Lab confirmation is not necessary

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
Trichuriasis	Yes	Yes – Stool	Raw stool or Adult Worm	Raw Stool - PVA & Formalin Adult Worm - Formalin or Ethanol	Ambient	Not specified; within expiration date of PVA & Formalin vials	G-2B	See trichuriasis section for additional details
Varicella PCR	Yes or send directly to CDC	No	Lesion/scab scraping	NO media	Ambient temperature	Within 48 hours of Collection	G-2V form needed only if sending to DSHS to be forwarded to CDC	DSHS will forward the specimen to MN PH lab. Providers can also submit specimens directly to CDC.
Vibriosis	Isolates required by law	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2B	Clinical specimen requested, if isolate not available See Vibriosis section for additional details

Viral Hemorrhagic Fever (non-Ebola)	Testing done by CDC	No	Multiple	Varies	Varies	Varies	Contact EAIDU	Approval from CDC is required before submitting specimen for testing. Contact EAIDU to arrange for testing.

Condition / Pathogen	Send specimens to DSHS laboratory	Collection kit available	Preferred specimen	Media	Transport temperature	Time period for receipt	DSHS laboratory form	Note
VISA/VRSA	Yes	No	Isolate	Blood agar or BHI medium	Ambient	Within 48 hours of susceptibility Results	G-2B	Call DSHS regional HAI Epidemiologist for the appropriate jurisdiction
Yersiniosis	Outbreaks or by request only	No	Isolate	Agar slant	Ambient	Not specified; within expiration date of media	G-2B	See shigellosis section for additional details

Cold = 2 – 8 °C
Ambient = room temperature

REVISION HISTORY

May 2021

- Getting a Lab Submitter ID and Submission Forms:
  - Added toll-free number
- How to Order Specimen Collection Supplies:
  - Removed fecal specimens for bacterial culture, fecal specimens for intestinal parasites from specimen collection kits available to be ordered
  - Added face mask to supplies provided, deleted specimen tube from Nasopharyngeal (NP) swab for Pertussis (PCR) tests
- Steps to Ship Specimens:
  - Changed the word "Most" to "All" specimens require at least two identifiers on the specimen tube/container such as patient name and date of birth.
  - Changed the word "State" to "Federal" do not ship a specimen to arrive on Saturday, Sunday or a Federal holiday.
- Preferred Specimen Submission Table:
  - Edits to Acute Flaccid Myelitis (AFM): Preferred specimen updated, DSHS laboratory form updated
  - Campylobacteriosis: Send specimens to DSHS laboratory for outbreaks or by request only
  - Candida Auris: Send specimens to DSHS laboratory, collection kit available only for surveillance studies directed by DSHS EAIDG, preferred specimen isolate, media Sabouraud Dextrose agar slants, transport temperature ambient, time period for receipt as soon as possible, DSHS laboratory form G-2E, notifiable condition as of 1/5/21
  - Carbapenem- resistant *Enterobacterales* (CRE) and Pseudomonas aeruginosa (CRPA): Collection kit not available, preferred specimen isolate, media Agar slant, transport temperature ambient, time period for receipt not specified; within expiration date of media, DSHS laboratory form G-2E, lab confirmation is not necessary however submission is appreciated.
  - Cyclosporiasis: Added media Cary Blair
  - Legionellosis: Time period for receipt changed to not specified; within expiration date of media
  - Measles - PCR: Added throat swab is preferred specimen
  - Meningococcal (*Neisseria meningitidis*): Time period for receipt changed to not specified; within expiration date of media
  - Multidrug-resistant *Acinetobacter* (MDR-A): Collection kit not available, preferred specimen isolate, media Agar Slant, temperature ambient, time period for receipt not specified; within expiration date of media, DSHS laboratory form G-2E, added test not performed at DSHS, specimens will be submitted to Regional ARLN for testing.
  - Rubella PCR: Added throat swab is preferred specimen
  - Varicella PCR: Added G-2V form needed only if sending to DSHS to be forwarded to CDC

