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# **The Role of Public Health in Reducing Healthcare Associated Infections**

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**HAI Epidemiologist**

**Texas Department of State Health Services**



# Objectives

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1. Understand the impact of Healthcare Associated Infections (HAIs) and Multidrug Resistant Organisms (MDROs) in our communities.
2. Describe mandatory reporting requirements for MDROs in Texas.
3. Discuss initiatives implemented by Texas Department of State Health Services (DSHS) to help healthcare facilities improve their infection control programs.



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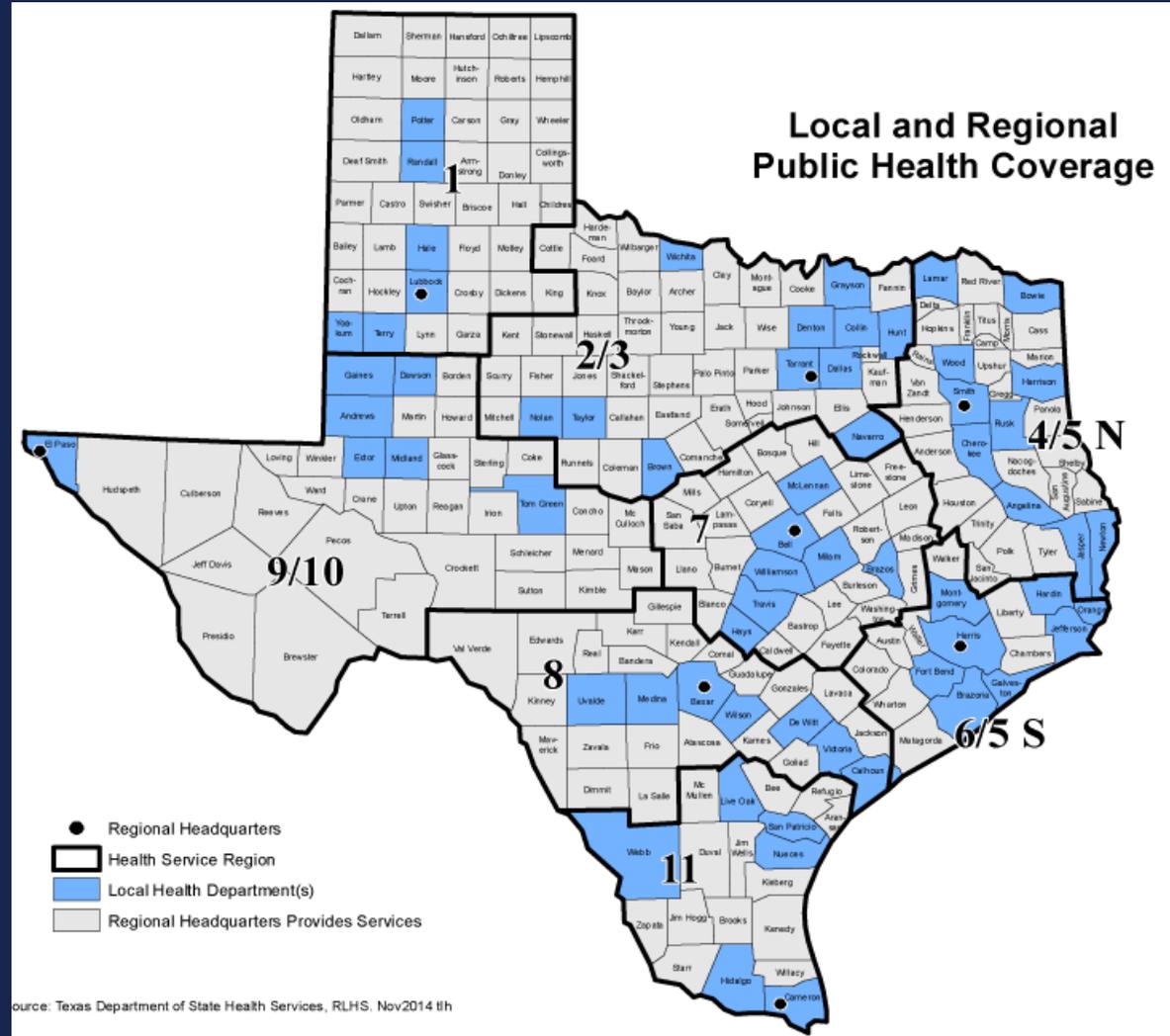




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# Texas Public Health Structure



Source: Texas Department of State Health Services, RLHS, Nov2014 1th





# Healthcare Settings

## In Texas there are:

- **575** acute care hospitals
- **67** long-term acute care hospitals
- **552** ambulatory surgery centers
- **200** free standing emergency medical care facilities
- **1214** nursing homes
- **2025** assisted living facilities

*\*As of March 2021*

## Other facilities include:

- Long-term care facilities
- Inpatient rehabilitation facilities
- Outpatient clinics
- Urgent care
- Dialysis settings
- Blood banks/plasma donation centers
- Birthing centers
- And more!



# HAI Activities

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1. Texas Notifiable Conditions
2. TAP Strategy
3. ICAR Visits
4. HAI Outbreaks & Investigations
5. Antibiotic Resistance Laboratory Network
6. COVID-19 Pandemic Response



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# Texas Notifiable Conditions



# Texas Notifiable Conditions

Texas Administrative Code (TAC) Chapter 97, Title 25- list of notifiable conditions  
 Health and Safety Code, Title 2, Subtitle D, Chapter 81, Section 81.061(c)- authority to review medical records



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## Texas Notifiable Conditions - 2021

**Report all Confirmed and Suspected cases**  
**24/7 Number for Immediately Reportable – 1-800-705-8868**

Contact Information

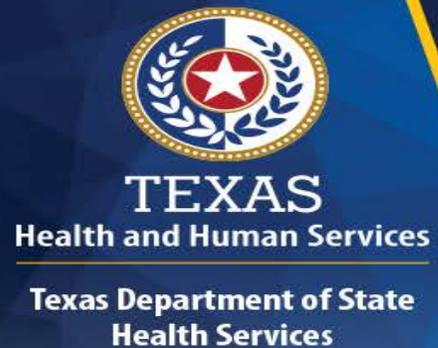


Access List Online 
 Unless noted by\*, report to your local or regional health department using number above or find contact information at <http://www.dshs.texas.gov/idcu/investigation/conditions/contacts/>

A – L	When to Report	L – Y	When to Report
*Acquired immune deficiency syndrome (AIDS) <sup>1</sup>	Within 1 week	Legionellosis <sup>2</sup>	Within 1 week
Amebic meningitis and encephalitis <sup>2</sup>	Within 1 week	Leishmaniasis <sup>2</sup>	Within 1 week
Anaplasmosis <sup>2</sup>	Within 1 week	Listeriosis <sup>2,3</sup>	Within 1 week
<b>Anthrax<sup>2,3,25</sup></b>	<b>Call Immediately</b>	Lyme disease <sup>2</sup>	Within 1 week
Arboviral infections <sup>2,4,5</sup>	Within 1 week	Malaria <sup>2</sup>	Within 1 week
*Asbestosis <sup>6</sup>	Within 1 week	<b>Measles (rubeola)<sup>2</sup></b>	<b>Call Immediately</b>
Ascariasis <sup>2</sup>	Within 1 week	<b>Meningococcal infection, invasive (<i>Neisseria meningitidis</i>)<sup>2,3</sup></b>	<b>Call Immediately</b>
Babesiosis <sup>2,5</sup>	Within 1 week	<b>Mumps<sup>2</sup></b>	<b>Within 1 work day</b>
<b>Botulism (adult and infant)<sup>2,3,7,25</sup></b>	<b>Call Immediately<sup>7</sup></b>	Paragonimiasis <sup>2</sup>	Within 1 week
<b>Brucellosis<sup>2,3,25</sup></b>	<b>Within 1 work day</b>	<b>Pertussis<sup>2</sup></b>	<b>Within 1 work day</b>
Campylobacteriosis <sup>2</sup>	Within 1 week	*Pesticide poisoning, acute occupational <sup>8</sup>	Within 1 week
*Cancer <sup>9</sup>	See rules <sup>9</sup>	<b>Plague (<i>Yersinia pestis</i>)<sup>2,3,25</sup></b>	<b>Call Immediately</b>
<b><i>Candida auris</i><sup>2,3,10</sup></b>	<b>Within 1 work day</b>	<b>Polio myelitis, acute paralytic<sup>2</sup></b>	<b>Call Immediately</b>
<b>Carbapenem-resistant <i>Enterobacteriaceae</i> (CRE)<sup>2,11</sup></b>	<b>Within 1 work day</b>	<b>Poliovirus infection, non-paralytic<sup>2</sup></b>	<b>Within 1 work day</b>
Chagas disease <sup>2,5</sup>	Within 1 week	Prion disease such as Creutzfeldt-Jakob disease (CJD) <sup>2,12</sup>	Within 1 week

In addition to 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. This includes any case of a select agent<sup>25</sup>**  
 See select agent list at <https://www.selectagents.gov/selectagentsandtoxinslist.html>

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





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# Texas Notifiable MDROs

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**CRE:** *Klebsiella* species and *E.coli*

**Candida auris:** *Candida auris*

**VISA:** Vancomycin Intermediate *Staphylococcus aureus*

**VRSA:** Vancomycin Resistant *Staphylococcus aureus*

Background:

- Reporting of *Candida auris* began in January 2021
- Isolate submission required for *C. auris*, VISA, VRSA
- MDR-A was reportable from April 2014-January 2021



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# TAP Strategy

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# TAP Strategy

## Targeted Assessment for Prevention



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- Use CLABSI, CAUTI, and C. diff. data for action
- Prioritize prevention efforts
- Target location with greatest opportunity
- Use standardized method to identify gaps
- Resources to address gaps



# Assess: Questionnaire



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I. General Infrastructure, Capacity, and Processes, Continued	Response	Comments (and/or "As Evidenced By")
Does your facility routinely <u>audit</u> * (monitor and document) adherence of all healthcare personnel** to:		
*Audit is defined as an assessment (typically by direct observation, either hospital-wide or unit-specific) of healthcare personnel adherence with facility policies. ** For personnel given the responsibility to insert, assist with insertion, or maintain central venous catheters ("central lines").		
17. Central line insertion documentation (date, procedure, complications, etc)?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	
18. Site selection (avoidance of the femoral site in adults)?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	
19. Daily assessment and prompt removal of central lines that are no longer needed?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	
20. Adherence to proper central line <u>insertion</u> practices?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	
21. Adherence to proper central line <u>maintenance</u> procedures?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	
Does your facility routinely provide feedback data to healthcare personnel on:		
22. CLABSI rates and/or standardized infection ratios (SIR)?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	
23. Central line device utilization ratios (DUR)?	<input type="radio"/> Yes <input type="radio"/> No <input type="radio"/> Unk	

II. Appropriate Use of Central Venous Catheters ("Central Lines")	Response						Comments (and/or "As Evidenced By")
	Never	Rarely	Sometimes	Often	Always	Unknown	
1. Do ordering providers document an <u>indication</u> for central lines?	<input type="radio"/>						
2. Are central lines assessed on a daily basis to ensure they are still needed?	<input type="radio"/>						
3. Are central lines that are no longer needed promptly removed?	<input type="radio"/>						

# Prevent: Feedback Report

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# ICAR Visits



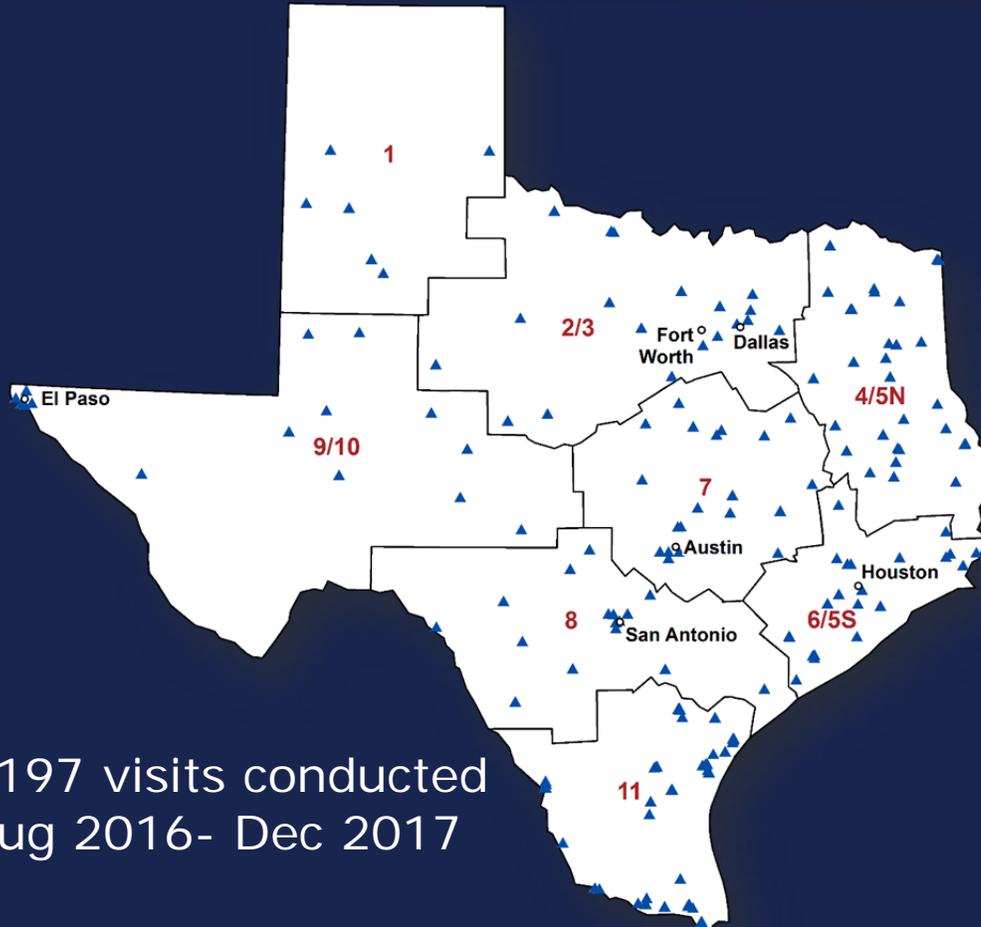
# ICAR

## Infection Control Assessment and Response



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\*197 visits conducted  
Aug 2016- Dec 2017

- Use CDC tools to conduct non-regulatory, voluntary onsite infection control assessments.
- Identify gaps and provide recommendations to help mitigate them.

