



Candida auris 101

Mississippi State Department of Health

February 2024

Disclosure of conflicts of interest

- *Kathryn Taylor, MD has nothing to disclose.*
- *Brittany Fowler, PharmD has nothing to disclose.*



Urgent public health threat

ANTIBIOTIC RESISTANCE THREATS
IN THE UNITED STATES

2019



Urgent Threats

These germs are public health threats that require urgent and aggressive action:



CARBAPENEM-RESISTANT
ACINETOBACTER



CANDIDA AURIS



CLOSTRIDIODES DIFFICILE



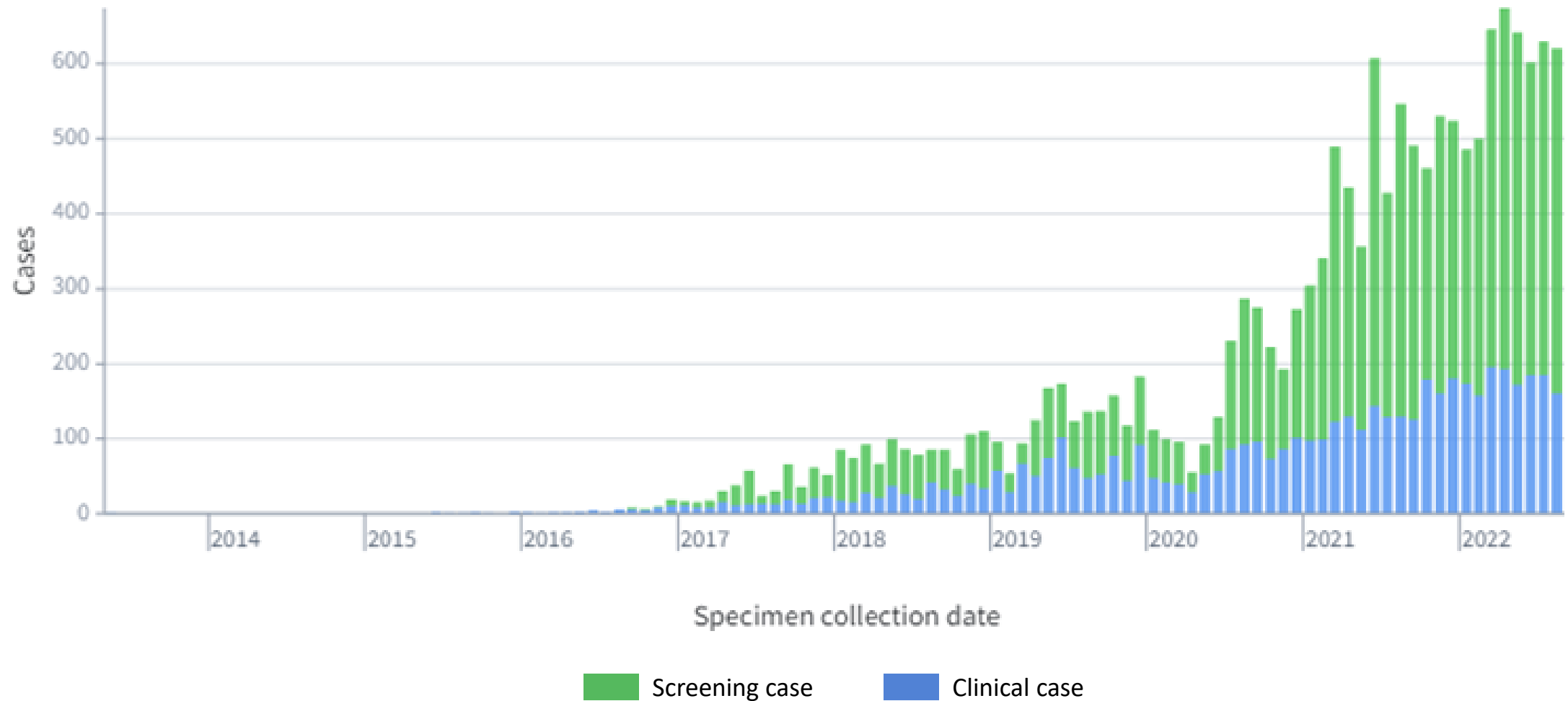
CARBAPENEM-RESISTANT
ENTEROBACTERIACEAE



DRUG-RESISTANT
NEISSERIA GONORRHOEAE



Increasing cases of *C. auris*



Geographic spread of *C. auris*

2013-2016
4 states



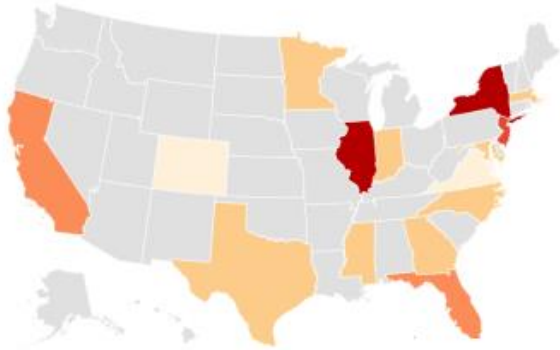
2017
6 new states



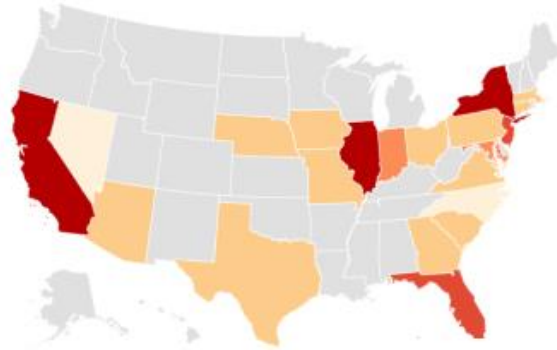
2018
2 new states



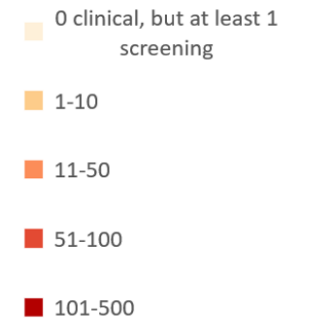
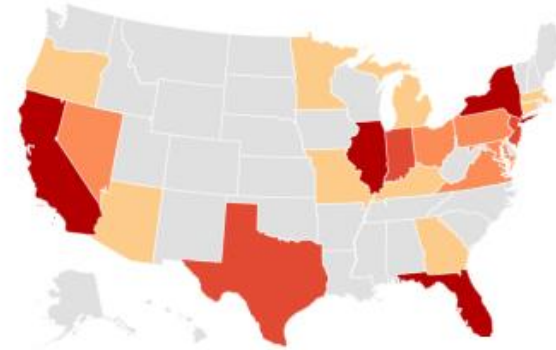
2019
5 new states + Washington DC



