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# Infection Prevention for Epidemiologists

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**HAI Epidemiologists**

# Objectives

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- Develop a better understanding of the role of an Infection Preventionist in a healthcare setting.
- Identify resources to assist in investigations related to healthcare-associated infections.
- Explain the steps that are unique to controlling a healthcare-associated infection outbreak.



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# Healthcare-Associated Infections

Healthcare-Associated Infections (HAIs) are infections that patients develop during the course of receiving treatment for other conditions at a healthcare facility.

**650K**

people in the US develop  
infections during a hospital stay

**1 in every 25 patients**

**75K**

people die each year as a result  
of hospital infections



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# Infection Control in perspective



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Son état est confusionnel, mais sa température est retombée.

# Healthcare Settings

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- Acute care hospitals
- Long-term care facilities
- Long-term acute care hospitals
- Inpatient rehabilitation facilities
- Ambulatory surgery centers
- Outpatient clinics
- Urgent care/freestanding emergency rooms
- Dialysis settings
- Blood banks/plasma donation centers
- Birthing centers
- And more!



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# How Do Infections Occur?

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**In order for an infection to occur, three elements are required:**

## ***Source of infecting microorganism***

- Patients
- Personnel
- Visitors
- Inanimate objects

## ***Susceptible host***

- Age
- Underlying disease
- Steroid therapy
- Chemotherapy or radiation
- Surgery
- Indwelling catheters
- Poor skin integrity
- Poor nutrition

## ***Means of transmission for the microorganism***

- Contact
- Droplet
- Airborne



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# Most common types of HAIs

HAI Estimates Occurring in US Acute Care Hospitals, 2011

Major Site of Infection	Estimated No	Percent of Total
Pneumonia	157,500	22%
Gastrointestinal Illness	123,100	17%
UTI	93,300	13%
Primary Bloodstream Infections	71,900	10%
Surgical Site from any inpatient surgery	157,500	22%
Other types of infections	118,500	16%
<b>Estimated total number of infections in hospitals</b>	<b>721,800</b>	<b>100%</b>



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# Who are infection preventionists?



Infection preventionists use their detective skills to find the bad germs and make sure everyone is doing the right things to keep you safe.



Catheters or other devices will be placed in your body after your skin receives proper cleaning.



Healthcare workers will clean their hands before and after they care for you.



Your healthcare workers will wear gloves, gowns, and masks at the right times.

If you are in isolation, you and your visitors may need to do this too.



Your room and any equipment that is used on you will be clean.



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[www.apic.org/InfectionPreventionandYou](http://www.apic.org/InfectionPreventionandYou)

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# Infection Control Program

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## a. Policies and Procedures

- *Standard and Transmission based precautions*
- *Environmental cleaning*
- *Occupational health*

## b. Risk Assessment

## c. Surveillance System

## d. Antibiotic Stewardship Program

\*Infection Control Program needs to be reviewed annually and as national standards change\*



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# **Standard and Transmission Based Precautions**

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# How can we prevent infections?

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**a. Standard Precautions**: Applies to all individuals regardless of diagnosis or presumed infection status.

**b. Transmission-Based Precautions (Isolation Precautions)**: Designed for individuals who have or are suspected to have highly transmissible infections that require additional precautions beyond standard precautions.



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# Standard Precautions

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- Also known as **Universal Precautions**.
- Designed to reduce the risk of transmission from recognized and unrecognized sources of infection.
- Applies to all patients/residents regardless of diagnosis or presumed infection status.
- Includes:
  - Hand Hygiene
  - Personal Protective Equipment
  - Waste/sharp disposal
  - Safe injection practices



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**The single most important measure to reduce the risk of infection is:**

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**HAND HYGIENE**



[www.cdc.gov/HandHygiene](http://www.cdc.gov/HandHygiene)

# Techniques for hand hygiene

1. Alcohol-based hand rubs
2. Soap and water



CDC guidelines:

<https://www.cdc.gov/mmwr/PDF/rr/rr5116.pdf>



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# Soap and water *or* Alcohol-based hand sanitizer

## WASH WITH SOAP AND WATER

- When hands are visibly dirty
- After a known or suspected exposure to c. diff (during outbreaks or higher endemic rates)
- After a known or suspected exposure to infectious diarrhea during *norovirus* outbreaks
- If exposure to *Bacillus anthracis* is known or suspected
- Before eating
- After using a restroom

## USE AN ALCOHOL-BASED HAND SANITIZER

- For EVERYTHING ELSE!



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# When should caregivers perform hand hygiene?

- After **contact with blood, body fluids, secretions, excretions**, and equipment contacted with the above whether or not gloves are worn.
- Before **insertion/care of invasive devices** (CVC, Foley, or Vents).
- After contact with a **patient's intact skin**.
- After contact with **environmental surfaces** in the immediate vicinity of patients/residents.
- Before **eating, drinking and handling food**.
- After **toileting**.

**IPs should monitor adherence and provide direct feedback.**



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# Other things to keep in mind...

1. Hand hygiene is important for both healthcare workers and patients/residents.
2. Healthcare workers should assist/encourage patients/residents to perform hand hygiene.
  - Before entering and after exiting their rooms.
  - Before and after activities that require contact within other patients/residents or with games.
  - Before and after meals.
  - After toileting.
3. Hand hygiene training and competency for staff upon hire and annually thereafter.