Facility Type	Texas
Acute Care Hospitals	54
Dialysis	23
Long-term Care Facility	116
Outpatient	4
Total	197*



# Data Collection Tool



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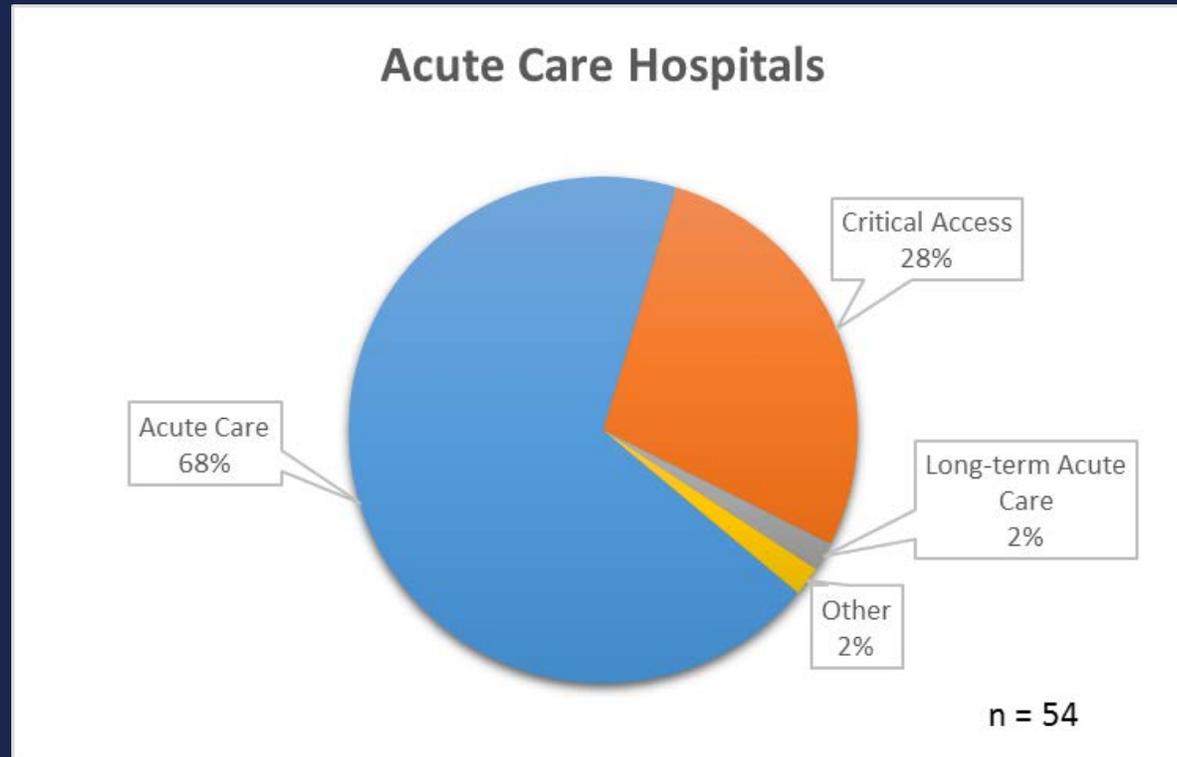
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II. Infection Control Training, Competency, and Implementation of Policies and Procedures		
Elements to be assessed	Assessment	Notes/Areas for Improvement
<b>A. Hand Hygiene</b>		
<p>1. Hospital has a competency-based training program for hand hygiene.</p> <p>Verify the following:</p> <ul style="list-style-type: none"> <li>a. Training is provided to all healthcare personnel, including all ancillary personnel not directly involved in patient care but potentially exposed to infectious agents (e.g., food tray handlers, housekeeping, and volunteer personnel).</li> <li>b. Training is provided upon hire, prior to provision of care at this hospital.</li> <li>c. Training is provided at least annually.</li> <li>d. Personnel are required to demonstrate competency with hand hygiene following each training.</li> <li>e. Hospital maintains current documentation of hand hygiene competency for all personnel.</li> </ul>	<p><input type="radio"/> Yes <input type="radio"/> No</p> <ul style="list-style-type: none"> <li>a. <input type="radio"/> Yes <input type="radio"/> No</li> <li>b. <input type="radio"/> Yes <input type="radio"/> No</li> <li>c. <input type="radio"/> Yes <input type="radio"/> No</li> <li>d. <input type="radio"/> Yes <input type="radio"/> No</li> <li>e. <input type="radio"/> Yes <input type="radio"/> No</li> </ul>	
<p>2. Hospital routinely audits (monitors and documents) adherence to hand hygiene.</p> <p>Verify the following:</p> <ul style="list-style-type: none"> <li>a. Respondent can describe process used for audits.</li> <li>b. Respondent can describe frequency of audits.</li> <li>c. Respondent can describe process for improvement when non-adherence is observed.</li> </ul>	<p><input type="radio"/> Yes <input type="radio"/> No</p> <ul style="list-style-type: none"> <li>a. <input type="radio"/> Yes <input type="radio"/> No</li> <li>b. <input type="radio"/> Yes <input type="radio"/> No</li> <li>c. <input type="radio"/> Yes <input type="radio"/> No</li> </ul>	



# Demographics



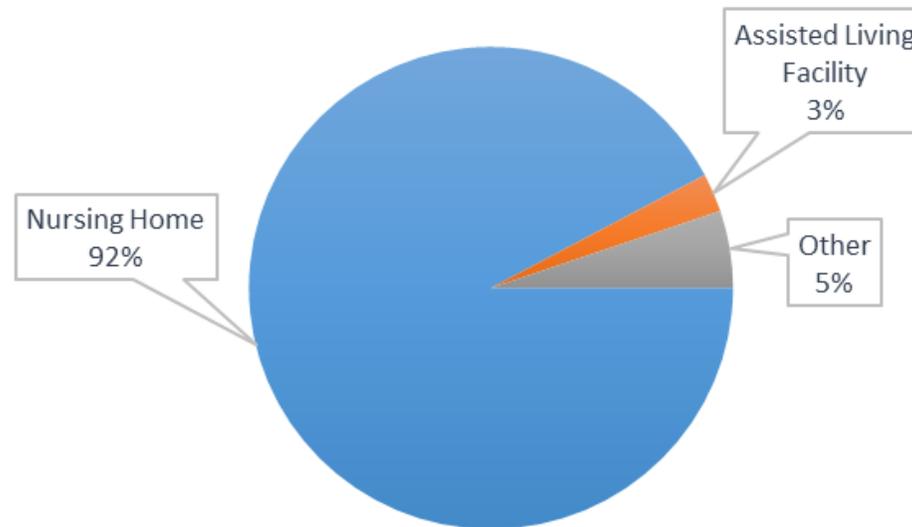
	Mean	Min	Max
Number of Licensed Beds	112	10	557
FTE Infection Preventionist	0.97	0.03	5

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# Demographics

## Long-term Care Facilities



n = 116



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	Mean	Min	Max
Number of Licensed Beds	108	10	367
Total IC Staff Hours per Week	12	0	42

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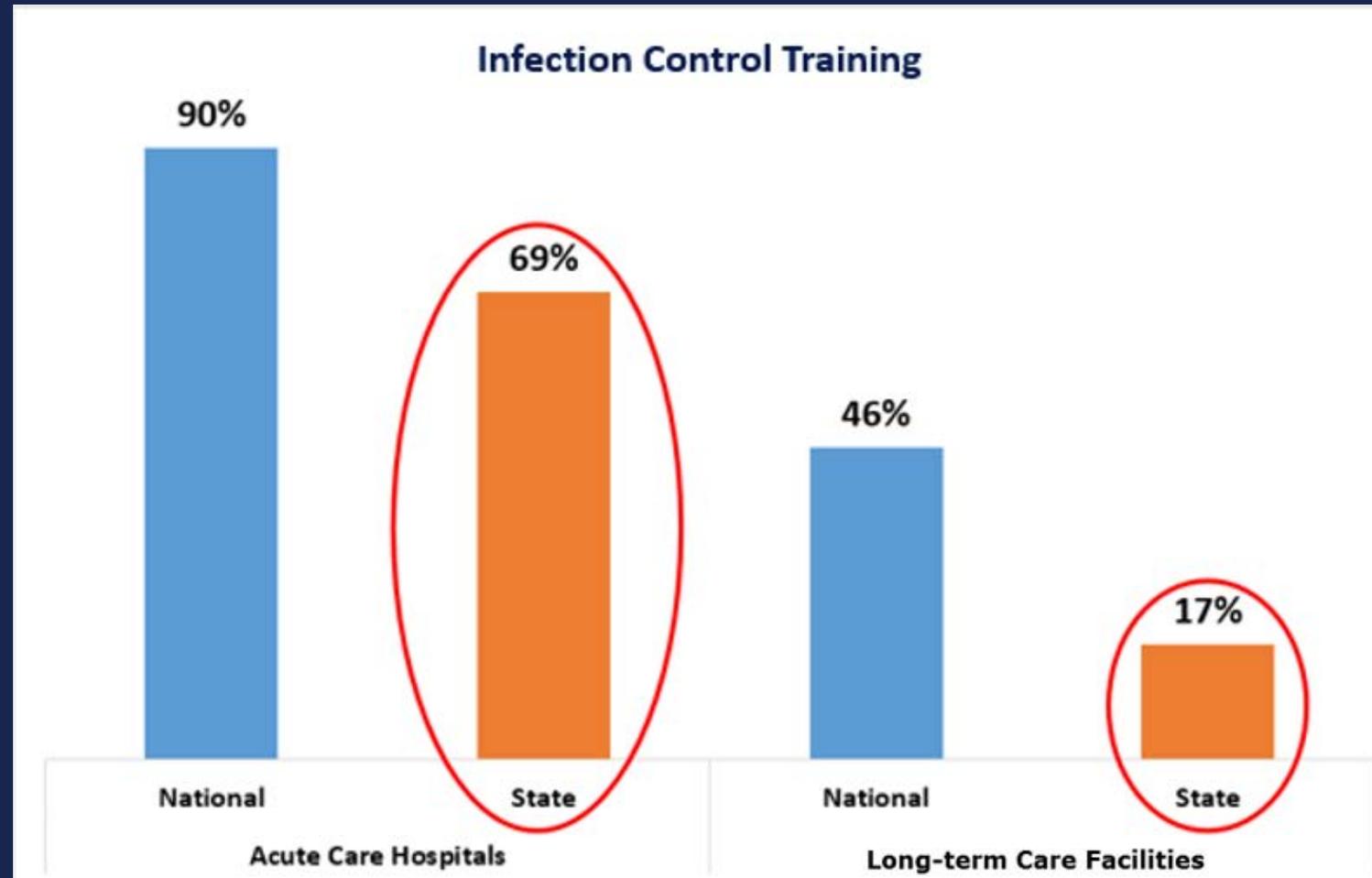
# Formal Infection Control Training



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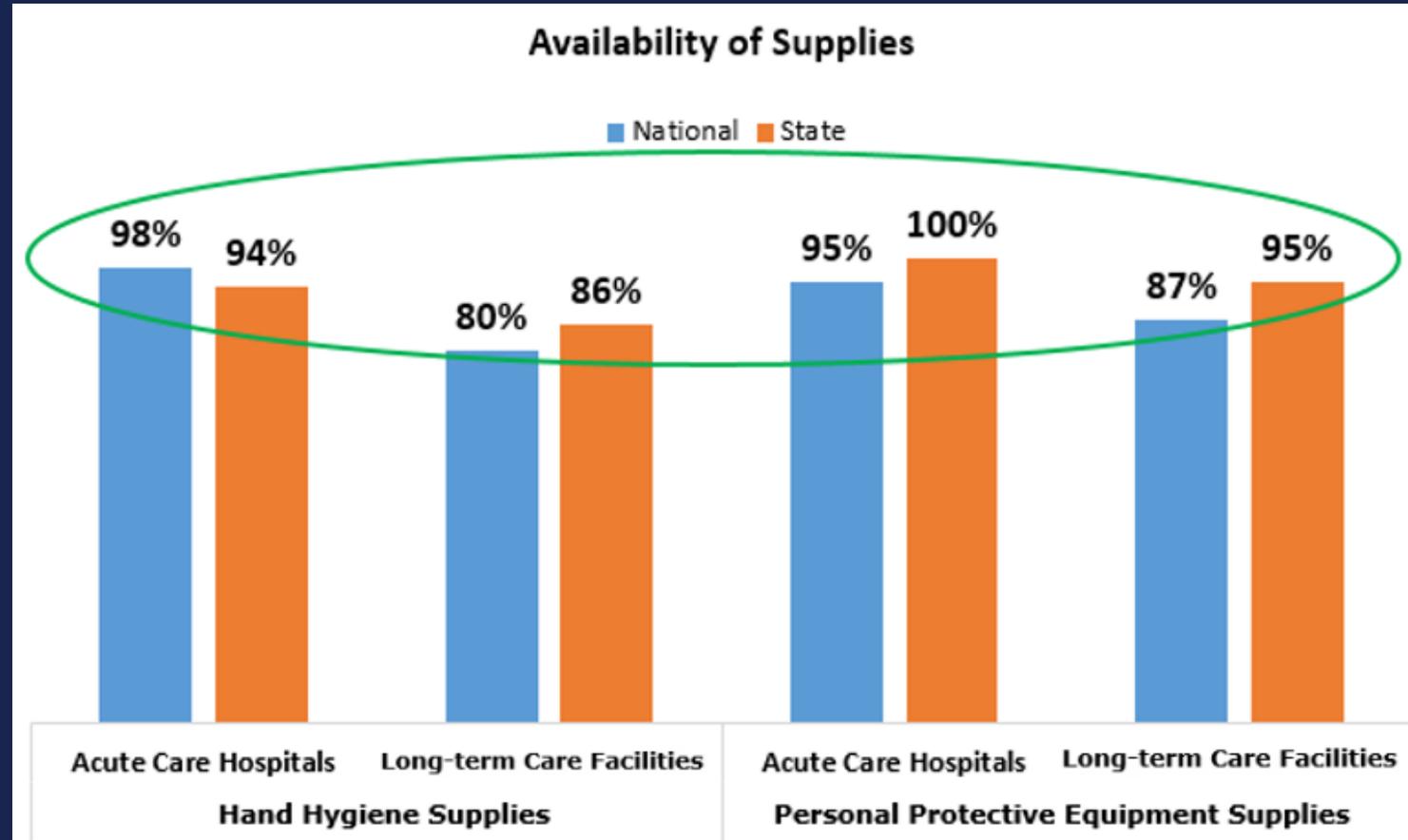
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# Standard Precautions