January 2018

- Updated the Basic Health Department Recommendations and how to Order Specimen Collections Supplies sections
- Updated How to Order Specimen Collection Supplies section for Pertussis PCR to include note about testing only in outbreak situations or by request.
- In the Preferred Specimen Submission Table:
    - Added the word Lab to "Flu Surveillance Protocol" in the "Notes" column of the "Influenza" row
    - Minor edits to botulism, salmonellosis. STEC, and vibriosis
    - Changed *E. coli,* shiga toxin-producing to Shiga toxin-producing *E. coli* and moved to alphabetical place in chart
    - Acute flaccid myelitis row updated to send specimen to DSHS not directly to the CDC, and to contact EAIDU VPD team
    - Updated diphtheria notes section to contact EAIDU VPD team
    - Added words invasive disease to *Haemophilus influenzae* and *Streptococcus pneumoniae*

Appendix D: Summary of Updates

December 2023

Introductions

- Minor revisions to staff

Ascariasis

- Distinguish the common names for these agents i.e. worms or helminths, from the scientific classification
- Clearly define the incubation period
- Morbidity is associated with both symptomatic and asymptomatic infections
- Updated how to submit a case investigation
- Described procedure for a case that is lost to follow-up
- Provide case with information about testing and treatment

Botulism

- Deleted On-Call phone and provided 24/7 line phone
- Minor revisions

Campylobacter

- Replaced hyperlink to NORS since NORS website was updated in 2023
- Minor revisions to links

Hepatitis A

- Updated the outbreak definition and criteria

Hepatitis B

- Updated the confirmatory and presumptive laboratory criteria
- Updated the prioritization of investigations

Hookworm

- Distinguish the common names for these agents i.e. worms or helminths, from the scientific classification
- Clearly define the incubation period
- Morbidity is associated with both symptomatic and asymptomatic infections
- Updated how to submit a case investigation
- Described procedure for a case that is lost to follow-up
- Provide case with information about testing and treatment

Measles

- Updated Outbreaks section
- Updated Prophylaxis Guidelines section
- Updated monitoring contacts section
- Updated measles viral specimen collection – PCR testing page

Mumps

- Updated clinical criteria
- Updated laboratory evidence
- Updated epidemiologic linkage criteria

- Updated case classifications
- Updated flowcharts

Novel Coronavirus, Other

- Updated wording on page 282: "Any suspected novel coronavirus case, **in absence of more likely etiology**, should be investigated immediately."

Poliomyelitis (Paralytic and Non-Paralytic)

- Updated the clinical case definition
- Updated laboratory evidence
- Updated case classifications

Salmonella Paratyphi

- Updated School/Child-Care criteria to match criteria for Salmonella Typhi
- Added exclusions for food employees

Salmonella Typhi

- Corrected guide on how to report Salmonella in NEDSS under Tab. 1 after "Food Samples and env.swabs"

Tricuriasis

- Distinguish the common names for these agents i.e. worms or helminths, from the scientific classification
- Clearly define the incubation period
- Morbidity is associated with both symptomatic and asymptomatic infections
- Updated how to submit a case investigation
- Described procedure for a case that is lost to follow-up
- Provide case with information about testing and treatment

Varicella

- Updated clinical criteria
- Updated laboratory evidence
- Updated epidemiologic linkage criteria
- Updated case classifications
- Updated case status classification flowchart
- Updated case investigation section
- Updated control measures
- Updated exclusion section
- Updated managing special situations section to include Immigration and Customs Enforcement (ICE) facilities

Appendix E: Additional Resources

Table of Contents:

DISEASE INVESTIGATION TOOLS

- The Emerging and Acute Infectious Disease Guidelines: http://www.dshs.texas.gov/eaidu/investigation/Investigation-Guidance.xls or
- The Epi Case Criteria Guide: www.dshs.texas.gov/preventable-adverse-events/infectious-disease-prevention-health-practioner-guidance-training
- NBS (NEDSS) Data Entry Guidelines: txnedss.dshs.state.tx.us -/PHINDox/UserResources/
- DSHS Reporting Forms: www.dshs.texas.gov/eaidu/investigation/forms/
- Investigation Forms and tools: www.dshs.texas.gov/eaidu/investigation/
- Notifiable Conditions List: Notifiable Conditions | Texas DSHS
- Hep A toolkit: Hepatitis A | Texas DSHS
- Measles toolkit: Measles Communication Toolkit | Texas DSHS
- Pertussis toolkit: Pertussis (Whooping Cough) | Texas DSHS
- Laboratory Submission Guide: www.dshs.texas.gov/lab/MRS_labtests_toc.shtm
- Council to Improve Foodborne Outbreak Response (CIFOR) Guidelines: http://cifor.us/products/guidelines
- CDC Legionellosis Hypothesis- Generating Questionnaire: Legionnaires' disease Investigations | LD Investigations | CDC
- CDC *Legionella* Environmental Assessment Form: Legionnaires' disease Investigations | LD Investigations | CDC
- Texas Influenza Surveillance Handbook: www.dshs.texas.gov/eaidu/disease/influenza/Texas-Influenza-Surveillance-Handbook/
- Vaccine Information Sheets: http://www.dshs.texas.gov/immunize/literature/litlist.shtm
- A Primer for Lone Ranger Epidemiologists in Texas Counties Disease Surveillance and Epidemiology Health Practitioner Guidance and Training | Texas DSHS
- Communicable Disease Chart and Notes for Schools and Child-Care Centers (i.e., School Exclusion chart)
    - Copies can be ordered at School Communicable Disease Chart | Texas DSHS
- Texas Food Establishment Rules (TFER) https://www.dshs.texas.gov/foodestablishments/laws-rules.aspx