**Think about the accessibility of sinks and hand sanitizers in healthcare facilities. Are they easily accessible to caregivers and patients/residents?**



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# Personal Protective Equipment (PPE)



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## WEAR GLOVES

Wear gloves when handling blood, body fluids, nonintact skin or soiled items. Change gloves between patients. Wash hands after removing gloves.



## WEAR MASK

Wear a mask and eye protection or face shield to protect mucous membranes of the eyes, nose, and mouth when likely to be splashed.



## WEAR GOWN

Wear a gown to protect skin and prevent soiling of clothing when likely to be splashed or sprayed. Wash hands after removing gown.

- **Anticipate exposure!**
- **Also use when patient/resident is on isolation precautions.**
- **Is the PPE in the facility easily available to the caregivers?**

# Isolation Precautions



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## 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings

Infection/Condition	Type of Precaution	Duration of Precaution	Precautions/Comments
Pediculosis (Lice)	Contact + Standard	Until 24 hours after initiation of effective therapy after treatment	
Pertussis (whooping cough)	Droplet + Standard	Until 5 days	Single patient room preferred. Cohorting an option. Post-exposure chemoprophylaxis for household contacts and HCWs with prolonged exposure to respiratory secretions [863]. Recommendations for Tdap vaccine in adults under development.

<https://www.cdc.gov/infectioncontrol/guidelines/isolation/appendix/type-duration-precautions.html>

# Types of Precautions

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- 1. Contact** – spread by skin to skin contact or contact with contaminated surfaces.
  - Example: MDROs
  - *PPE: Gowns and gloves*
- 2. Droplet** – spread in large droplets by coughing, talking, or sneezing.
  - Example: Influenza
  - *PPE: Masks*
- 3. Airborne** – spread in small particles and remain suspended in the air.
  - Example: Tuberculosis.
  - *PPE: N-95 respirator*
  - *Special room: Negative pressure*



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# More recommendations...

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- **Signage** should be placed outside the patient/resident's room.
- **Single-use disposable devices** or dedicated noncritical equipment, should be used when possible.
- Noncritical equipment shared between patients/residents should be **cleaned and disinfected** using an EPA-registered disinfectant after use.
- **PPE should be readily available** near the entrance to the patient/resident's room.
- **Education should be provided** to patients/residents and their visitors on the use of the precautions.

# Communication between units/other facilities



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<b>Precautions</b>	Currently in Isolation Precautions? <input type="checkbox"/> Yes		<input type="checkbox"/> No Isolation Precautions	
	If Yes check: <input type="checkbox"/> Contact <input type="checkbox"/> Droplet <input type="checkbox"/> Airborne <input type="checkbox"/> Other: _____			
<b>Organisms</b>	<b>Did or does have (send documentation):</b>		<input type="checkbox"/> No Known MDRO or Communicable Diseases	
	<b>Multiple Drug Resistant Organism (MDRO):</b>			<input type="checkbox"/> Yes
	MRSA			<input type="checkbox"/>
	VRE			<input type="checkbox"/>
	Acinetobacter not susceptible to carbapenems			<input type="checkbox"/>
	E. coli or Klebsiella not susceptible to carbapenems			<input type="checkbox"/>
	<b>Significant communicable disease:</b>			<input type="checkbox"/> Yes
	C. diff			<input type="checkbox"/>
Other <sup>±</sup> : _____ <small>±e.g.; lice, scabies, disseminated shingles, norovirus, flu, TB, etc.</small>		<input type="checkbox"/> (current or ruling out)		
*Additional info if known:				

<https://www.cdc.gov/hai/pdfs/toolkits/InfectionControlTransferFormExample2.pdf>



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# **Occupational Health**

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# Bloodborne Pathogens

- **Bloodborne pathogens** are infectious microorganisms in human blood that can cause disease in humans.
- They **include**, but are not limited to:
  1. Hepatitis B
  2. Hepatitis C
  3. HIV
- They can be transmitted through sexual contact, mother to child and **infected needle or sharp exposure.**



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# Bloodborne Pathogen Exposure Control Plan



- OSHA's 29CFR 1910.1030 Standard requires all employers to develop a written exposure control plan.
- **Model template:**  
<https://www.osha.gov/Publications/osha3186.pdf>



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# Regulated Biohazard Waste

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1. Items that would release blood or other potentially infectious materials in a liquid or semi-liquid state.
2. Items that are caked with dried blood or other potentially infectious materials.
3. Contaminated sharps.
4. Pathological and microbiological wastes.



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# Sharp Disposal



- Used sharps are to be placed in **puncture-resistant containers**.
- The Texas Commission on Environmental Quality (**TCEQ**) has guidelines on how to manage and dispose medical waste.

[https://www.tceq.texas.gov/permitting/waste\\_permits/msw\\_permits/mw\\_disposal.html](https://www.tceq.texas.gov/permitting/waste_permits/msw_permits/mw_disposal.html)

# Tuberculosis Guidelines



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There are two types of testing for TB in healthcare workers.

## 1. Initial baseline testing upon hire:

- Two-step testing with a TB skin test or a TB blood test.

## 2. Annual or serial screening:

- Determined by state regulations or risk assessment outcomes.