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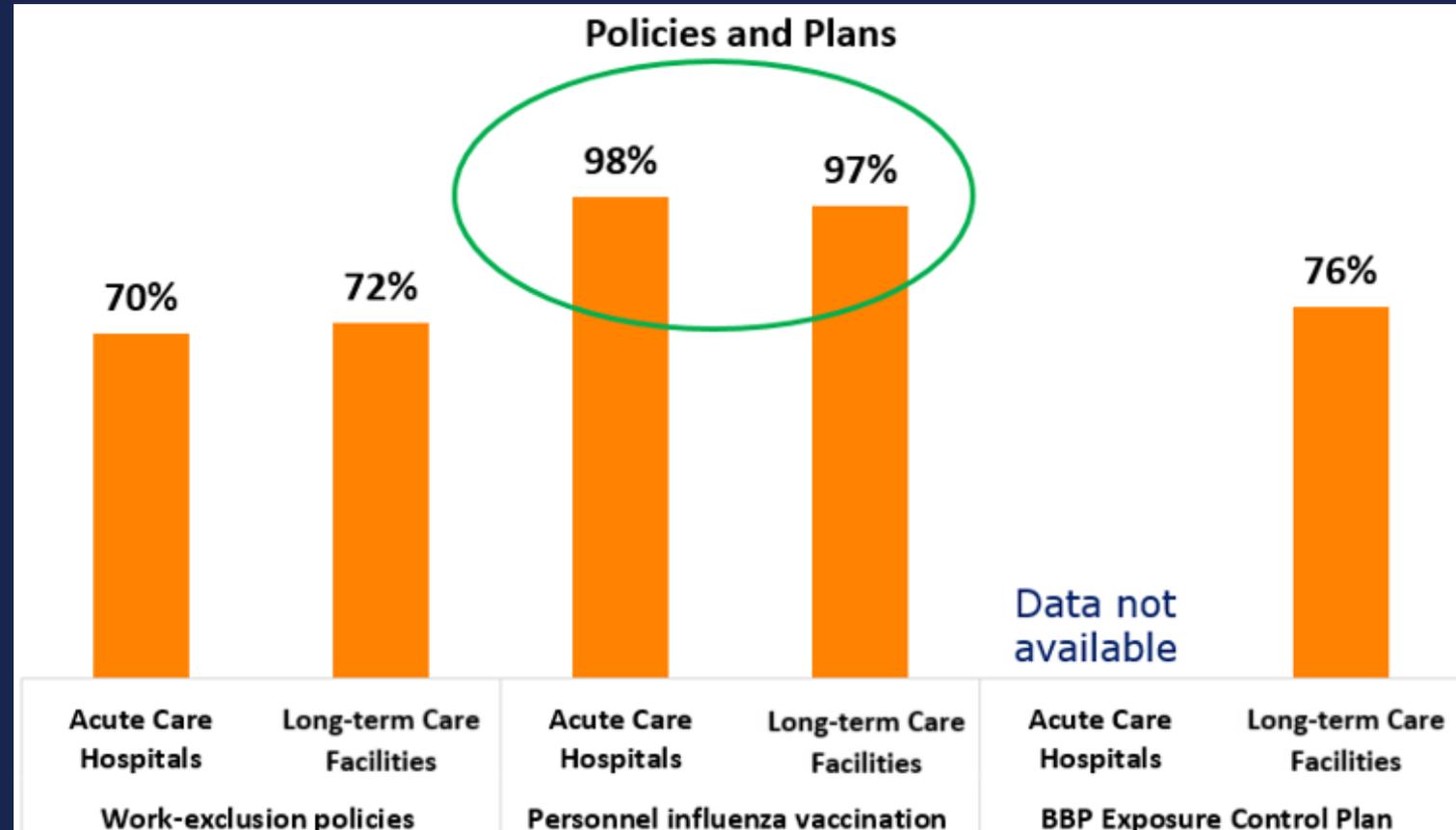
# Employee Health



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## Texas

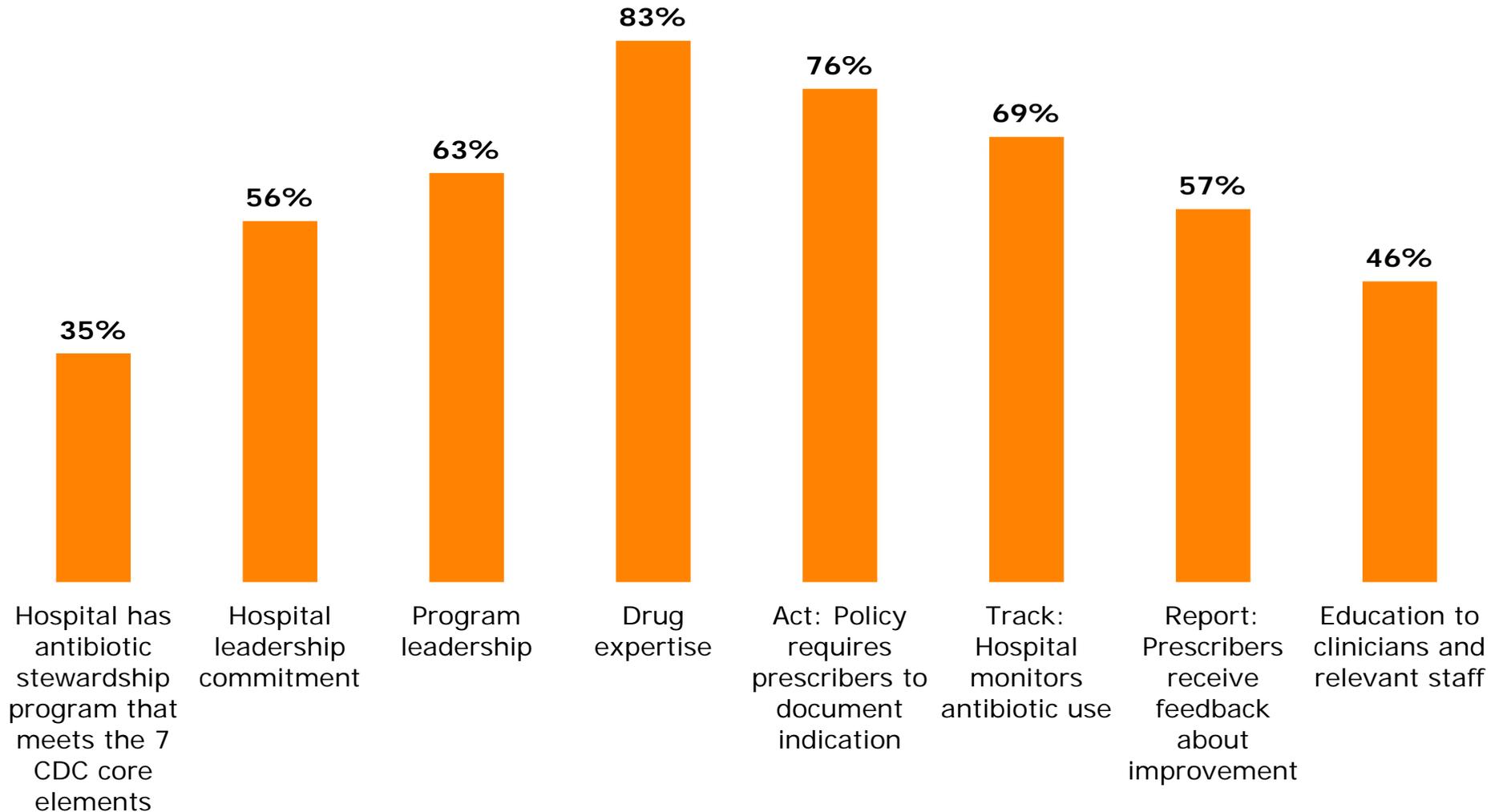


# Antibiotic Stewardship Elements in Acute Care Hospitals



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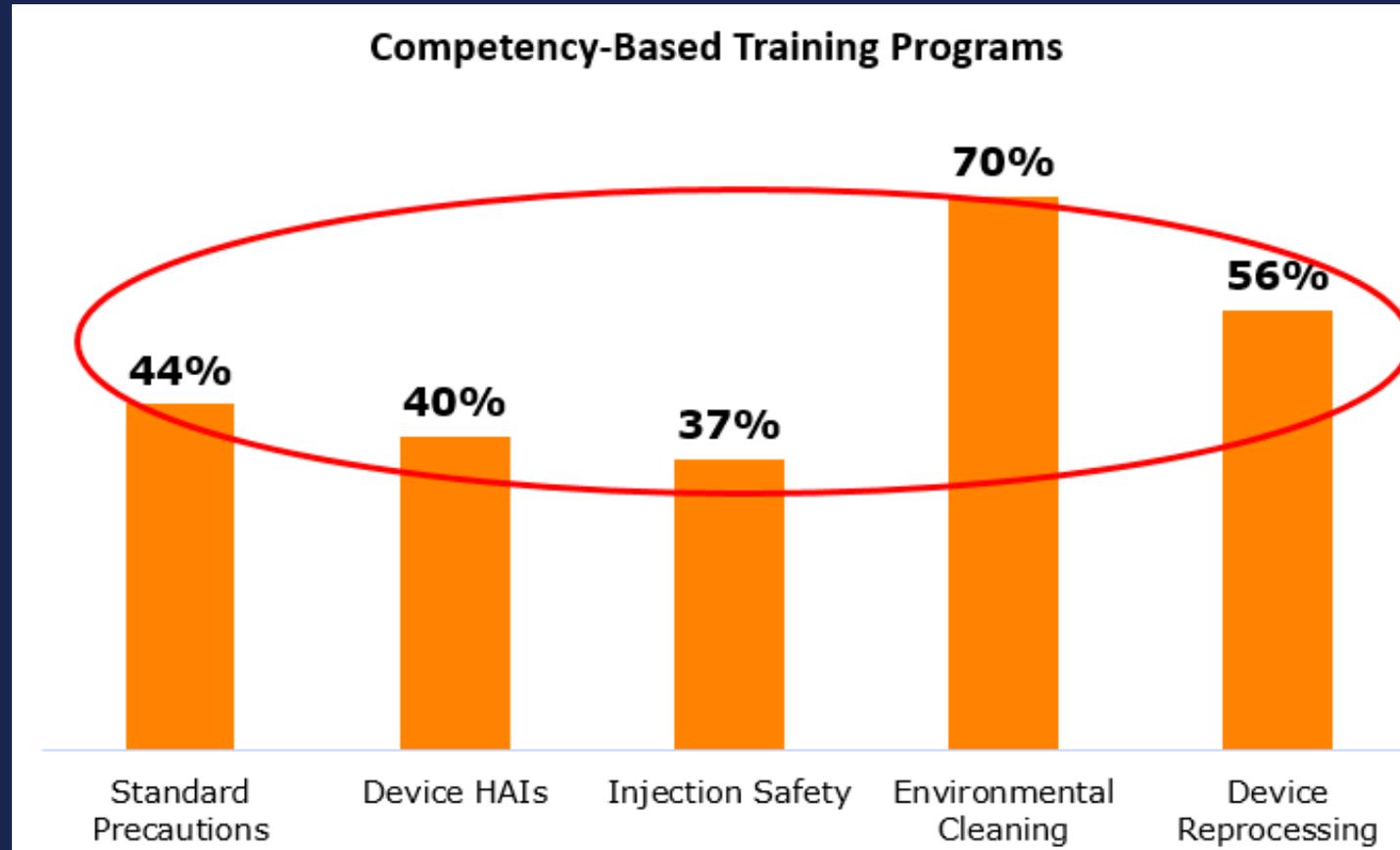
# Education Programs



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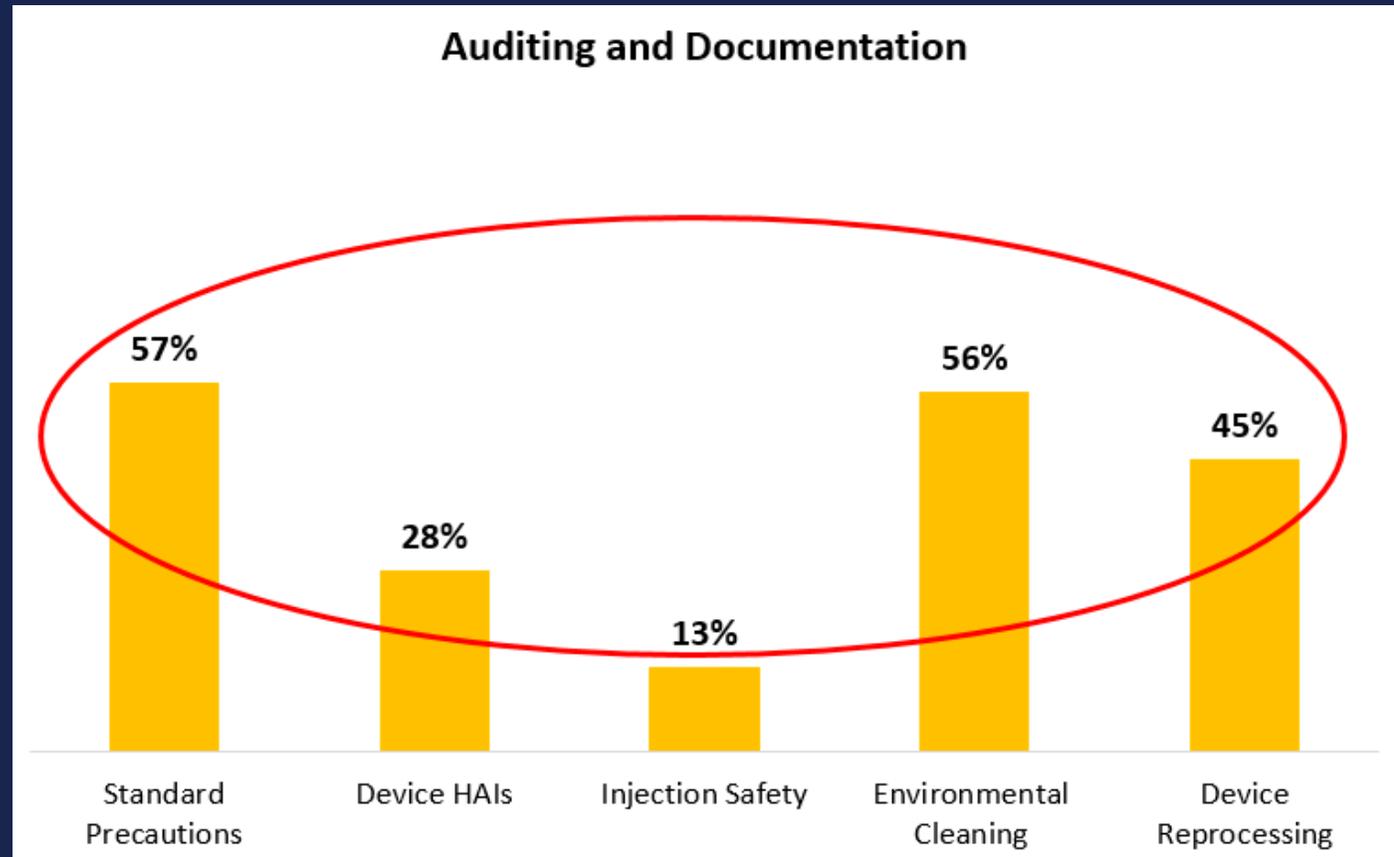
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## Acute Care Hospitals