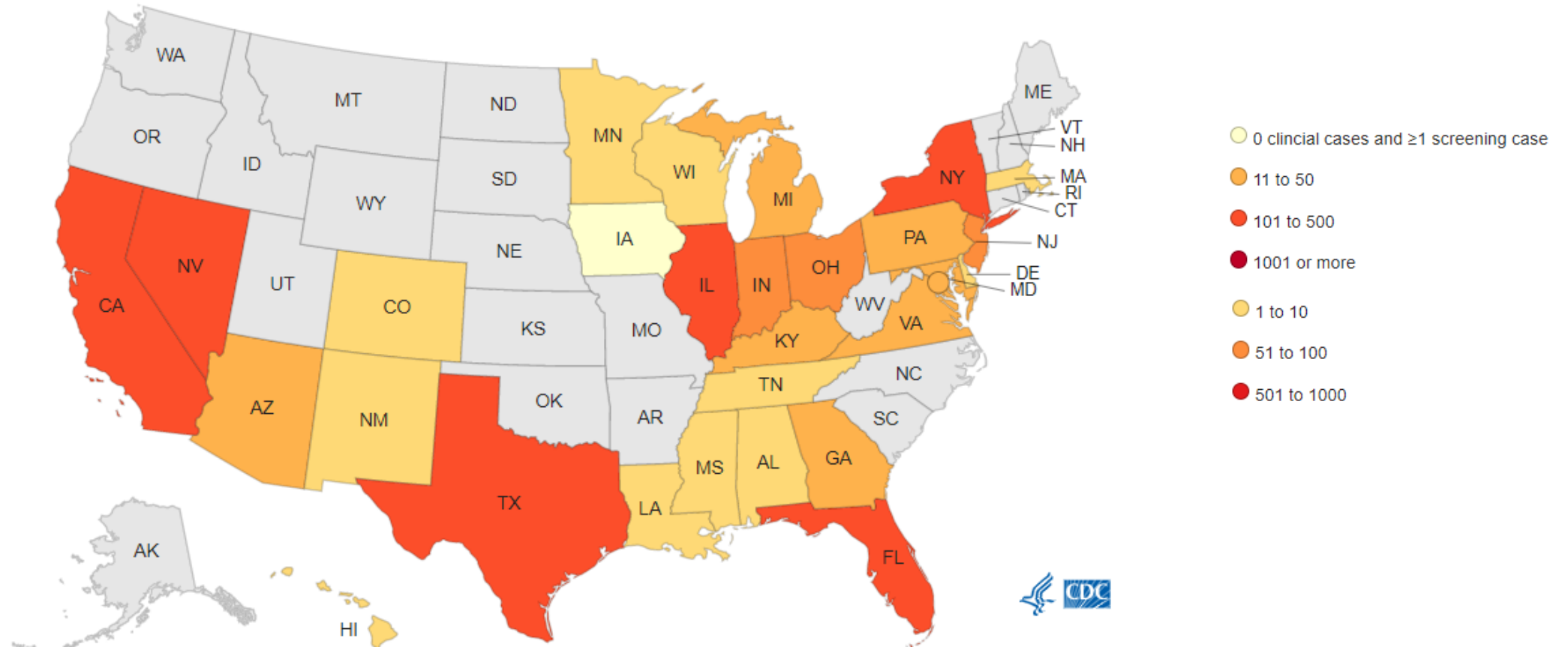
2020
8 new states



2021
3 new states

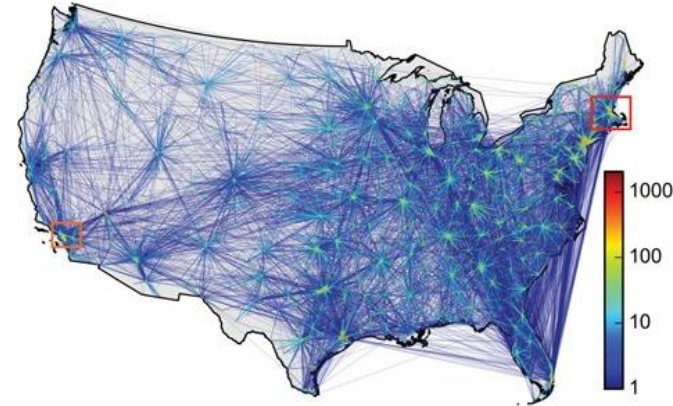


Reported clinical cases of *C. auris*, Nov 2021- Dec 2022



C. auris no longer just introduced from abroad

- Most cases are the result of local transmission
- Introductions by colonized patients from high burden areas in the U.S. are more common
- The first case may represent local transmission and is just the tip of the iceberg

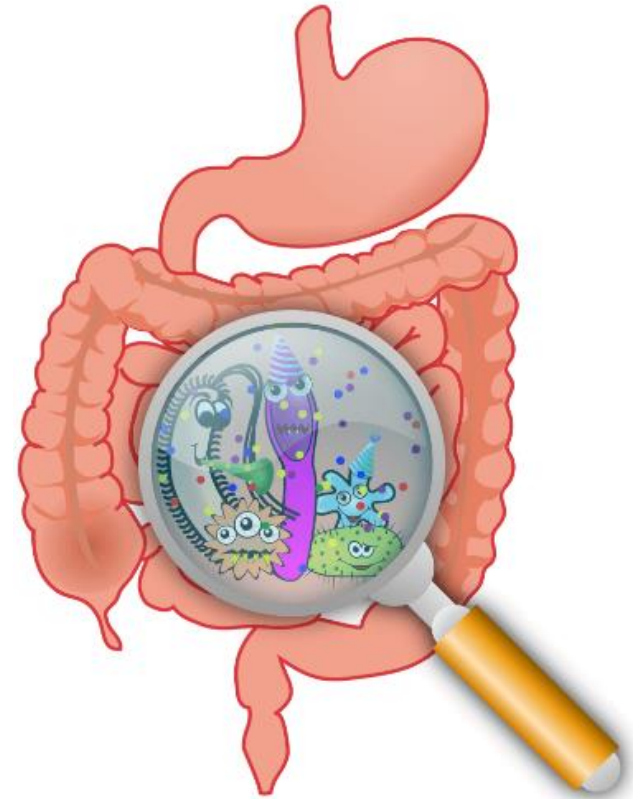


U.S. Facility transfer network
Fernandez-Garcia et al. Nature (2017)