Risk classification	Frequency of testing
Low	Baseline; then test if TB exposure occurs
Medium	Baseline, then annually
Potential ongoing transmission	Baseline, then every 8–10 weeks until evidence of transmission has ceased

# TB Risk Assessment



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09/27/2006

Centers for Disease Control and Prevention  
Division of Tuberculosis Elimination

## Appendix B. Tuberculosis (TB) risk assessment worksheet

This model worksheet should be considered for use in performing TB risk assessments for health-care facilities and nontraditional facility-based settings. Facilities with more than one type of setting will need to apply this table to each setting.

Scoring    ✓ or Y = Yes                    X or N = No                    NA = Not Applicable

### 1. Incidence of TB

What is the incidence of TB in your community (county or region served by the health-care setting), and how does it compare with the state and national average? What is the incidence of TB in your facility and specific settings and how do those rates compare? (Incidence is the number of TB cases in your community the previous year. A rate of TB cases per 100,000 persons should be obtained for comparison.)\* This information can be obtained from the state or local health department.

Community rate \_\_\_\_\_  
State rate \_\_\_\_\_  
National rate \_\_\_\_\_  
Facility rate \_\_\_\_\_  
Department 1 rate \_\_\_\_\_  
Department 2 rate \_\_\_\_\_  
Department 3 rate \_\_\_\_\_

Are patients with suspected or confirmed TB disease encountered in your setting (inpatient and outpatient)?

Yes    No

[https://www.cdc.gov/tb/publications/guidelines/pdf/appendixb\\_092706.pdf](https://www.cdc.gov/tb/publications/guidelines/pdf/appendixb_092706.pdf)

# Work Exclusion Policies

## Center for Disease Control and Prevention (CDC)

**Table 3.** Summary of suggested work restrictions for health care personnel exposed to or infected with infectious diseases of importance in health care settings, in the absence of state and local regulations (modified from ACIP recommendations<sup>9</sup>)

Disease/problem	Work restriction	Duration	Category
Conjunctivitis	Restrict from patient contact and contact with the patient's environment	Until discharge ceases	II
Cytomegalovirus infections	No restriction		II
Diarrheal diseases			
Acute stage (diarrhea with other symptoms)	Restrict from patient contact, contact with the patient's environment, or food handling	Until symptoms resolve	IB
Convalescent stage, <i>Salmonella</i> spp.	Restrict from care of high-risk patients	Until symptoms resolve; consult with local and state health authorities regarding need for negative stool cultures	IB
Diphtheria	Exclude from duty	Until antimicrobial therapy completed and 2 cultures obtained $\geq 24$ hours apart are negative	IB
Enteroviral infections	Restrict from care of infants, neonates, and immunocompromised patients and their environments	Until symptoms resolve	II

<https://www.cdc.gov/hicpac/pdf/infectcontrol98.pdf>



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# **Environmental Cleaning**

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# Sanitary Environment



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- Surfaces become contaminated with infectious agents.
- Some agents can survive for prolonged periods on surfaces.
- Contact with contaminated surfaces can lead to cross transmission between people and environment.

Bacteria	Viability
<i>Acinetobacter spp.</i>	3 days – 5 months
<i>C.difficile (spore)</i>	5 months
<i>E.coli</i>	1.5 hours – 16 months
Enterococcus spp/VRE	5 days – 4 months
Klebsiella spp	2 hours – 30 months
Staph aureus / MRSA	7 days – 7 months



# Essentials of Environmental Cleaning

1. **Selecting appropriate** disinfectants and cleaning products.
  - a. *Clostridioides difficile*
  - b. *Candida auris*
2. Having regular **cleaning schedules**.
3. Providing proper **education and training** to all staff.
4. **Observing/monitoring** cleaning processes.
5. Ensuring **pest control** is done routinely.



UV markers



ATP detection



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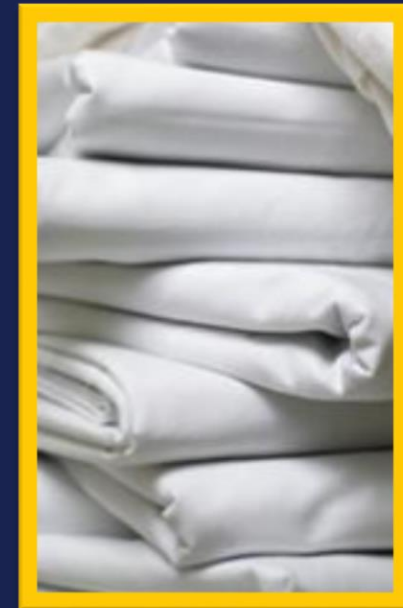
# Linen & Laundry



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- All **used linen** and laundry is considered **contaminated**.
- Keep **clean linen covered** or stored properly.
- Ensure laundry area has **availability of hand hygiene** products.
- **Wear appropriate PPE** (i.e., gloves and gowns) while sorting and handling contaminated linens.
- **Separate clean and dirty areas**. Workflow should prevent cross-contamination.
- Perform an **audit** for onsite and offsite laundry facilities.