# Auditing Process

## Acute Care Hospitals



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# **HAI Outbreaks & Investigations**

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# HAI Outbreaks

## Simple Definition:

An increase in the number of hospital-acquired or healthcare facility-acquired cases of disease among patients or staff over & above the expected number of cases

**DSHS HAI Epis responded to over 270 outbreaks between 2017-2020. This excludes COVID-19 outbreaks.**

## Response includes:

- Site visits, phone calls, or email consultation
- Education and provision of resources
- Coordination of lab submission if necessary



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# HAI Outbreaks

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## A single case may constitute an outbreak

For example:

- VISA or VRSA
- Any unusual or novel MDRO or MDRO with an unusual resistance pattern conferring resistance to critical antibiotic(s)
- Legionellosis
- Post-procedure infection with an unusual organism (e.g., invasive fungal infection after an epidural in an immunocompetent patient)



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# HAI Outbreak Detection

- Notifiable Conditions: Texas Administrative Code §97.3

In addition to 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. This includes any case of a select agent** <sup>25</sup>

See select agent list at <https://www.selectagents.gov/selectagentsandtoxinslist.html>

- Alerts from clinical, reference, and public health labs of increases in isolates
- National alerts of multi-state outbreaks, sometimes linked to contaminated products
- Alerts from regulatory agencies

# Infection Control Breaches



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DEPARTMENT OF HEALTH & HUMAN SERVICES  
Centers for Medicare & Medicaid Services  
7500 Security Boulevard, Mail Stop C2-21-16  
Baltimore, Maryland 21244-1850



## Center for Clinical Standards and Quality/Survey & Certification Group

Ref: S&C: 14-36-ALL

**REVISED 10.28.16**

**DATE:** May 30, 2014

**TO:** State Survey Agency Directors

**FROM:** Director  
Survey and Certification Group

**SUBJECT:** Infection Control Breaches Which Warrant Referral to Public Health Authorities  
*\*\*\*Additional Information has been added to Breaches to Be Referred. This policy memorandum  
supersedes policy memorandum S&C: 14-36-ALL\*\*\**

<https://www.cms.gov/Medicare/Provider-Enrollment-and-Certification/SurveyCertificationGenInfo/Downloads/Survey-and-Cert-Letter-14-36.pdf>



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# **MDR-A Community Outbreak**

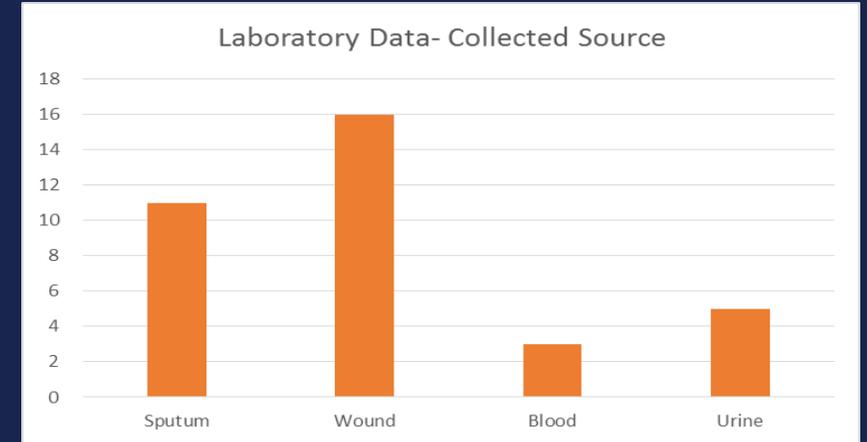
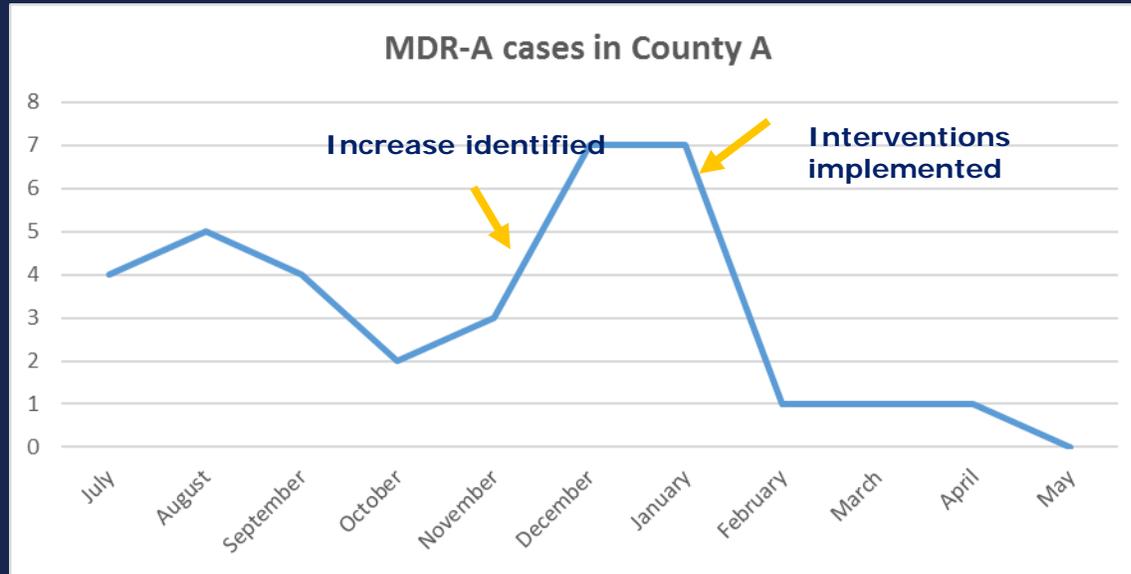
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# MDR-A Community Outbreak



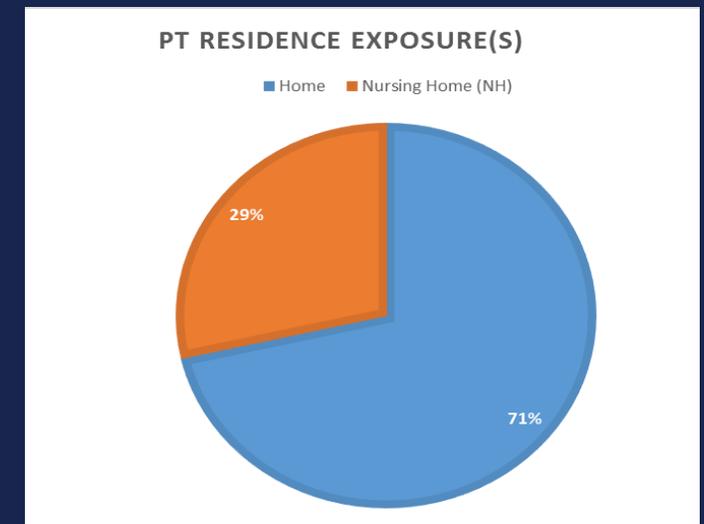
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## Epi information:

- 35 patients (8 deaths)
- 74% of cases had >1 overnight medical stays
- 12 healthcare facilities involved (5 identified as high risk)



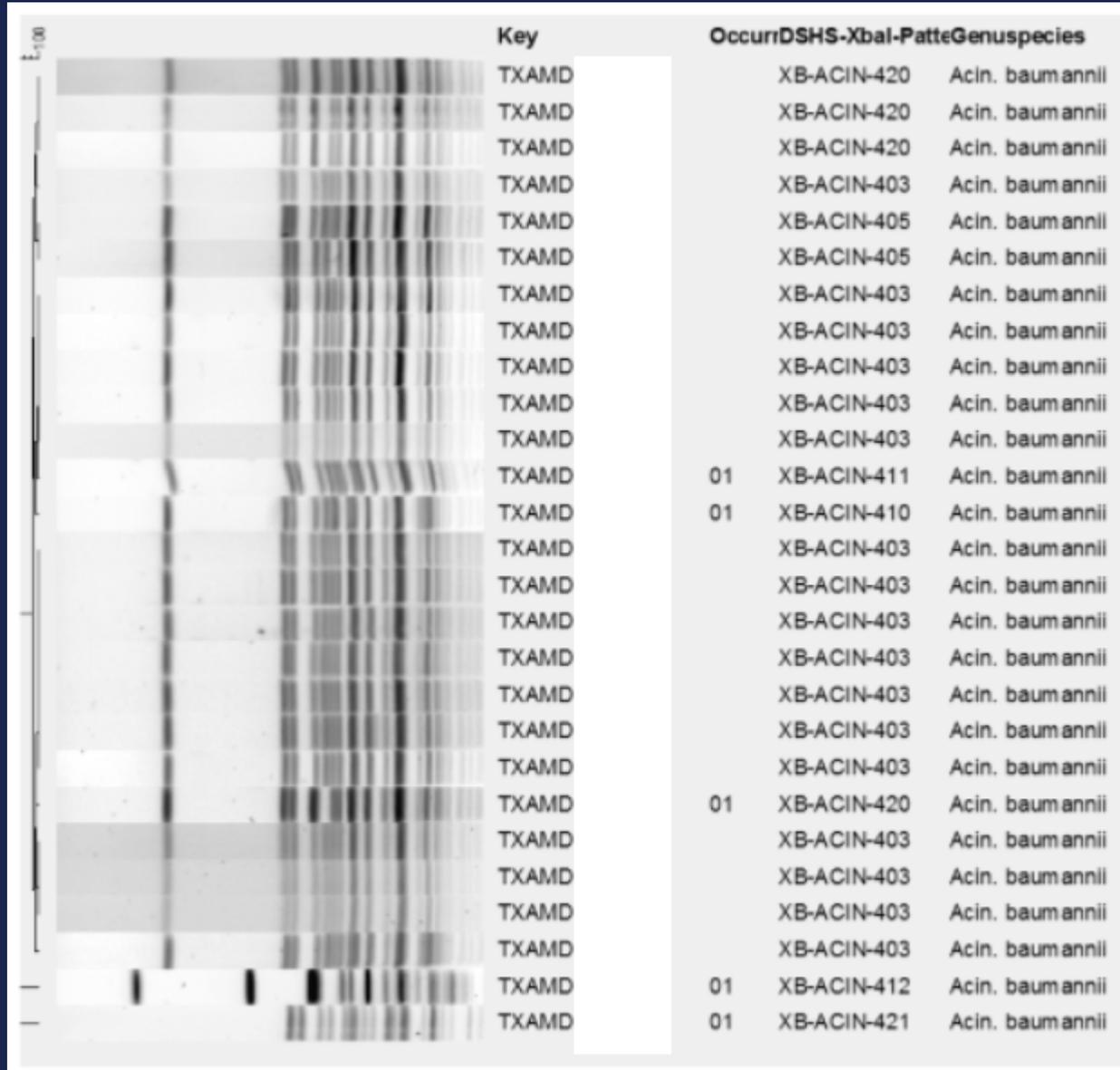
# MDR-A PFGE



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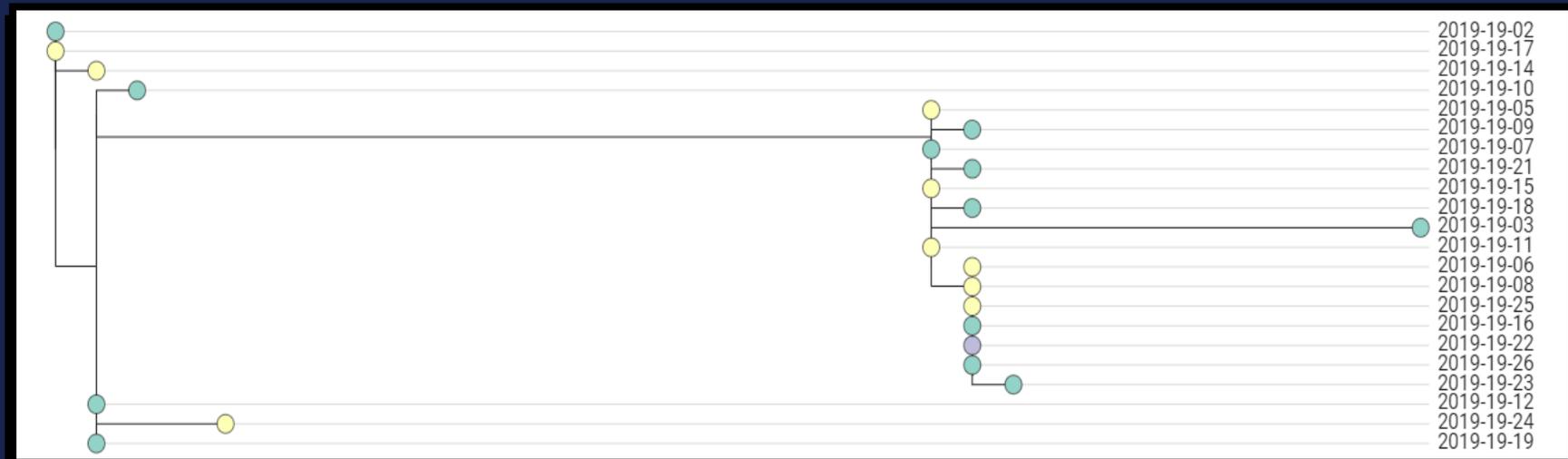
# MDR-A Whole Genome Sequencing