Typical *Candida* infections

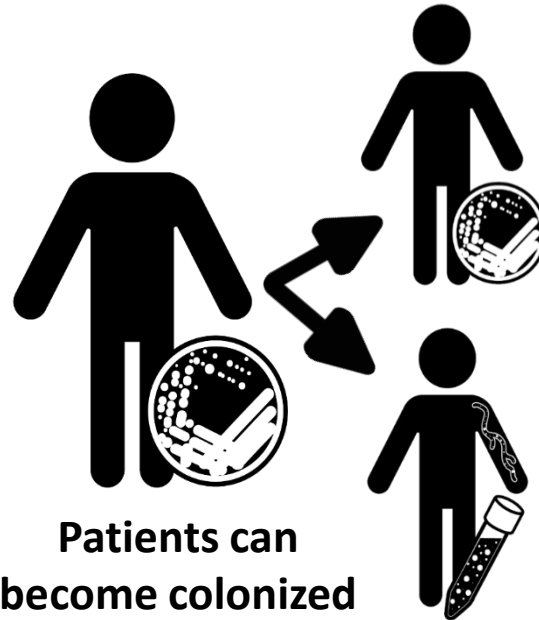
- **Conventional wisdom:** autoinfection from host flora, particularly from gut (*not person-to-person transmission*)
- **Outbreaks:** rare
- **Resistance:** depends on the species, generally low but increasing among some species



Why are we concerned about *Candida auris*?



Highly
drug-resistant



Patients can
become colonized
and develop
invasive infections



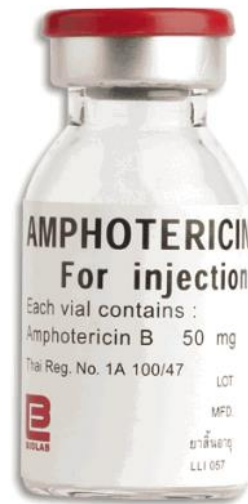
Spreads in healthcare
settings



C. auris resistance in the United States



84%
Azoles



25%
Polyenes



2%
Echinocandins
First-line treatment

Preliminary data from AR Lab Network

Increase in *C. auris* resistance

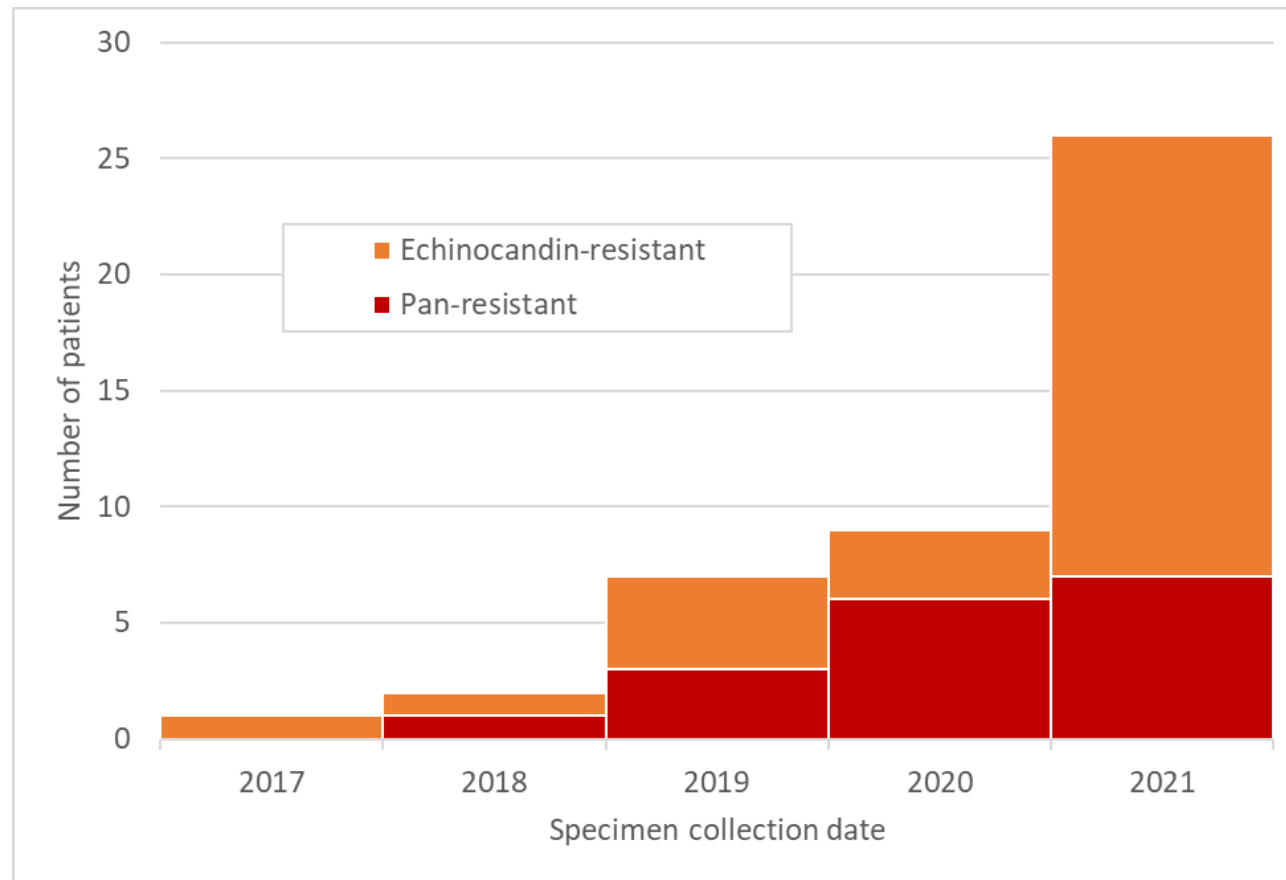
- Pan-resistant cases before 2020 were rare, had no epi links, and developed in patients on echinocandin treatment
- 2 clusters of pan- or echinocandin-resistant strains demonstrating first evidence of spread among patients in healthcare facilities
- One cluster in DC and one cluster in TX