# Cleaning Medical Devices

## Spaulding Classification System

Patient Contact	Examples	Device Classification	Minimum Inactivation Level
Intact skin		Non-Critical	Cleaning and/or Low/Intermediate Level Disinfection
Mucous membranes or non-intact skin		Semi-Critical	High Level Disinfection
Sterile areas of the body, including blood contact		Critical	Sterilization



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# High Level Disinfection (HLD)



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Manual vs. Automated





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# Sterile Processing Department (SPD)

- Steam sterilization (preferred method)
- Flash sterilization
- Low-Temp technologies
  - Ethylene Oxide "Gas"
  - Hydrogen Peroxide Gas Plasma
- Peracetic Acid
- Dry-heat
- Other methods





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# Quality Control – HLD and SPD

- Hands-on training
- Annual competencies
- Audits/rounds in all areas
- Log books
- Routine maintenance

Vanderbilt University Medical Center  
Operative Services  
UNIT BASED STERILIZATION LOG

Department: \_\_\_\_\_ Sterilizer #: \_\_\_\_\_ Date: \_\_\_\_/\_\_\_\_/\_\_\_\_

Load #	Reason	Cycle Type	OR #	In Sterilizer	Exposure			Chemical Indicator	# Included	Patient Sticker	LOAD ITEMS		
					Time	Maximum Temp	Pressure 21/32				Circle One	Circle One	OPEN
Loading Operator	1. Contaminated in OR	Gravity		Time				ACCEPT	Pass				
	2. Received Unsterile			A.M. P.M.									
	3. Turnover	Prevac		Out of Sterilizer				REJECT	Fail		1)		
	4. One of a Kind Item			Time									2)
	5. Terminal				Unloading Operator Signature						3)		
	6. Hole in Wrapper												
	7. Implant												
	8.				A.M. P.M.								
1. Contaminated in OR													
Loading Operator	1. Contaminated in OR	Gravity		Time				ACCEPT	Pass				
	2. Received Unsterile			A.M. P.M.									
	3. Turnover	Prevac		Out of Sterilizer				REJECT	Fail		1)		
	4. One of a Kind Item			Time									2)
	5. Terminal				Unloading Operator Signature						3)		
	6. Hole in Wrapper												
	7. Implant												
	8.				A.M. P.M.								
1. Contaminated in OR													
Loading Operator	1. Contaminated in OR	Gravity		Time				ACCEPT	Pass				
	2. Received Unsterile			A.M. P.M.									
	3. Turnover	Prevac		Out of Sterilizer				REJECT	Fail		1)		
	4. One of a Kind Item			Time									2)
	5. Terminal				Unloading Operator Signature						3)		
	6. Hole in Wrapper												
	7. Implant												
	8.				A.M. P.M.								
1. Contaminated in OR													

mydocuments/forms/office/vanderbilt daily sterilizer log #C 0718 / 12066



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# Surveillance System


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# Notifiable Conditions



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Access List Online 

## Texas Notifiable Conditions

**24/7 Number for Immediately Reportable-- 1-800-705-8868**

Report confirmed and suspected cases.  
Unless noted by \*, report to your local or regional health department using number above or find contact information at <http://www.dshs.state.tx.us/idcu/investigation/conditions/contacts/>



Contact Information\* 

A – I	When to Report	L – Y	When to Report
*Acquired immune deficiency syndrome (AIDS) <sup>1, 2</sup>	Within 1 week	*Lead, child blood, any level & adult blood, any level <sup>3</sup>	Call/Fax Immediately
Amebiasis <sup>4</sup>	Within 1 week	Legionellosis <sup>4</sup>	Within 1 week
Amebic meningitis and encephalitis <sup>4</sup>	Within 1 week	Leishmaniasis <sup>4</sup>	Within 1 week
Anaplasmosis <sup>4</sup>	Within 1 week	Listeriosis <sup>4,5</sup>	Within 1 week
<b>Anthrax</b> <sup>4, 5</sup>	<b>Call Immediately</b>	Lyme disease <sup>4</sup>	Within 1 week
Arboviral infections <sup>4, 6</sup>	Within 1 week	Malaria <sup>4</sup>	Within 1 week
*Asbestosis <sup>7</sup>	Within 1 week	<b>Measles (rubeola)</b> <sup>4</sup>	<b>Call Immediately</b>
Ascariasis <sup>4</sup>	Within 1 week	<b>Meningococcal infection, invasive (<i>Neisseria meningitidis</i>)</b> <sup>4, 5</sup>	<b>Call Immediately</b>
Babesiosis <sup>4</sup>	Within 1 week	<b>Multidrug-resistant <i>Acinetobacter</i> (MDR-A)</b> <sup>4, 8</sup>	<b>Within 1 work day</b>
<b>Botulism (adult and infant)</b> <sup>4, 5, 9</sup>	<b>Call Immediately</b> <sup>9</sup>	<b>Mumps</b> <sup>4, 10</sup>	<b>Within 1 work day</b> <sup>10</sup>

**In addition to the specified reportable conditions, any outbreak, exotic disease, or unusual group expression of disease that may be of public health concern should be reported by the most expeditious means available.**

<http://www.dshs.texas.gov/idcu/investigation/conditions/>



# HAI reporting in TX

Apart from the notifiable MDROs, there are other HAIs that are required to be reported in Texas and for CMS:

- Central Line Associated Bloodstream Infections (CLABSIs)
  - Catheter Associated Urinary Tract Infections (CAUTIs)
  - Select Surgical Site Infections (SSIs)
  - *Clostridium difficile* Infections (CDI)
  - *Methicillin Resistant Staphylococcus* (MRSA) Bacteremia
- 
- Facilities report HAIs through the CDC's National Healthcare Safety Network (NHSN).