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25 isolates tested



85%

95%

97%

# General findings

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- **Great cooperation and collaboration from all facilities.**
- **Areas for improvement:**
  - Surveillance system to identify trends
  - Inter-facility communication
  - Environmental cleaning and disinfection
  - Audits and feedback
  - Competency-based training
  - Compliance with contact precautions
  - Policy familiarity



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# **Stem Cell Investigation**

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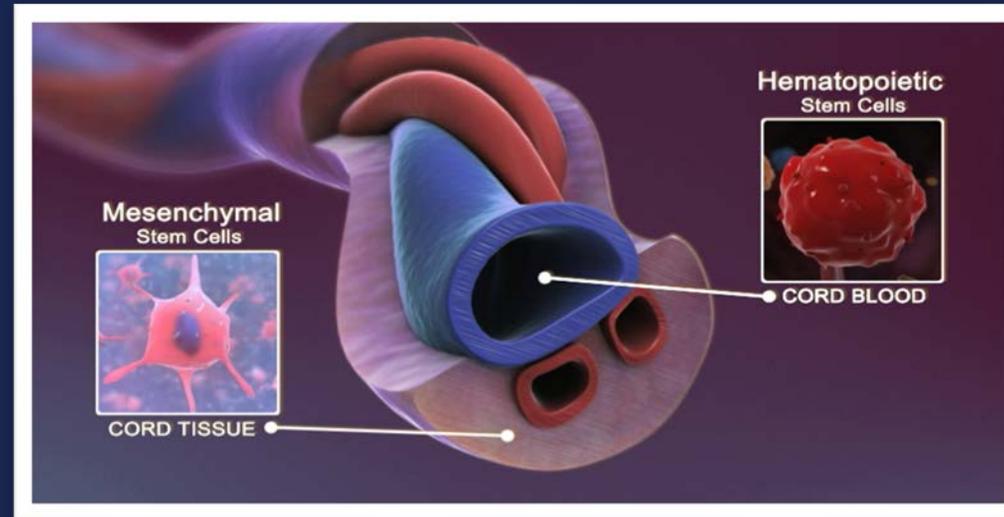


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# What happened?

Notification of 3 patients with bloodstream infections after non-FDA-approved umbilical cord blood-derived stem cell procedures at the same outpatient clinic.



Picture: <https://advancedrejuvenation.us/wp-content/uploads/2017/10/ubmstemcell.jpg>

# Investigation



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## Infection control assessment

### Findings:

- Not following manufacturer's instructions for pre-operative skin preparation.
- Gum chewing by technician.
- Patients' belongings placed on top of patient care supplies.
- Not wearing mask while conducting a lumbar procedure.



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# Investigation

**Infection control  
assessment**



**Isolate and  
product testing**

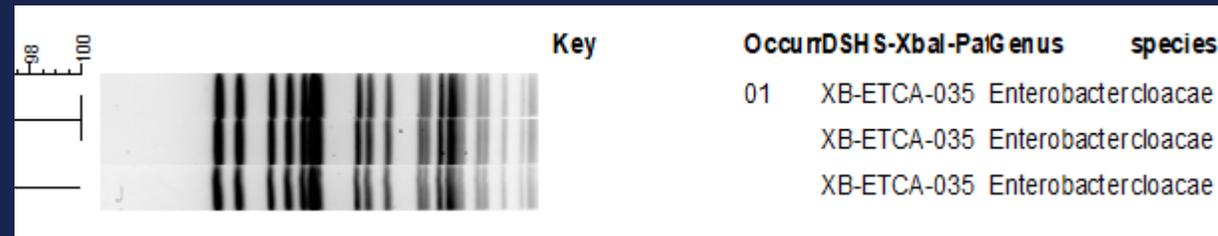
# Isolate and Product Testing Results



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## Isolate Testing

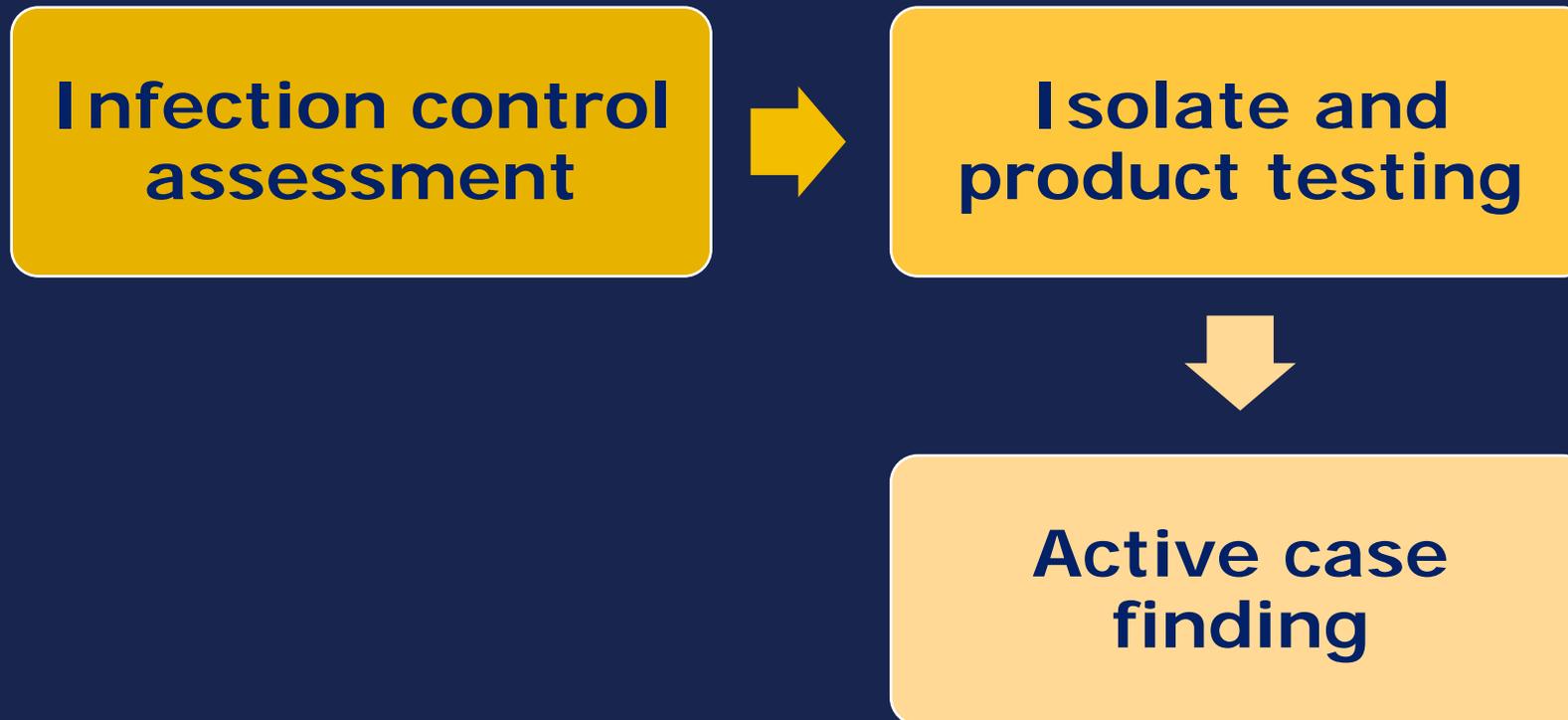


## Product Testing

Bacterial contamination, including *Enterobacter cloacae*, was recovered from all stem cell product vials tested. *Citrobacter freundii* was recovered from all tested vials, except one.



# Investigation





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67  
clinics  
received  
product

5  
additional  
cases

# Active Case Finding Results

61  
contacted  
(91%)

321  
patients  
identified

54  
reported  
back  
(89%)



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# Summary of Cases (8)

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- 100% with bloodstream infections
  - 50% with others infections as well
- 100% hospitalized
- Organisms isolated:
  - *E. coli*, *E. faecalis*, *C. koseri*, *C. freundii*, *E. cloacae*
- Reasons for administration:
  - Pain & arthritis
- Routes of administration:
  - Intra-articular injections
  - IV infusion



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# Conclusion

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- Laboratory tests suggest the bacterial infections may have occurred due to stem cell product contamination prior to distribution
- Unknown total case count in Texas due to self-reporting by facilities and patients
- Having standard procedures in place for large-scale active case finding aided this investigation



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# Conclusion

- Laboratory tests suggest the bacterial infections may have occurred due to stem cell product contamination prior to distribution
- Unknown total case count in Texas due to self-reporting by facilities and patients
- Having standard procedures in place for large-scale active case finding aids in investigation

**CASE CLOSED**



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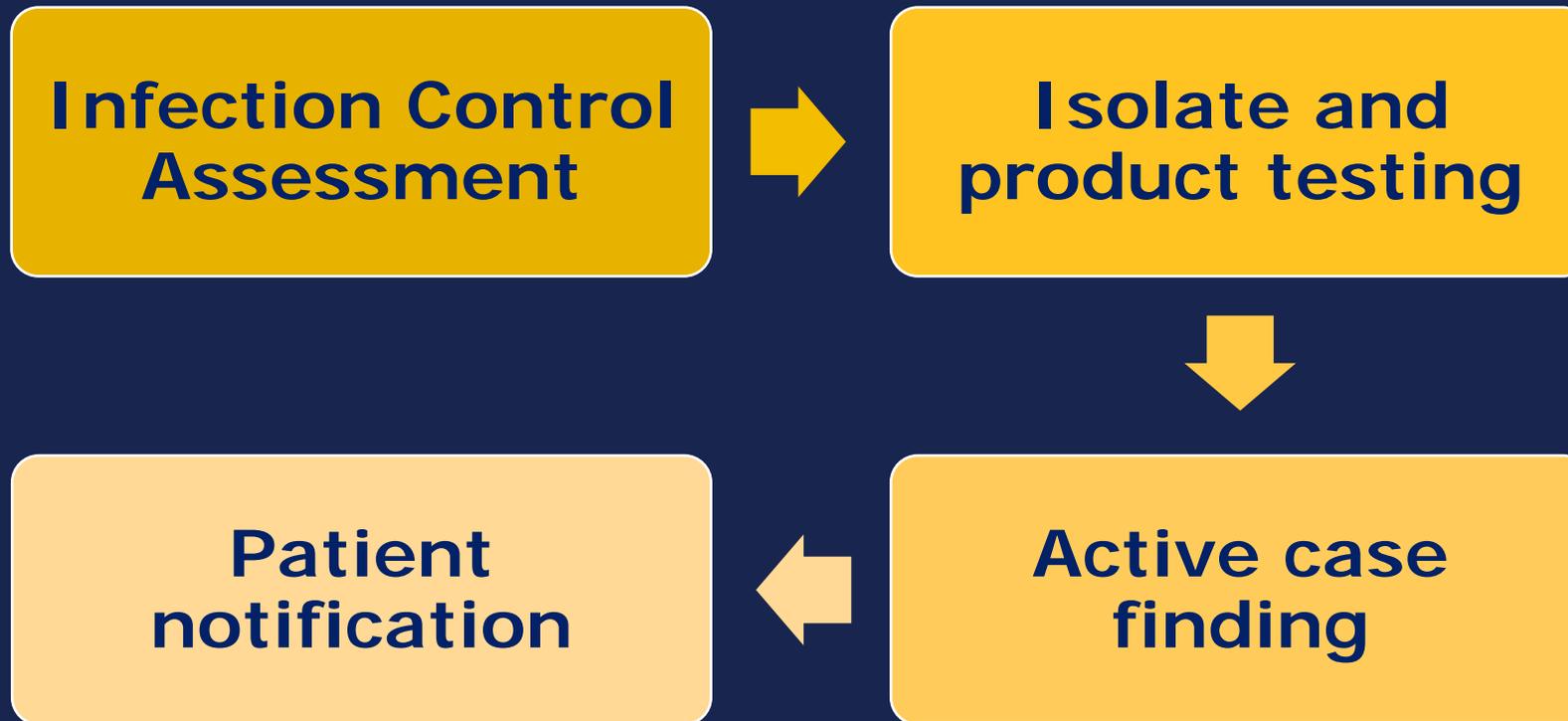
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# But wait...



# Investigation





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# Patient Notification

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- The next year, FDA inspection at the manufacturer found that testing and screening of the donors were not done appropriately.
- CDC recommended notifying patients of low risk of bloodborne pathogen infections and other communicable diseases.
- Texas health departments recommended patients consult with their doctors about getting tested.