First evidence of spread of pan- or echinocandin-resistant strains

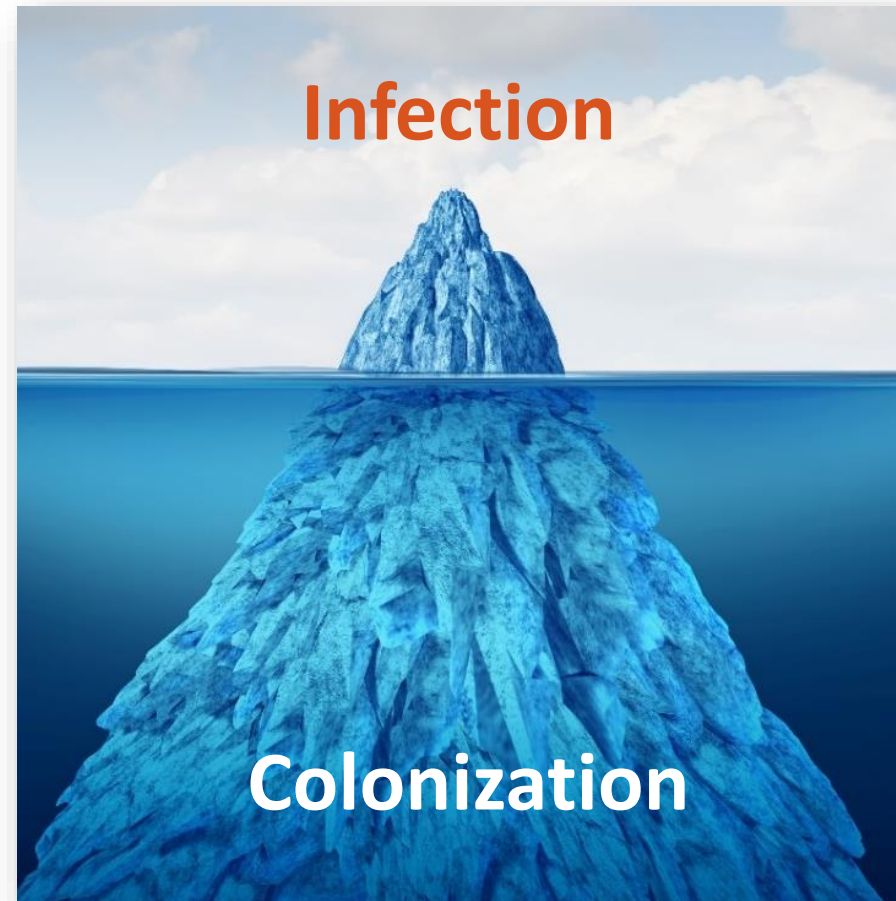
Increasing pan- or echinocandin resistance

~2% of isolates resistant to echinocandins (first-line treatment)



C. auris colonization

- Can lead to:
 - Infections
 - Transmission to others (so also require precautions)
- Primarily on skin
 - Recommend screening by swabbing axilla/groin
 - Nose and other body sites also can become colonized
- **Colonization can persist for a long time, often months to years**
- Currently, no well-established decolonization strategies