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# HAI Reporting



View reports & comment

**CMS**





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# Surveillance- LTC

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- **McGeer Criteria**

- Intended to serve as a national standard for infection surveillance in long-term care facilities
- Updated 2012 (original version 1991)
  - Infection surveillance only \*not clinical/diagnostic
  - Definitions:  
[http://www.jstor.org/stable/10.1086/667743#\\_i8](http://www.jstor.org/stable/10.1086/667743#_i8)
  - Webinar/training from APIC:  
<http://webinars.apic.org/session.php?id=10152>

# Audits/Bundles



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## Point of Care Testing Observations (e.g., assisted blood glucose monitoring)

HH performed	Clean gloves worn	Single use, lancet used? <sup>1</sup>	Testing meter <sup>2</sup>	Gloves removed <sup>3</sup>	HH performed <sup>3</sup>
<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Dedicated to resident, cleaned/disinfected before storing <input type="radio"/> Cleaned/disinfected before use on resident	<input type="radio"/> Yes <input type="radio"/> No	<input type="radio"/> Yes <input type="radio"/> No

## Hand Hygiene and Contact Precautions Observations

Staff type*	Type of opportunity	HH performed?	Gown or glove indicated?	Gown/glove used?
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown used <input type="radio"/> Glove used <input type="radio"/> Both <input type="radio"/> Neither

## Indwelling Urinary Catheter (IUC) Maintenance Observations (i.e., Foley)

Indication assessed regularly <sup>1</sup>	Indication appropriate <sup>2</sup>	HH before handling IUC	Clean gloves donned before handling IUC	Bag < 2/3 full	Bag below bladder	Unobstructed flow	Device secured properly	Bag emptied properly <sup>3</sup>	Specimen collected properly <sup>4</sup>	Gloves Removed after handling IUC	HH after handling IUC
<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes	<input type="radio"/> Yes
<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No	<input type="radio"/> No
<input type="radio"/> NA*	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA	<input type="radio"/> NA



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# Antibiotic Stewardship Program

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# Why is Antibiotic Stewardship Important?



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Roughly

**40–75%**

of antibiotics are  
prescribed incorrectly.

Nearly

**50%**

of antibiotics prescribed  
in nursing homes  
may be given  
longer than necessary.<sup>1</sup>

- What contributes to antibiotic overuse?
  - Prescribing antibiotics to **prevent** infections.
  - Prescribing antibiotics for **colonization**.
  - Poor **communication** between transfer facilities.
  - Poor **infection control** practices.

# CDC Core Elements of Antibiotic Stewardship



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## Leadership commitment

Demonstrate support and commitment to safe and appropriate antibiotic use in your facility



## Accountability

Identify physician, nursing and pharmacy leads responsible for promoting and overseeing antibiotic stewardship activities in your facility



## Drug expertise

Establish access to consultant pharmacists or other individuals with experience or training in antibiotic stewardship for your facility



## Action

Implement **at least one** policy or practice to improve antibiotic use



## Tracking

Monitor **at least one process** measure of antibiotic use and **at least one outcome** from antibiotic use in your facility



## Reporting

Provide regular feedback on antibiotic use and resistance to prescribing clinicians, nursing staff and other relevant staff



## Education

Provide resources to clinicians, nursing staff, residents and families about antibiotic resistance and opportunities for improving antibiotic use

# HAI Case Studies

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**Let's figure out what is going on...**



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# Case Study #1: C. diff in LTC

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Call from LTC facility stating that they have had a recent new case of C. diff after experiencing 5 cases previously in the last month.