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# *Strongyloides* Transplant Investigation

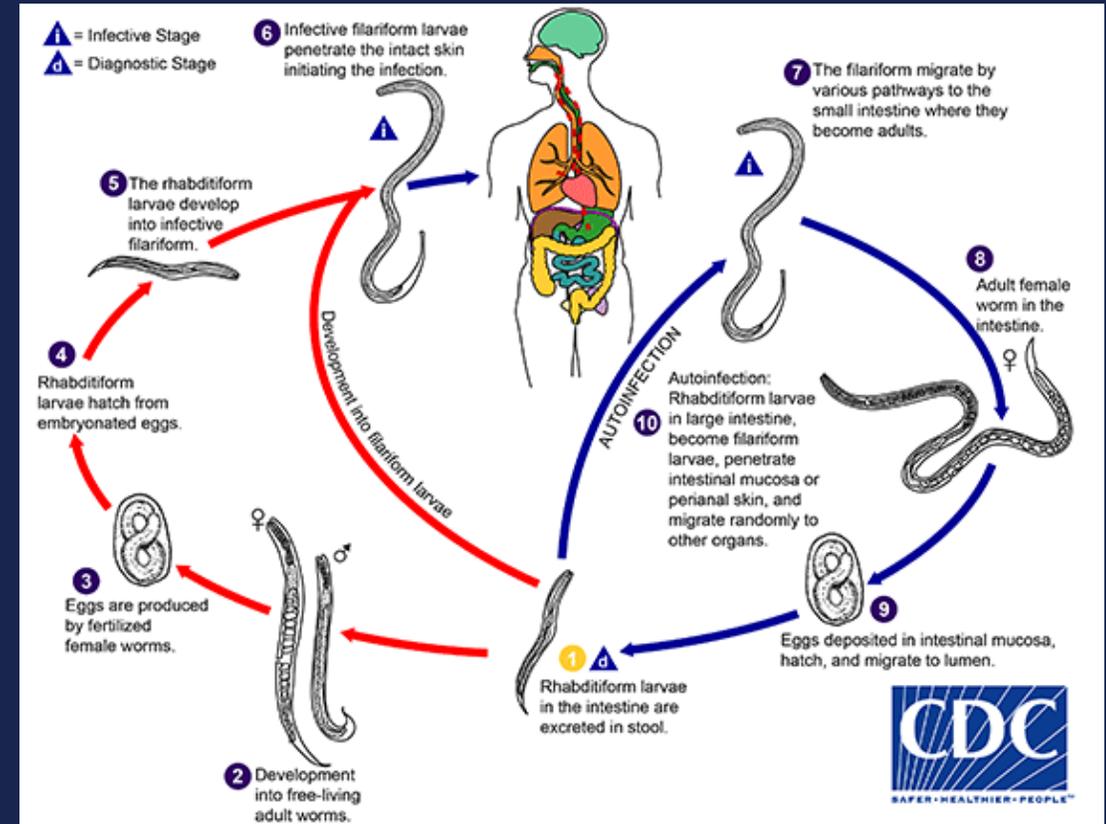


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# *Strongyloides stercoralis*

- Neglected Tropical Disease
- Transmitted by nematode (roundworm)
- Soil-transmitted helminth
  - Contact with soil containing the larvae
  - Alternates between free-living and parasitic cycles
  - Potential for autoinfection and multiplication within host





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# Investigation Overview

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- DSHS notified of left kidney recipient diagnosed with strongyloidiasis
- Donor:
  - Former resident of Mexico
  - Recent travel to Dominican Republic
- Recipients
  - Liver, right kidney, and left kidney
  - All three were Texas residents
- Affected facilities located in PHRs 2/3, 6/5S, 8, & 11



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# Investigation Steps

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- Left kidney recipient deceased
- Pre-transplant serology samples requested
  - Left kidney recipient
  - Donor
- Treatment recommendations for liver and right kidney recipient
  - Oral Ivermectin 200 ug/kg, once daily for 2 days
  - Repeated 2 weeks later



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# Investigation Findings

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- Pre-transplant serum from deceased left kidney recipient
  - Negative for strongyloidiasis
- Donor serology samples
  - Positive for strongyloidiasis
- Remaining recipients
  - Received the second and final round of treatment
  - Medical team conducted symptom survey
  - All remained asymptomatic



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# **Antibiotic Resistance Lab Network (ARLN)**

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# AR Lab Network

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The DSHS Lab and the CDC's Mountain Region AR Lab in Utah have a joint partnership to conduct testing for novel and emerging AR organisms including:

- CRE
  - *Escherichia coli*
  - *Klebsiella pneumoniae*
  - *Klebsiella oxytoca*
  - *Enterobacter* species
- CR-*Acinetobacter baumannii* (CRAB)
- CR-*Pseudomonas aeruginosa* (CRPA)
- *Candida auris*

# Carbapenemases



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- Enzymes that degrade carbapenem antibiotics
- Enzymes of primary public health concern
  - *K. pneumoniae* carbapenemase (KPC)
  - New Delhi Metallo- $\beta$ -lactamase (NDM)
  - Verona Integron Mediated Metallo- $\beta$ -lactamase (VIM)
  - Imipenemase (IMP)
  - Oxacillin carbapenemase (OXA)
  - Mobilized Colistin resistance genes (mcr-1, mcr-2)

# Why are these mechanisms a public health priority?

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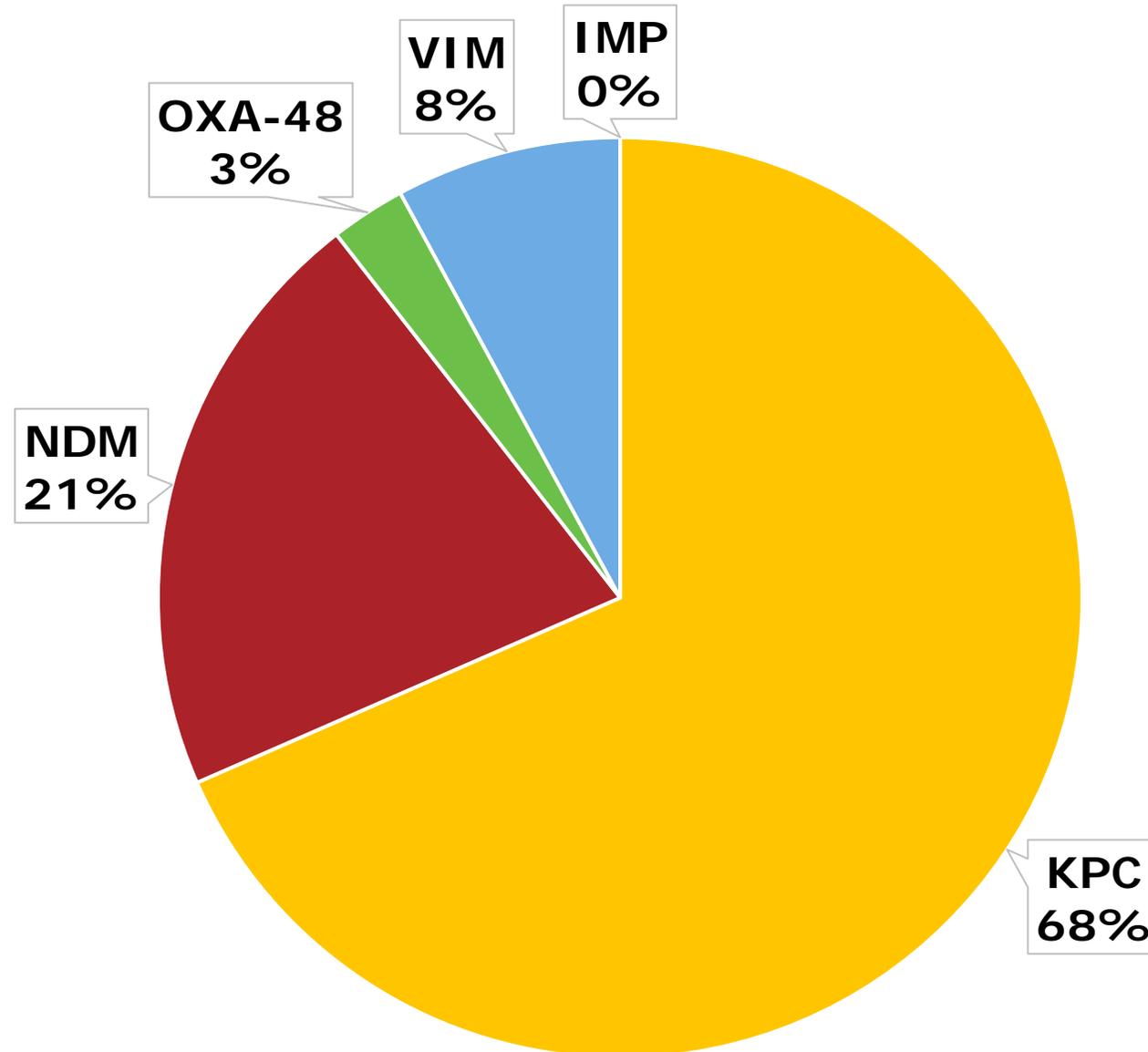
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- Cause infections associated with high mortality rates
- Resistance is highly transmissible
  - Between patients
  - Between organisms
- Treatment options are limited
  - Pan-resistant strains identified
  - Could be years before new agents are available to treat
- Potential for spread into the community
- Carbapenemase-producing CRE has spread rapidly throughout US and world

# Resistance Mechanisms Identified in PHR 2/3

## July 2017-February 2021



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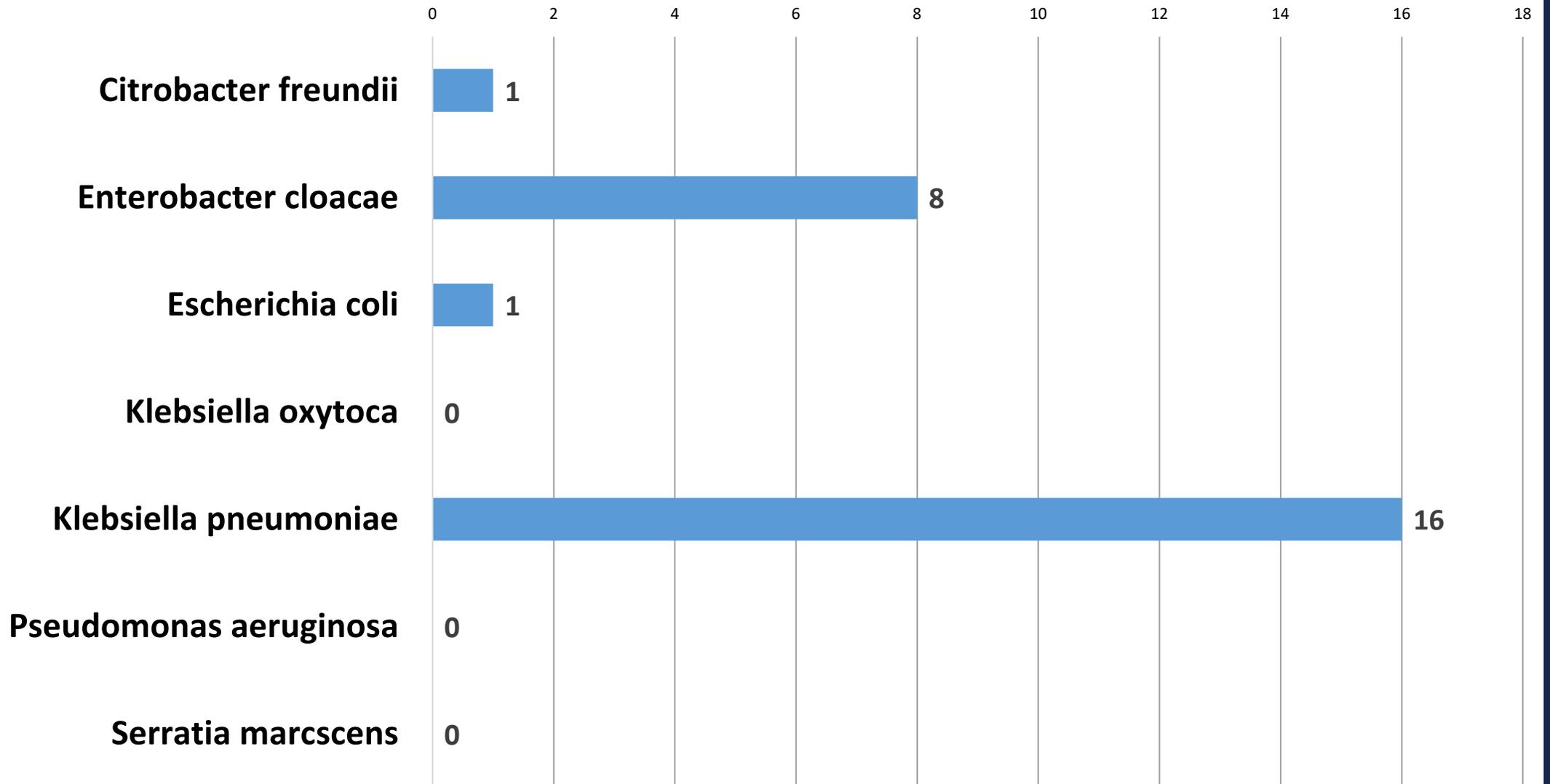


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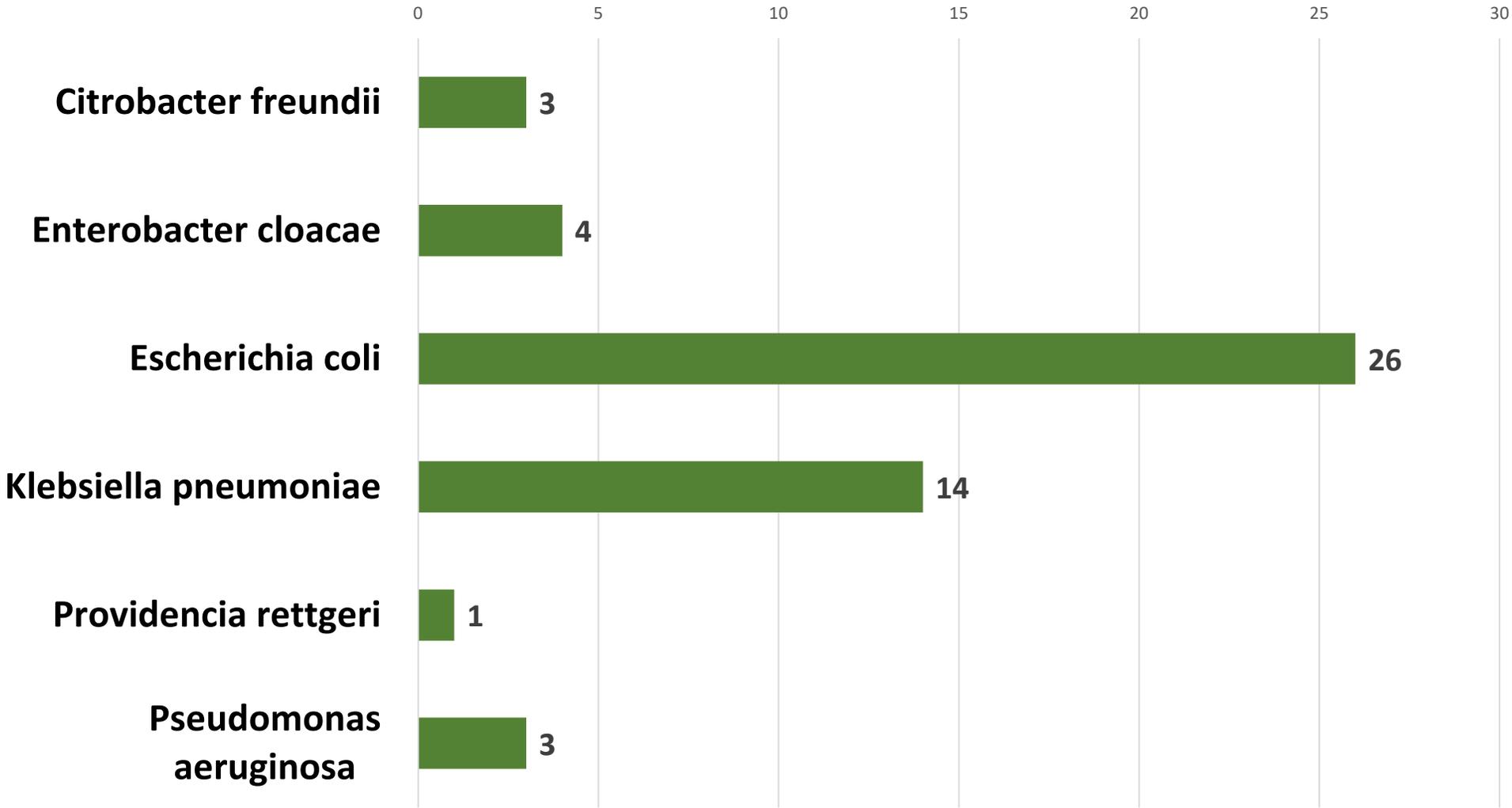
# KPC Organism Data