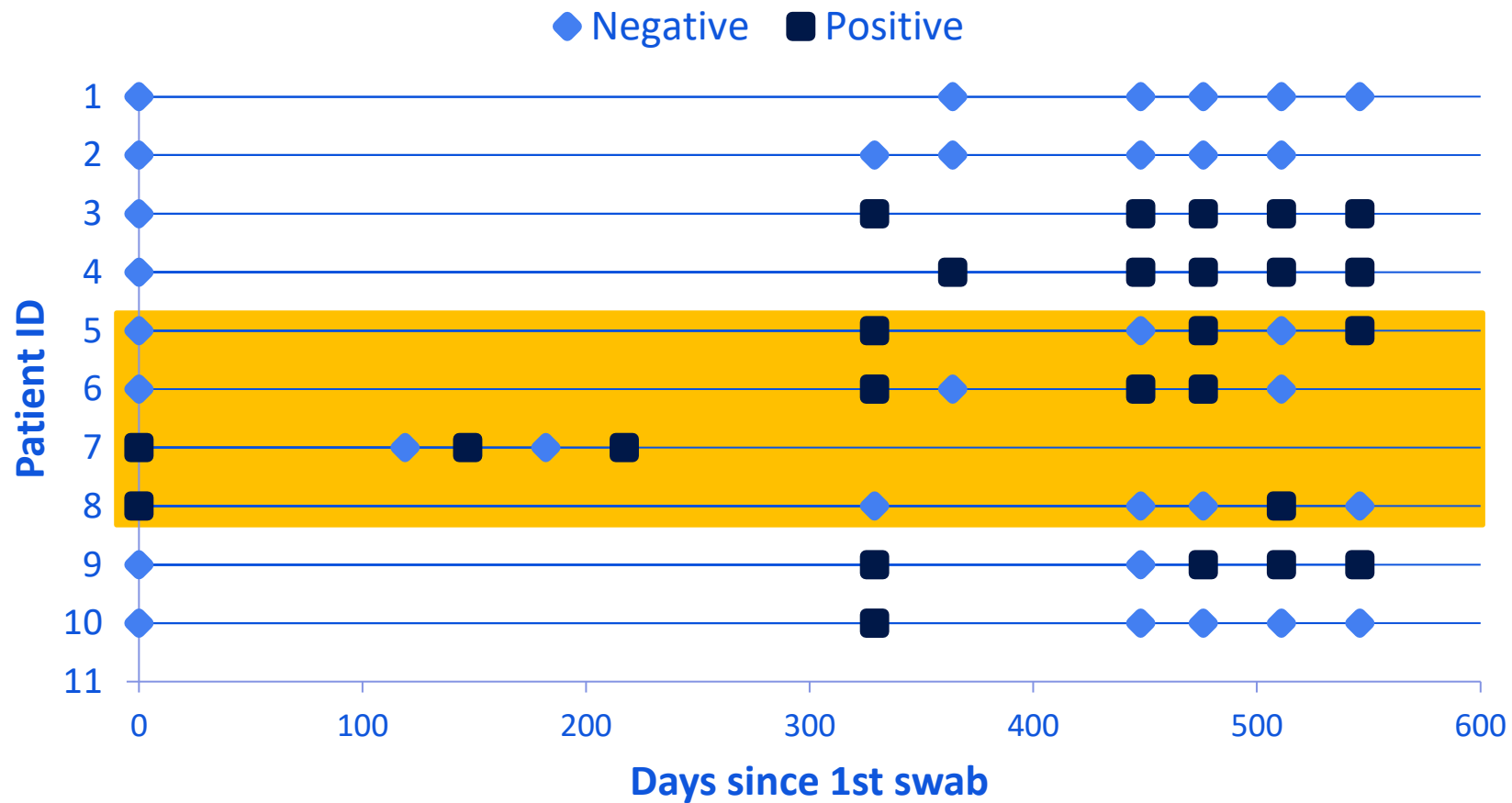


Clinical Cases vs. Colonized Cases

- Colonized
 - Identified in a non-invasive site (e.g., skin)
 - No signs of infection or disease
 - Persistent and/or intermittent – up to several years
 - Treatment is not recommended!
 - Can lead to infection in some individuals
- Clinical
 - Identified in sites including blood and wounds
 - Signs of infection and/or invasive disease
 - May remain colonized after recovering from *C. auris* infection