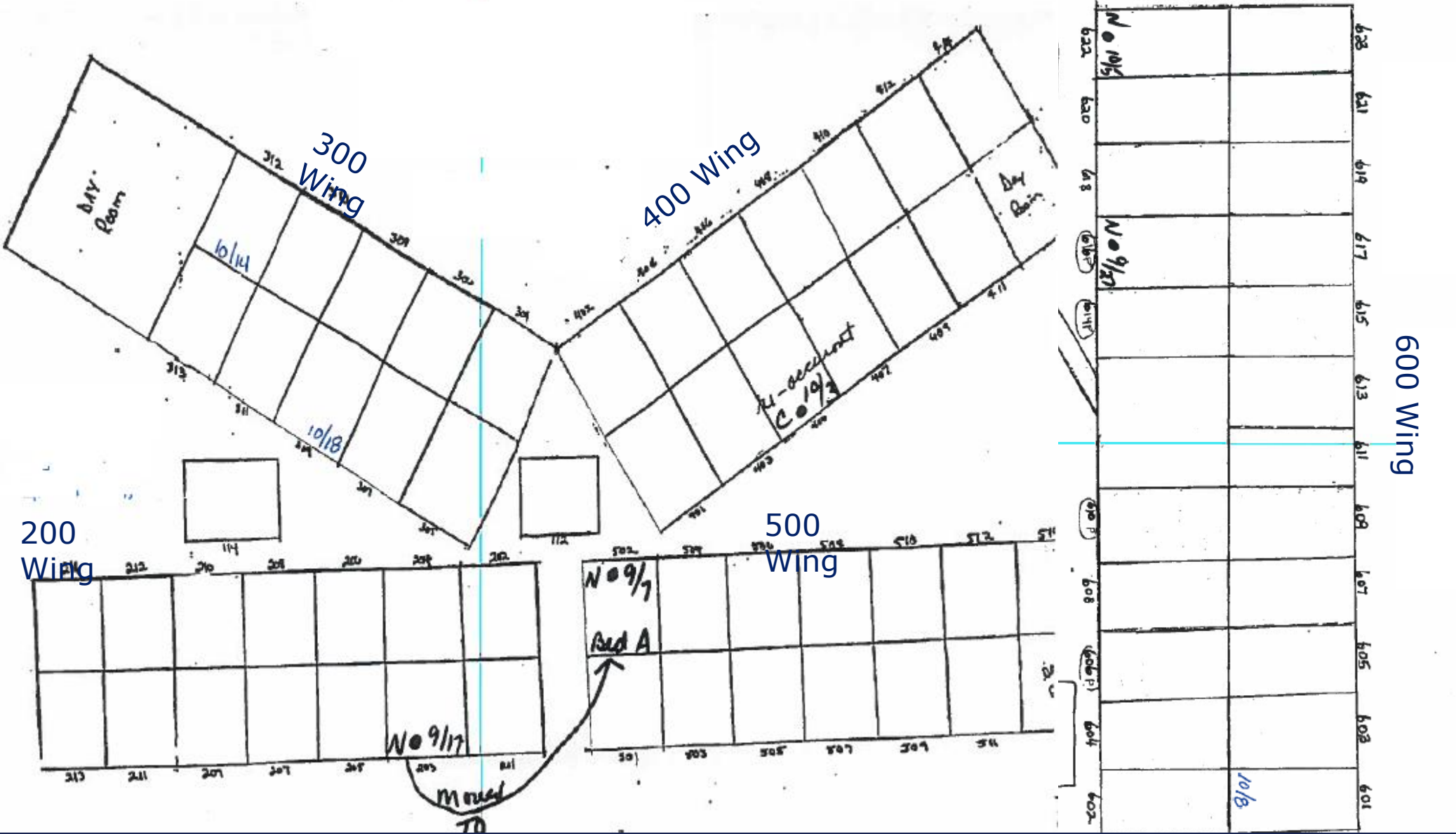
- They want to know if it is reportable
- Asking for advice on management
  
- First case 9/7 and last case 10/5
- Visit to facility revealed 3 additional cases they were not counting bringing the total to 8 cases with the most recent occurring on 10/18



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# Case Study #1: C. diff in LTC

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What would be some of the considerations regarding management of this outbreak?

- Isolation
- Case definition
- Environmental Issues (cleaning)
- Hand hygiene
- Co-horting staff
- Audits of processes
- Antibiotic Stewardship



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# Case Study #2: Dialysis Monitoring

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You receive a call from a new IP at a hospital that has an inpatient dialysis unit. He asked if environmental culturing is necessary and if so, which microbiology test should be used for dialysis units.

How would you respond?

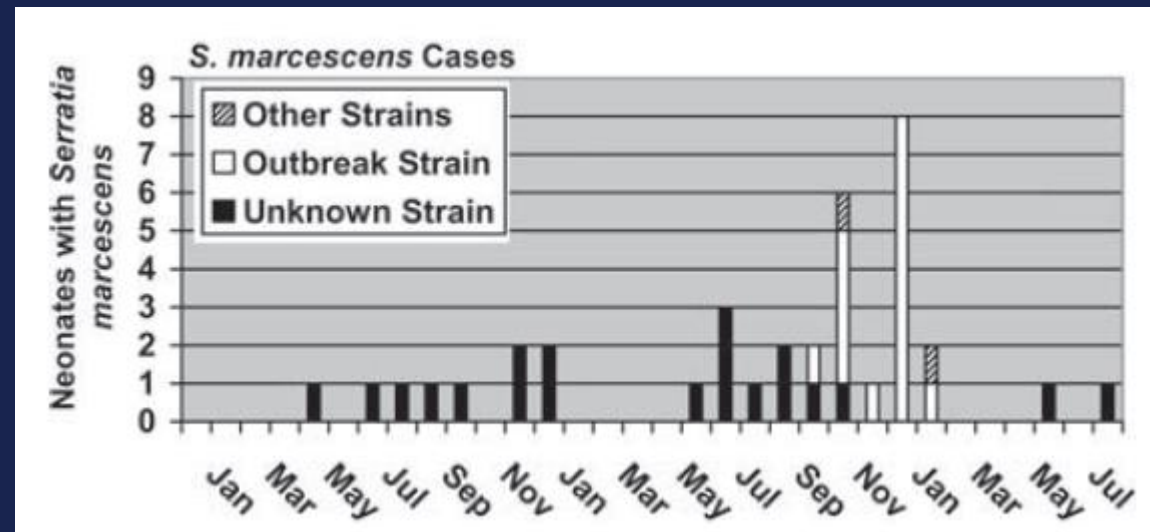


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# Case Study #3: Trouble in the NICU

An IP calls to report there have been 6 cases of *Serratia marcescens* infections in their NICU in the past month.