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# NDM Organism Data

July 2017-February 2021



■ NDM



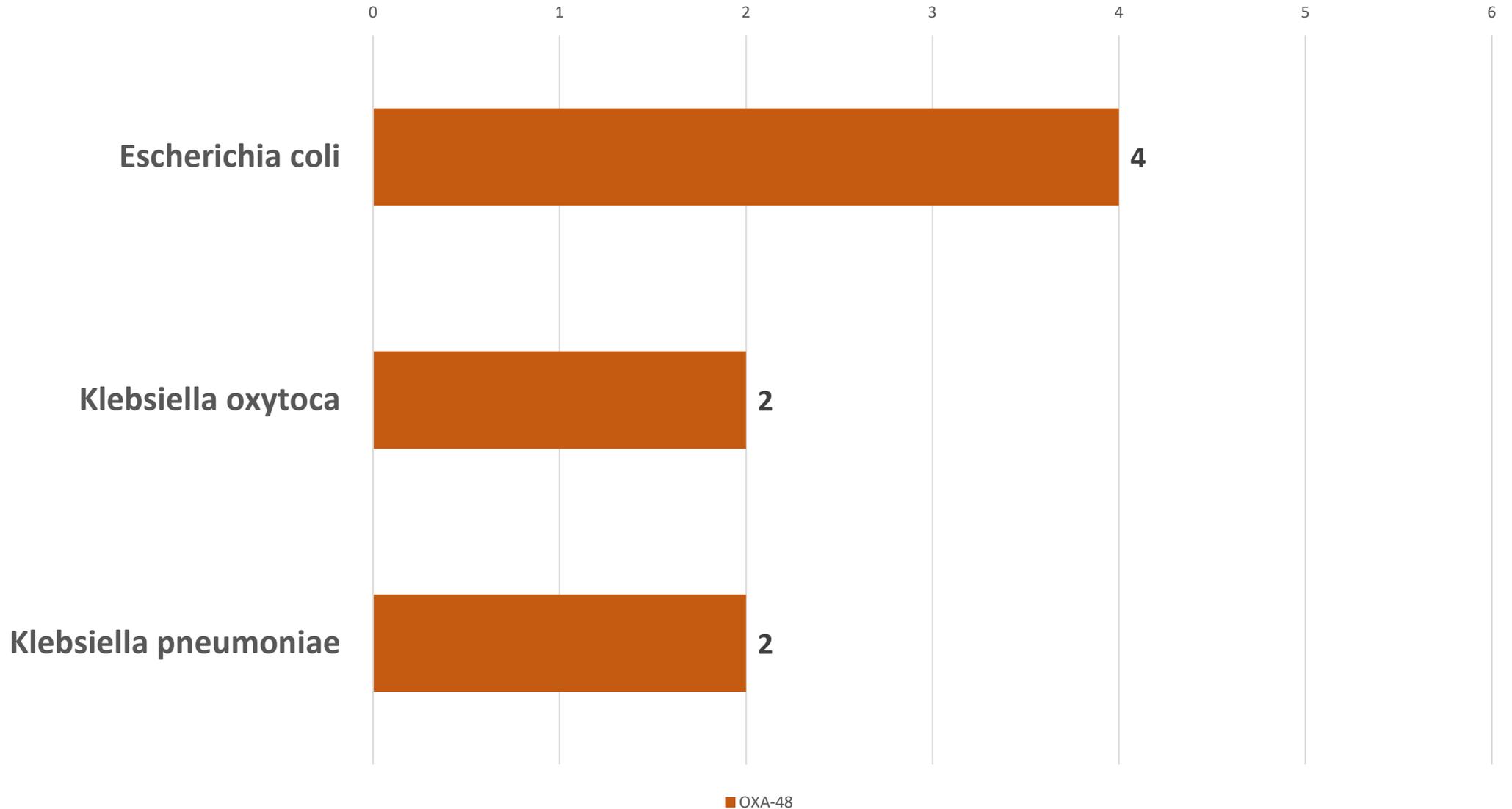


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# OXA-48 Organism Data

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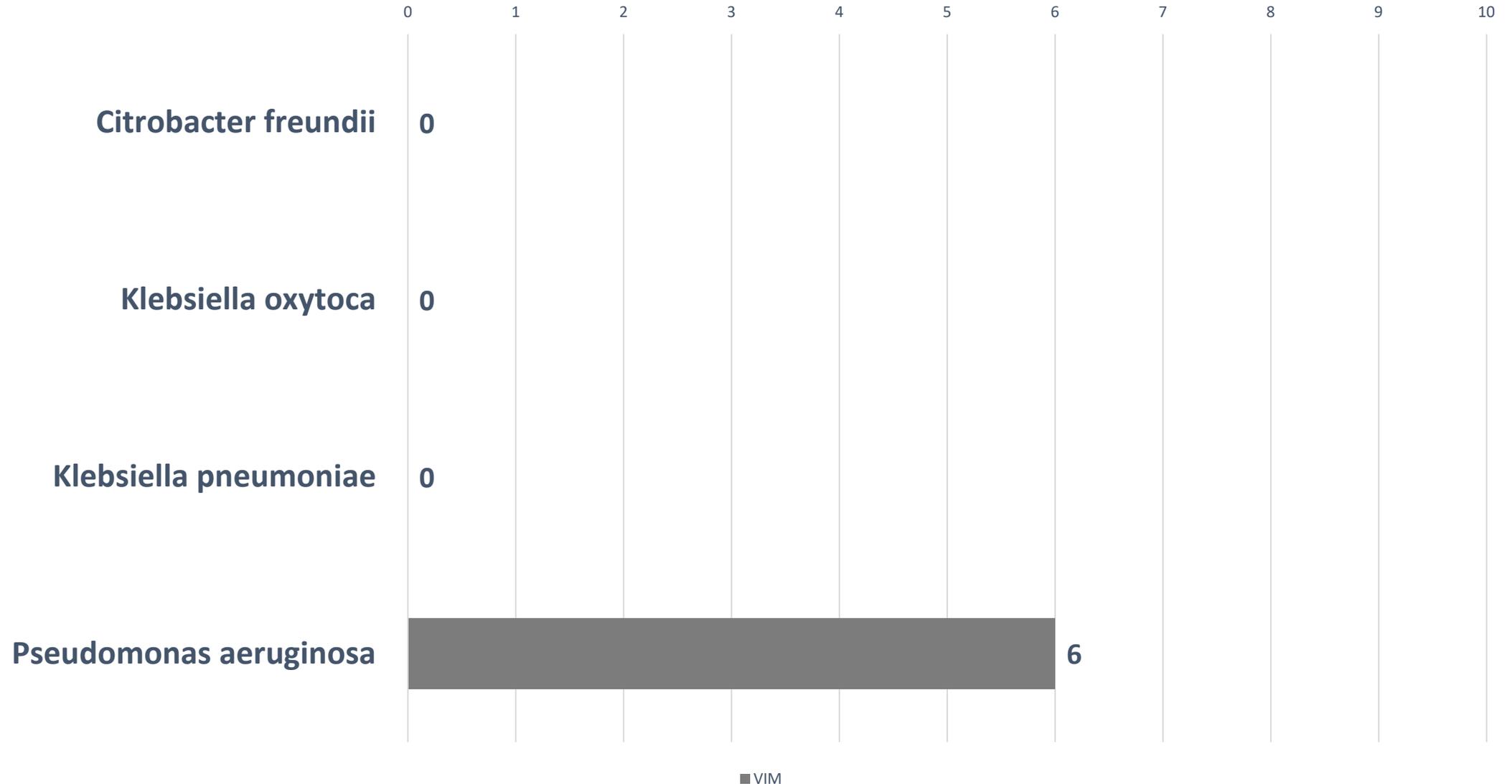


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# VIM Organism Data

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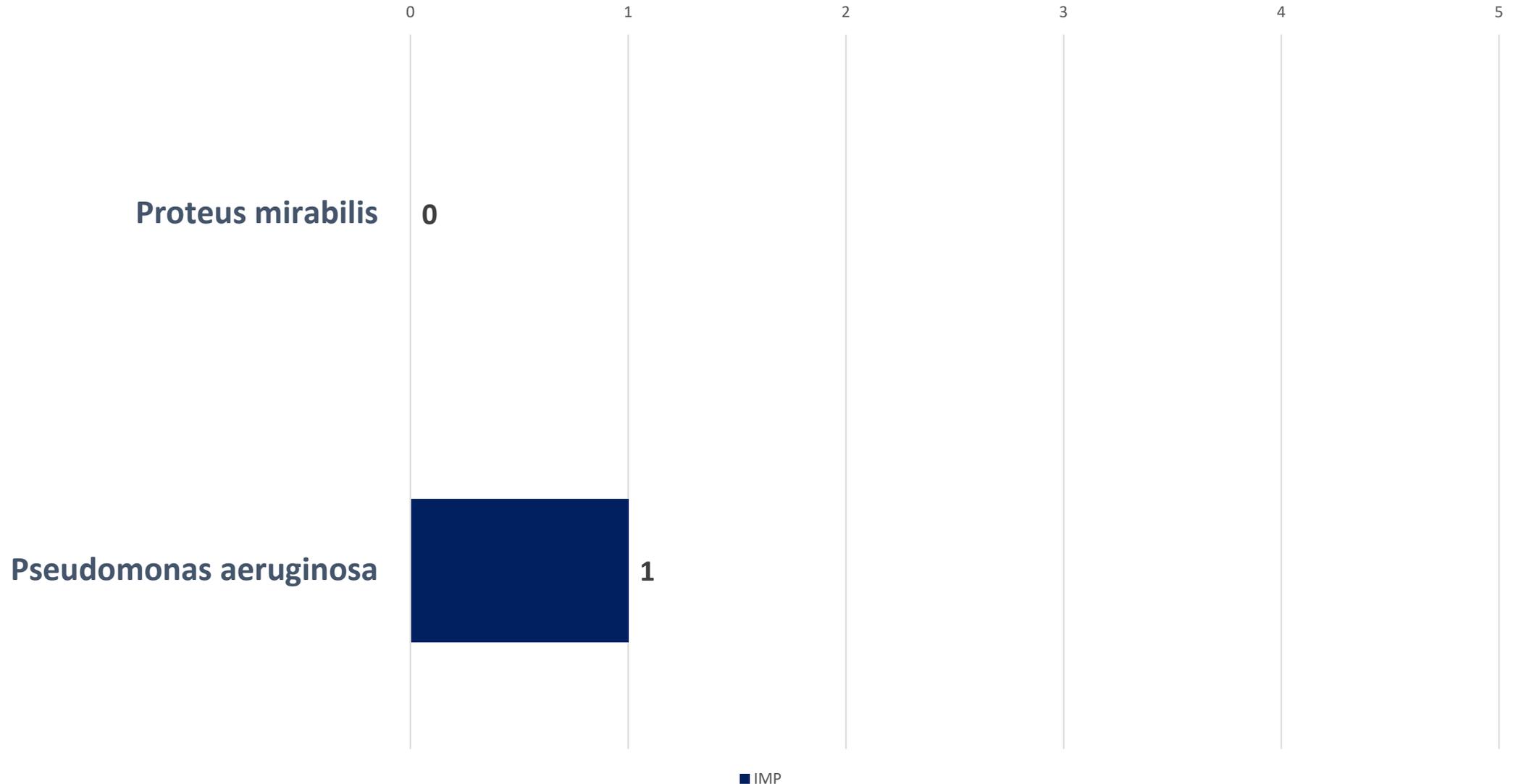