Long Term Colonization, but intermittent negatives



C. auris colonization can continue after discharge

Open Forum Infectious Diseases

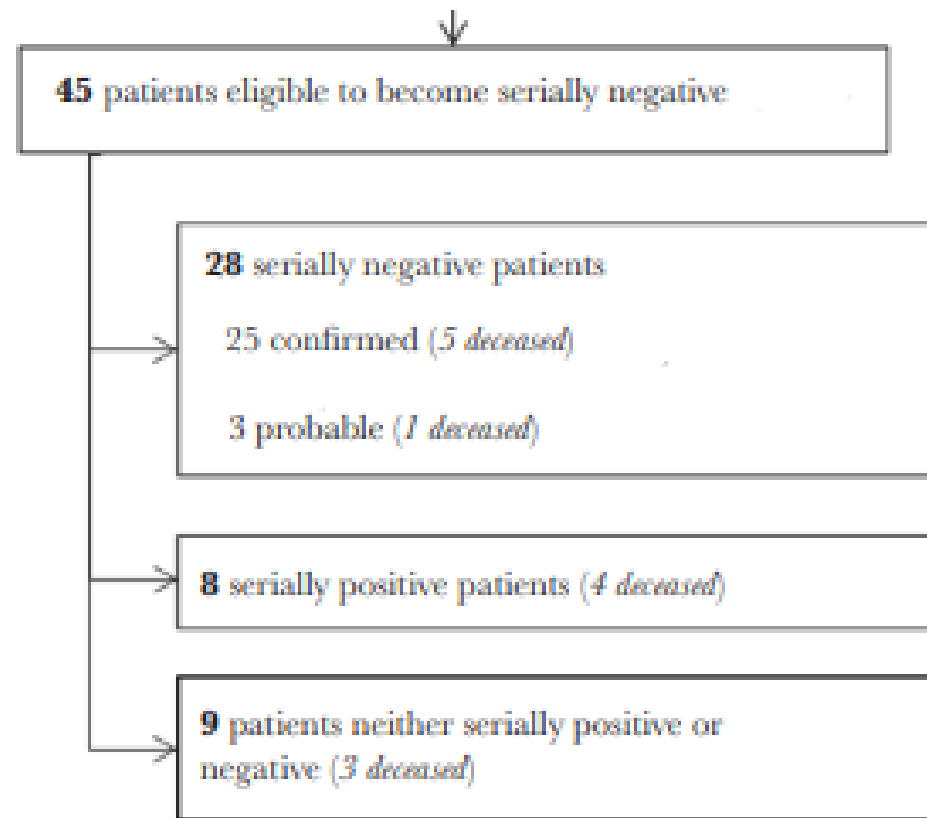
MAJOR ARTICLE



Candida auris Colonization After Discharge to a Community Setting: New York City, 2017–2019

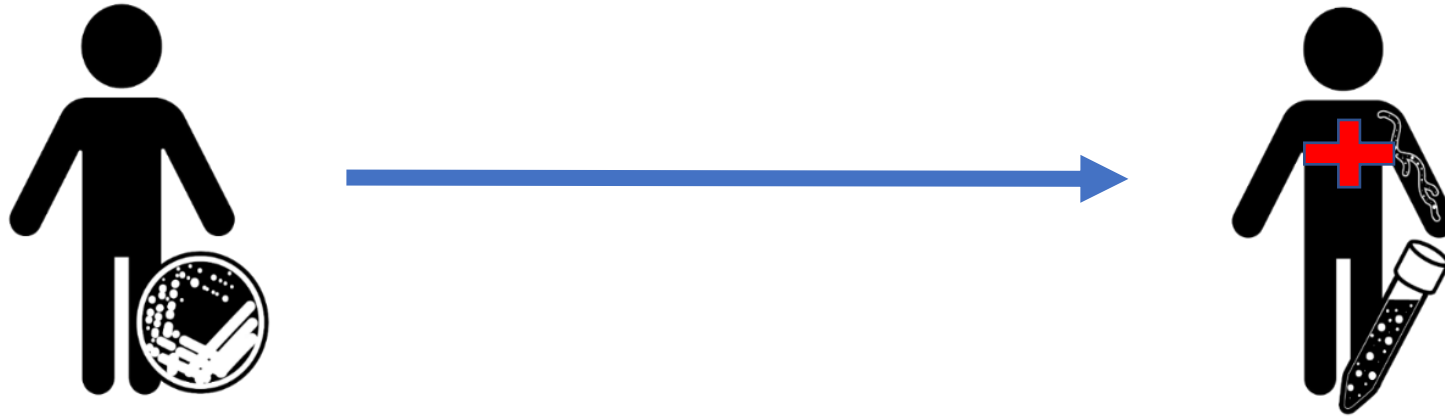
Genevieve Bergeron,^{1,2,*} Danielle Bloch,¹ Kenya Murray,¹ Molly Kratz,¹ Hilary Parton,¹ Joel Ackelsberg,¹ Mike Antwi,¹ Paula Del Rosso,¹ Marie Dorsinville,¹ Hannah Kubinson,¹ Maura Lash,¹ Sophie Rand,¹ Eleanor Adams,² Yanchun Zhu,⁴ Richard Erazo,³ Sudha Chaturvedi,⁴ and Don Weiss¹

18% remained positive for 2 screenings after discharge



Can cause invasive infections and high mortality

- 8% of colonized patients have positive clinical specimens, of which *half* are bloodstream infections