10/25/2018

Maragakis, L. L., Winkler, A., Tucker, M. G., Cosgrove, S. E., Ross, T., Lawson, E., Carroll, KC., Perl, T. M. (2008, May). Outbreak of multidrug-resistant *Serratia marcescens* infection in a neonatal intensive care unit. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18419363>



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# Case Study #3: Trouble in the NICU

- 36 beds total
- 3 isolation rooms
- Adjacent charting, office, and storage space

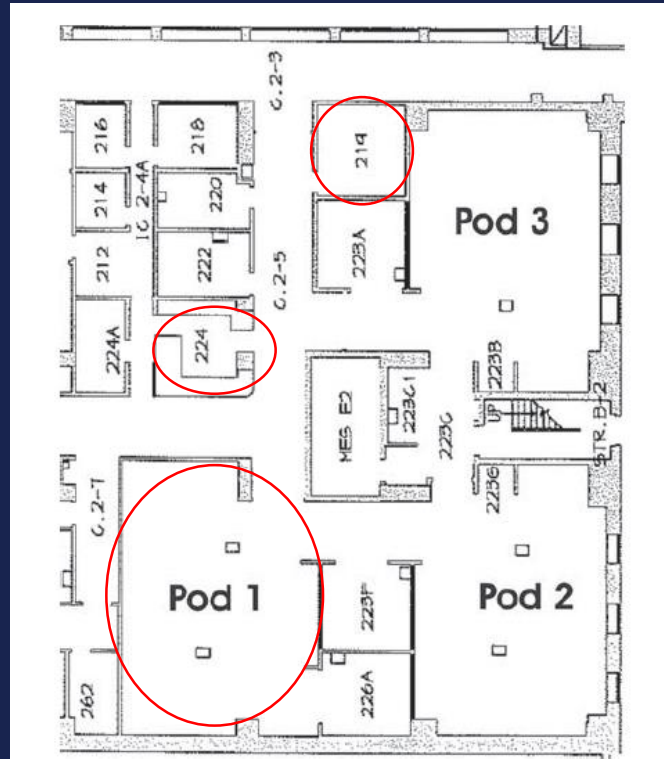


FIGURE 2. Floor plan of the neonatal intensive care unit at the Johns Hopkins Hospital. Three 10-bed rooms, designated pods 1, 2, and 3, surround a central medication area. Also shown are 3 rooms used for isolation precautions and an adjacent area for charting and office space.

Maragakis, L. L., Winkler, A., Tucker, M. G., Cosgrove, S. E., Ross, T., Lawson, E., Carroll, K.C., Perl, T. M. (2008, May). Outbreak of multidrug-resistant *Serratia marcescens* infection in a neonatal intensive care unit. Retrieved from <https://www.ncbi.nlm.nih.gov/pubmed/18419363>



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# Case Study #3: Trouble in the NICU

## *What was the cause?*

- Potential risk factors studied: gestational age, low birth weight (p value 0.06), mode of delivery, low Apgar score, previous surgery, underlying diseases, mechanical ventilation, nasogastric intubation, central line, arterial line (OR 6.33), length of stay in the NICU, parenteral nutrition (TPN), inhalation medication therapy (OR 7.22), ingestion of breast milk or formula.
  - Markers of more severely ill and susceptible neonates
  - Many neonates required multiple sources of nutrition which complicated the investigation
- Reported sources of transmission in other studies include: hands, contaminated breast pumps, breast milk, soap, disinfectant, laryngoscope blades, and air conditioning ducts.
- Overcrowding has been implied as a contributing factor in other studies.

# Case Study #4: Reprocessing Medical Equipment



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During an onsite hospital visit, you noticed several things about their cleaning process of medical equipment:

- A. They are conducting High Level Disinfection of their bronchoscopes in between cases.
- B. They are using a probe cover on their transvaginal ultrasound probes, then cleaning with a disinfectant wipe in between cases, and soaking the probes in bleach at the end of the day.
- C. They are spraying all surgical instruments with an enzymatic cleaner after use, then sending to the Sterile Processing Department to be sterilized.

Which observation (A, B, or C) is an example of an incorrect practice?

Is patient notification required?





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# Case Study #5: *Klebsiella*+PEG

- During your investigation, you notice *Klebsiella pneumoniae* cases increasing in a specific nursing home.

What do You do Next?