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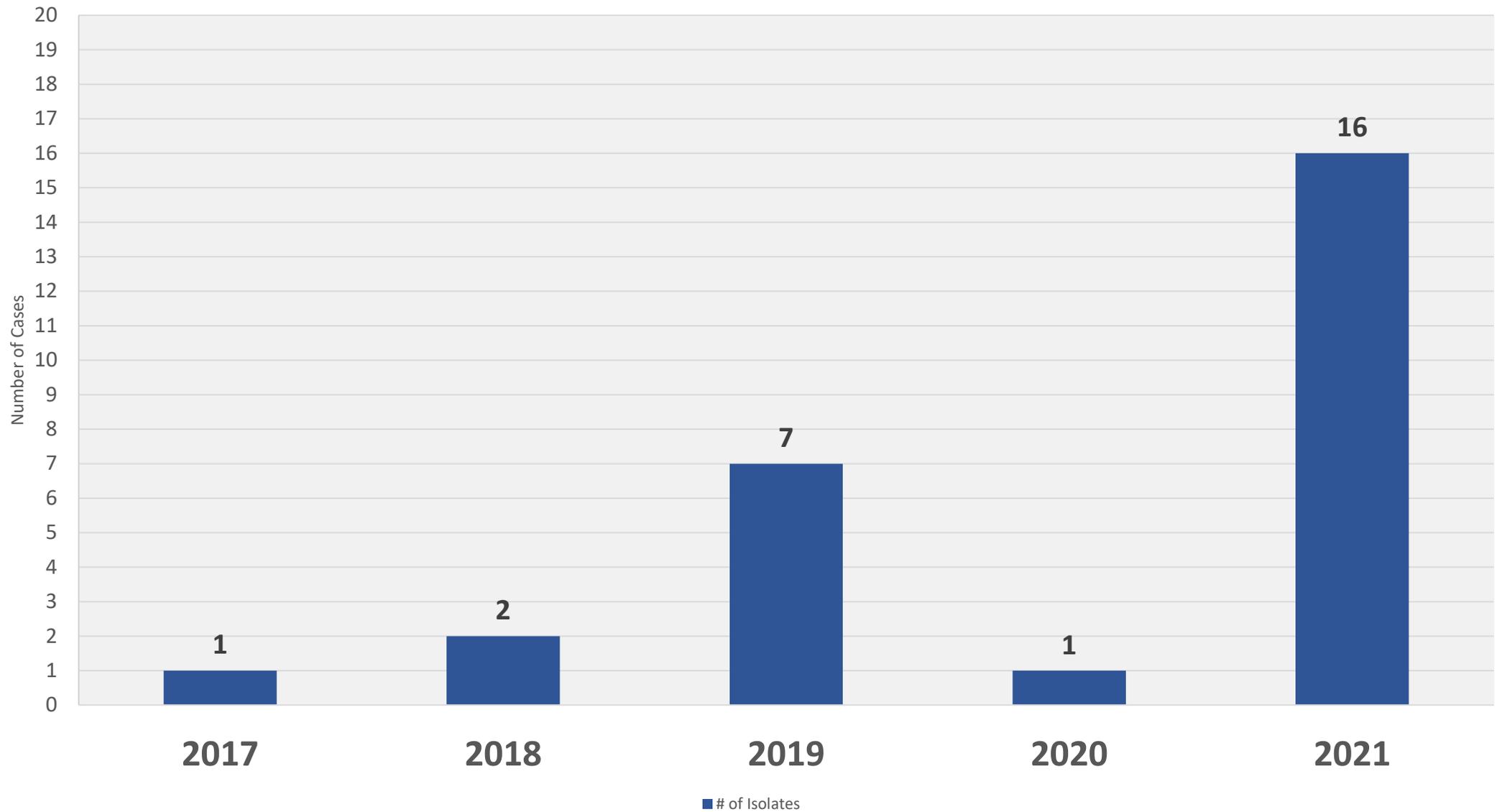
# IMP Organism Data

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# Texas *Candida auris* cases

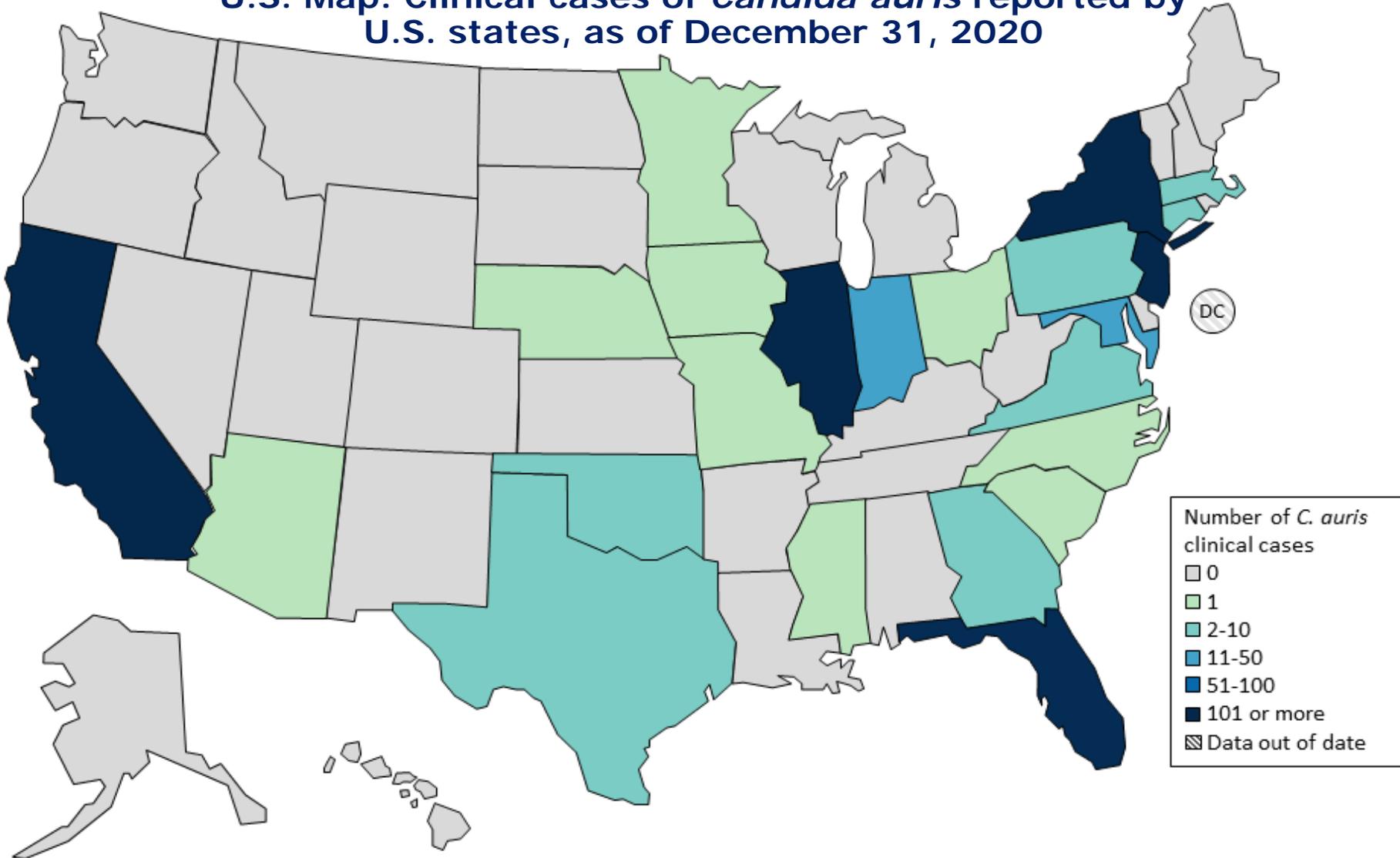
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## U.S. Map: Clinical cases of *Candida auris* reported by U.S. states, as of December 31, 2020



- Most *C. auris* cases in the United States have been detected in the New York City area, New Jersey, California, Florida, and the Chicago area.
- Strains of *C. auris* in the United States have been linked to other parts of the world.
- **During this time period, Texas investigated 7 confirmed clinical cases.**



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# **Epidemiology Response**

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# Containing Unusual Resistance



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- Early and aggressive action, when even a single case is found, can keep these germs from spreading in healthcare facilities and causing hard-to-treat or even untreatable infections
- CDC estimates show that this aggressive approach could prevent 1,600 cases of CRE in one state over three years



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# **Texas Antibiotic Resistance Lab Network Response Plan and Epi-Lab Work Plan**

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Developed by:

**Texas Department of State Health  
Services Laboratory and  
Emerging and Acute Infectious  
Disease Unit**

**July 2020**



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# Texas Response Tiers

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- **Tier 1**

- Pan-nonsusceptible (CRE, CRPA)
- Pan-resistant (*Candida auris*, CRAB, CRE, CRPA)
- Other novel organisms and resistance mechanisms

- **Tier 2**

- *Candida auris*
- CRAB (Pan-nonsusceptible, IMP, KPC, NDM, VIM, uncommon plasmid-mediated OXA)
- CRE (IMP, NDM, OXA-48, VIM)
- CRPA (IMP, KPC, NDM, OXA-48, VIM)

- **Tier 3**

- CRE (KPC, MCR)

# Containment Response Elements

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- Review patient's healthcare exposures prior to and after positive specimen
- Prompt notification of healthcare providers and patient and implementation of appropriate transmission-based precautions
- Remote and onsite infection control assessments with observations of practices
- Screening of healthcare roommates and broader screening of healthcare contacts

# Containment Response Elements

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- Clear communication of patient status with transferring facilities
- Evaluate spread to healthcare facilities that regularly share patients with the index healthcare facility

# Laboratory Surveillance

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- Target laboratories that have performed cultures from healthcare settings where the patient received care in order to identify organisms with similar resistance patterns.
- These isolates should be saved and sent for testing to determine if they match the organism of interest.



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# Prepare for Novel Resistance

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- Plan for unusual resistance in your facility
- Develop and audit compliance to policies and procedures
- Assess infection control practices for gaps and educate to mitigate the gaps
- Communicate isolation status when patients are transferred
- Collaborate with the health department for prevention efforts



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# **COVID-19 Pandemic Response**





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# COVID-19 Response Activities

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- Provided direct assistance to healthcare facilities and health departments to mitigate over 1100 COVID-19 healthcare facility outbreaks
- Trained contractors and epidemiologists to conduct remote infection control assessments
- Conducted more than 1200 infection control assessments for COVID-19 containment from March 2020-March 2021
- Provided subject matter expertise related to inquiries from healthcare providers, Texas professional associations and societies, and public health entities



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# COVID-19 Response Activities

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- Provided education on COVID-19 and infection control to various audiences within Texas and nationally
- Developed Texas Long-Term Care Facility Preparedness Checklist
- Collaborated with public health, regulatory, and emergency management partners to create a unified approach to COVID-19 containment in healthcare facilities
  - Through our state's assistance request process, facilities were able to request HAI Epi/Infection Control, Testing, Staffing, Facility disinfection, PPE/Supplies

# Types of Healthcare Facilities That Received Assistance

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- Acute care hospitals
- Long-term acute care hospitals
- Skilled nursing facilities
- Assisted living facilities
- Intermediate care facilities for individuals with intellectual disabilities
- State Supported Living Centers
- Chemical Dependent Treatment Facilities
- Psychiatric Hospitals and State Hospitals
- Outpatient Clinics (e.g., dialysis, dental, mental health)
- And many more...

# Additional Infection Control Education

CDC's Project Firstline Infection Control Training

<https://www.cdc.gov/infectioncontrol/projectfirstline/about.html>



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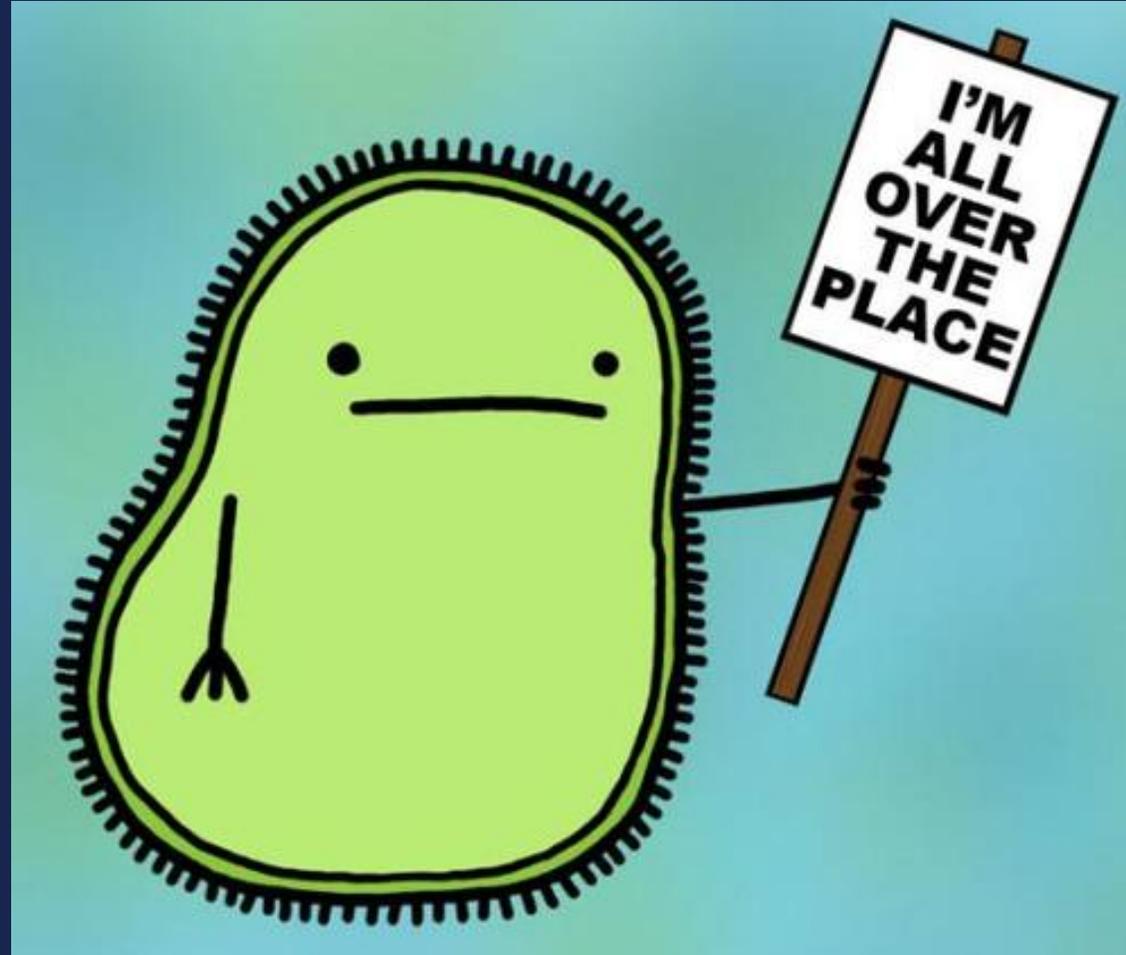


# Questions?



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# Thank you!

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11/4/2021