HELPFUL DSHS WEBSITES

- Department of State Health Services: www.dshs.texas.gov/
- Emerging and Acute Infectious Disease Unit: www.dshs.texas.gov/eaidu/health/ideas/
- State and county level data by condition: www.dshs.texas.gov/eaidu/Data/Annual/
- Foodborne Illness: http://www.dshs.texas.gov/eaidu/health/foodborne_illness/
- Food Establishments Group, Rules and Regulations: https://www.dshs.texas.gov/foodestablishments/laws-rules.aspx
- Perinatal Hepatitis B Prevention Program: https://www.dshs.texas.gov/immunize/perinatal-hepatitis-B/
- Immunization Unit: https://www.dshs.texas.gov/immunize/
- Infectious Disease Prevention Section: www.dshs.texas.gov/idps-home
- Laboratory Services: http://www.dshs.texas.gov/lab/
- Recommended Immunization Schedules: http://www.dshs.texas.gov/immunize/schedule/default.shtm
- School & Child-Care Facility Immunization Requirements: http://www.dshs.texas.gov/immunize/school/default.shtm
- Search by Disease: www.dshs.texas.gov/diseases-conditions
- Texas Administrative Code (TAC), Title 25 Health Services, §§97.1-97.14: Texas Administrative Code (TAC)
- Influenza (Flu): http://www.dshs.texas.gov/flu/
- Vaccine Adverse Event Reporting System (VAERS): www.dshs.texas.gov/immunize/safety/vaersweb.shtm
- Vaccine Preventable Diseases: https://www.dshs.texas.gov/vaccine-preventable-diseases
- Antibiotic-Resistance/Multidrug-Resistant Organisms: www.dshs.texas.gov/antibiotic-resistance-multidrug-resistant-organisms

HELPFUL CDC WEBSITES

- CDC Vaccines and Preventable Diseases: https://www.cdc.gov/vaccines/vpd/
- Manual for the Surveillance of Vaccine Preventable Diseases: www.cdc.gov/vaccines/pubs/surv-manual/index.html
- Morbidity and Mortality Weekly Report (MMWR): www.cdc.gov/mmwr/
- Epidemiology and Prevention of Vaccine Preventable Disease (Pink Book):

www.cdc.gov/vaccines/pubs/pinkbook/index.html

- Immunization Education & Training/Webinars: https://www.cdc.gov/vaccines/ed/webinar-epv/index.html
- Foodborne Outbreaks: http://www.cdc.gov/foodsafety/outbreaks/
- Food Safety: http://www.cdc.gov/foodsafety/
- National Outbreak Reporting System (NORS) http://www.cdc.gov/nors/
- Centers for Disease Control and Prevention *Streptococcus pneumoniae* information: http://www.cdc.gov/pneumococcal/about/index.html
- Centers for Disease Control and Prevention group A *Streptococcus* information: http://www.cdc.gov/groupastrep/index.html
- Centers for Disease Control and Prevention group B *Streptococcus* information: http://www.cdc.gov/groupbstrep/index.html
- Centers for Disease Control and Prevention Antibiotic/ Antimicrobial Resistance: www.cdc.gov/drugresistance/
- Centers for Disease Control and Prevention - National Healthcare Safety Network Enrolled Facilities: https://www.cdc.gov/nhsn/enrolled-facilities/index.html
- Centers for Disease Control and Prevention: Healthcare Infection Control Practices Advisory Committee (HICPAC)
- Guidelines for Isolation Precautions: https://www.cdc.gov/hicpac/2007IP/2007ip_appendA.html
- Centers for Disease Control and Prevention Ebola (Ebola Virus Disease) information: http://www.cdc.gov/vhf/ebola/
- Centers for Disease Control and Prevention Viral Hemorrhagic Fevers (VHFs) information: http://www.cdc.gov/vhf/virus-families/index.html
- Centers for Disease Control and Prevention Neglected Tropical Disease information: http://www.cdc.gov/globalhealth/ntd/