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# Case Study #5: *Klebsiella*+PEG



- On-site visit
- Commonalities
- Literature
- Lab look back
- Colonization Study



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# Case Study #5: *Klebsiella*+PEG

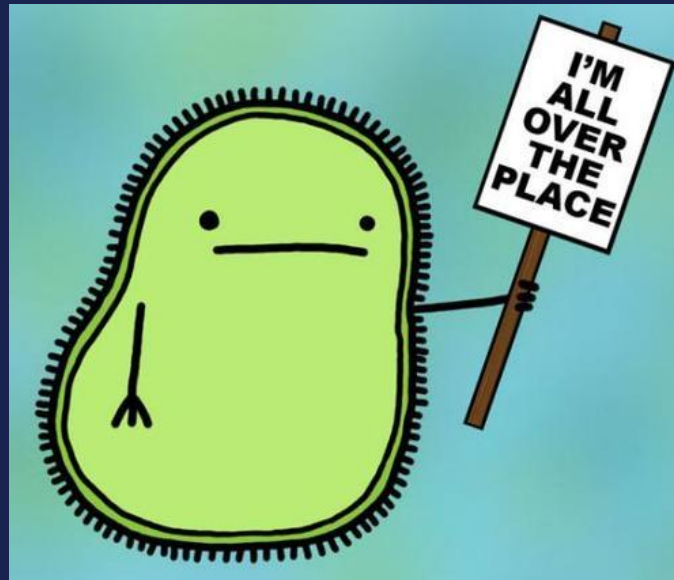


<https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-12-46.pdf>

- *The equipment for giving feeds should be handled in an aseptic way, so as to prevent contamination that could lead to infection/ sepsis and feed-giving sets should be discarded after each session (NICE, 2012)*
- *For patients who are immunosuppressed, the water should be boiled and then cooled, or sterile water should be used from a freshly opened container, so as to prevent further the risk of infection (NICE, 2012).*

# In closing...

1. What other HAI outbreak considerations can you think of?
2. Takeaways?
3. Questions?



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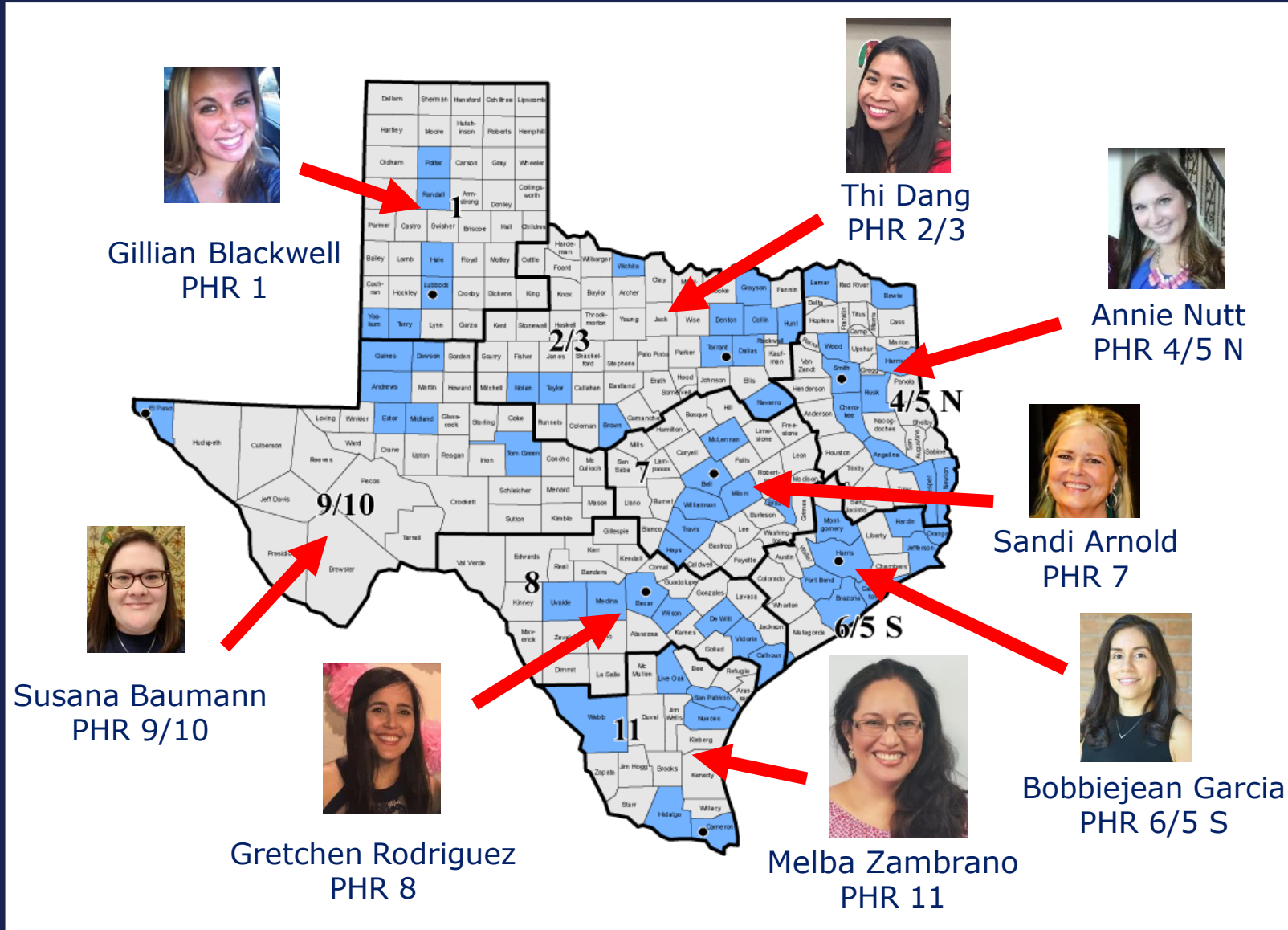
# Regional HAI Epidemiologists



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# Thank you!

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