ADDITIONAL LINKS AND RESOURCES

- **Control of Communicable Diseases Manual** (21st Edition). Heymann, D.L. (Ed). American Public Health Association: Washington; 2015. www.apha.org/ccdm (A subscription is required for full online access. If you are in need of a printed book copy, please contact DSHS EAIDU.)
- FDA Bad Bug Book; Handbook of Foodborne Pathogenic Microorganisms and Natural Toxins: http://www.fda.gov/downloads/food/foodborneillnesscontaminants/ucm2976

27.pdf

- FDA Recalls of Food & Dietary Supplements: http://www.fda.gov/food/recallsoutbreaksemergencies/recalls/default.htm

- Hepatitis B Foundation: www.hepb.org/

- Viral Hepatitis Serology Training Online: Viral Hepatitis Serology Training | Viral Hepatitis | CDC
- Prevention of Invasive Group A Streptococcal Disease among Household Contacts of Case Patients and among Postpartum and Postsurgical Patients: Recommendations from the Centers for Disease Control and Prevention: http://cid.oxfordjournals.org/content/35/8/950.long
- Immunization Action Coalition: www.immunize.org/

- American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. (ASHRAE) guidance for legionellosis:
    - ANSI/ASHRAE Standard 188-2015: "Legionellosis: Risk Management for Building Water Systems": https://www.ashrae.org/resources--publications/bookstore/ansi-ashrae-standard-188-2015-legionellosis-risk- management-for-building-water-systems

- Texas Food Safety and Defense Task Force https://tx.foodprotectiontaskforce.com/

- Texas Legionellosis Task Force Guidance: www.dshs.texas.gov/eaidu/disease/legionnaires/taskforce/

- Certification Board of Infection Control and Epidemiology http://www.cbic.org/

- Association for Professionals in Infection Control and Epidemiology http://www.apic.org/

Appendix F: Acronyms and Abbreviations

Acronym	Meaning
AAP	American Academy of Pediatrics
ACIP	Advisory Committee on Immunizations Practices
AFM	Acute Flaccid Myelitis
AFRI	Acute febrile respiratory illness
Ag	Antigen
AIDS	Acquired immune deficiency syndrome
ALF	Assisted living facility
APIC	Association for Professionals in Infection Control and Epidemiology
ARDS	Acute respiratory distress syndrome
ARI	Acute respiratory illness
ASAP	As soon as possible
ASHRAE	American Society of Heating, Refrigerating and Air-Conditioning Engineers
AVR	Antiviral resistant
BAL	Bronchoalveolar lavage
BMI	Body mass index
BSL	Biosafety Level
BT	Bioterrorism
BCYE	Buffered charcoal yeast extract (agar)
ccIIV	Cell culture-based inactivated influenza vaccine
CDC	Centers for Disease Control and Prevention
CIDRAP	Center for Infectious Disease Research and Policy (University Minnesota)
CIDT	Culture-independent diagnostic testing
CLIA	Clinical Laboratory Improvement Amendments
CLSI	Clinical and Laboratory Standards Institute
CMS	Centers for Medicaid and Medicare Services
CMV	Cytomegalovirus
CNS	Central nervous system
CO	(DSHS) Central office
CO_2	Carbon dioxide
COB	Close of business
COPD	Chronic obstructive pulmonary disease
CRE	Carbapenem-resistant *Enterobacterales*
CRS	Congenital rubella syndrome
CSF	Cerebrospinal fluid
CSTE	Council of State and Territorial Epidemiologists
CSV	Comma-separated values
Cx	Culture
DFA	Direct fluorescent antibody test
DGMQ	(CDC) Division of Global Migration and Quarantine
DNA	Deoxyribonucleic acid
DOB	Date of birth
DOD	Date of death

DSHS	(Texas) Department of State Health Services
DTP	Diphtheria and Tetanus Toxoids and Pertussis (vaccine)
EAIDU	Emerging and Acute Infectious Disease Unit
ED	Emergency department

Acronym	Meaning
EIA	Enzyme immunoassay (interchangeable with ELISA)
ELC	Epidemiology & Laboratory Capacity
ELISA	Enzyme-linked immunosorbent assay (interchangeable with EIA)
ELITE	Environmental Legionella Isolation Techniques Evaluation (program)
EMS	Emergency medical services
ER	Emergency room
ERT	(DSHS) Epidemiology Response Team
EVD	Ebola virus disease
FDA	Food and Drug Administration
FLA	Free living ameba
FTM	Flu transport medium
GAE	Granulomatous Amebic Encephalitis
GAS	Group A Streptococcus
GBS	Group B Streptococcus
GISN	(WHO) Global Influenza Surveillance Network
HAI	Healthcare-associated infection
HAV	Hepatitis A virus
HBcAg	Hepatitis B core antigen
HBeAg	Hepatitis B e antigen
HBIG	Hepatitis B immune globulin
HBsAg	Hepatitis B virus surface antigen
HBV	Hepatitis B virus
HCP	Healthcare provider/professional
HCW	Healthcare worker
HD	Health department
HHS	Health and Human Services
HI	Hemagglutination inhibition
Hib	*Haemophilus influenzae* type B
HICPAC	Healthcare Infection Control Practices Advisory Committee
HIV	Human immunodeficiency virus
HPAI	Highly pathogenic avian influenza
HSR	(DSHS) Health Service Region
HVAC	Heating, ventilation, and air conditioning
Hx	History
IATA	International Air Transport Association
IC	Infection control
ICD	International Classification of Diseases
ICP	Infection control practitioner
ICS	Incident command system
ICU	Intensive care unit
ID	Identification

IDCU	(DSHS) Infectious Disease Control Unit
IG	Immune globulin

Acronym	Meaning
NREVSS	National Respiratory and Enteric Virus Surveillance System
NVSN	New Vaccine Surveillance Network
OP	Oropharyngeal
OPV	Oral Polio Vaccine
OTC	Over-the-counter
PAHO	Pan American Health Organization
PAM	Primary amebic meningoencephalitis
PCV7	Pneumococcal conjugate vaccine 7-valent
PCV13	Pneumococcal conjugate vaccine 13-valent
PFGE	Pulsed-field gel electrophoresis
PCR	Polymerase chain reaction
PEP	Post exposure prophylaxis
PHEP	Public Health Emergency Preparedness
PHLIMS	Public health laboratory information management system
PHP	Public Health Preparedness
PIO	Public Information Office
PO	*Per os* (oral administration) or post office
PPE	Personal protective equipment
PPSV23	Pneumococcal polysaccharide vaccine 23-valent
PPV	Positive predictive value
ProMed	Program for Monitoring Emerging Diseases
PUI	Patient under investigation
PVA	Polyvinyl alcohol
RHD	Regional health department
RIV	Recombinant (hemagglutinin) influenza vaccine
RNA	Ribonucleic acid
rRT-PCR	Real-time reverse transcription polymerase chain reaction
SARI	Severe acute respiratory illness
SHD	State health department
SOB	Shortness of breath
SSN	Social security number
SST	Serum separator tube
Sx	Symptoms
TAC	Texas Administrative Code
TAHC	Texas Animal Health Commission
Td	Tetanus-diphtheria (vaccine)
Tdap	Tetanus toxoid, Reduced Diphtheria toxoid, Acellular Pertussis (vaccine) (7 & older)

TIG	Tetanus immune globulin
TIV	Trivalent inactivated vaccine (used prior to 2013-14 influenza season)
TMP-SMP	Trimethoprim/sulfamethoxazole (antibiotic)
TPI	Texas provider identifier
TPW	Texas Parks and Wildlife
TSS	Toxic shock syndrome
TT	Tetanus toxoid
USMU	(CDC) US-Mexico Unit
UTM	Universal transport medium
VariZIG	Varicella Zoster immune globulin
VHF	Viral hemorrhagic fever
VISA	Vancomycin-intermediate *Staphylococcus aureus*
VPD	Vaccine preventable disease
VRSA	Vancomycin-resistant *Staphylococcus aureus*
VTM	Viral transport medium
VZV	Varicella zoster virus
WHO	World Health Organization