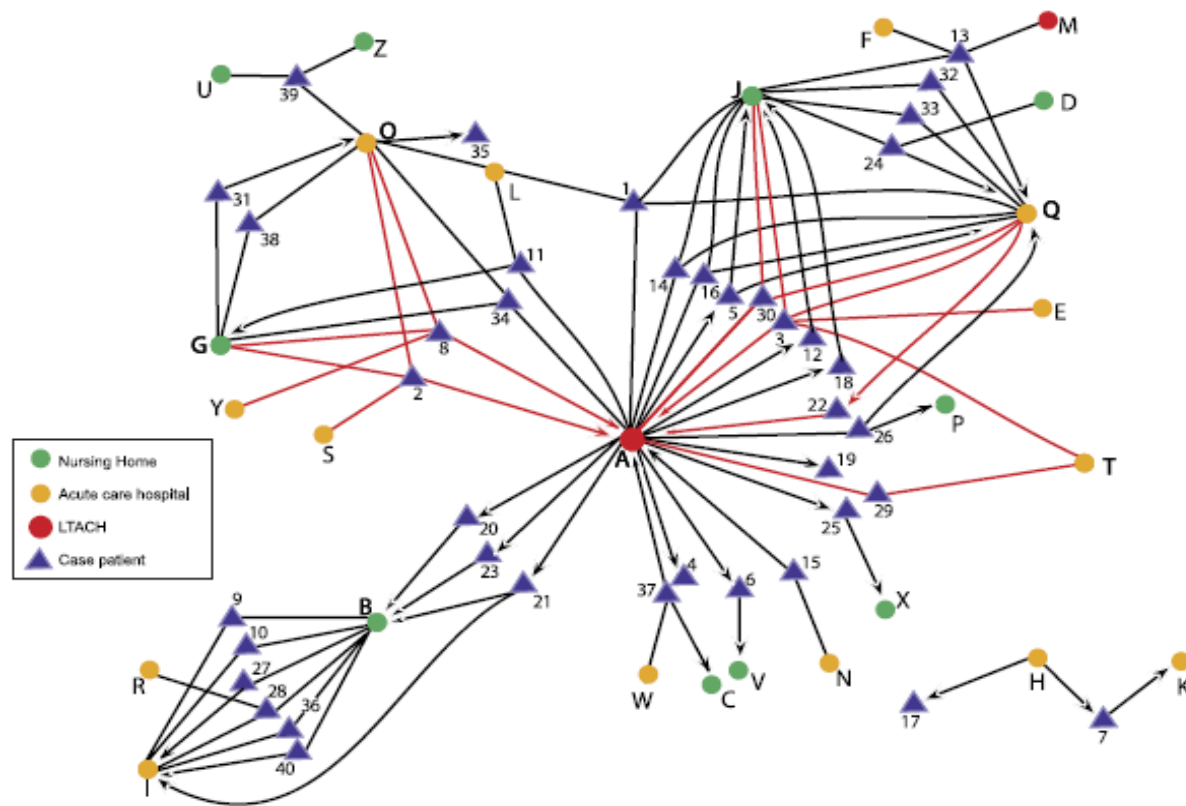
- Mortality of invasive infections is **~40%** within the first 30 days

***C. auris* often affects the sickest of the sick**

- Invasive devices (e.g., tracheostomies)
- Ventilator-dependent
- Colonized with other multidrug-resistant organisms
- Recently received antibiotics and antifungals
- Not a threat to general public or healthy individuals



Spread is amplified in high acuity post-acute care facilities (similar to other MDROs)

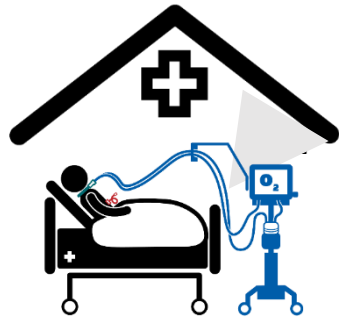


- LTACHs and vent-capable SNFs:
 - Long lengths of stay
 - High acuity patients
 - Less infection control infrastructure than short stay acute care hospitals

LTACH = long-term acute care hospital
SNF = skilled nursing facilities

vSNFs and LTACHs are disproportionately affected

C. auris prevalence



in vSNFs: 23-71%
in LTACHs: 23-36%

vSNF = skilled nursing facility with ventilator units
LTACH = long-term acute care hospital

C. auris prevalence



in SNFs: 0-2%
In ACHs: 0-14%

SNF = skilled nursing facility
ACH = short-stay acute care hospital

Acute care hospitals play an important role too!

- Can still have transmission and outbreaks
- Can identify local cases and outbreaks that might be missed
- Role model for infection control



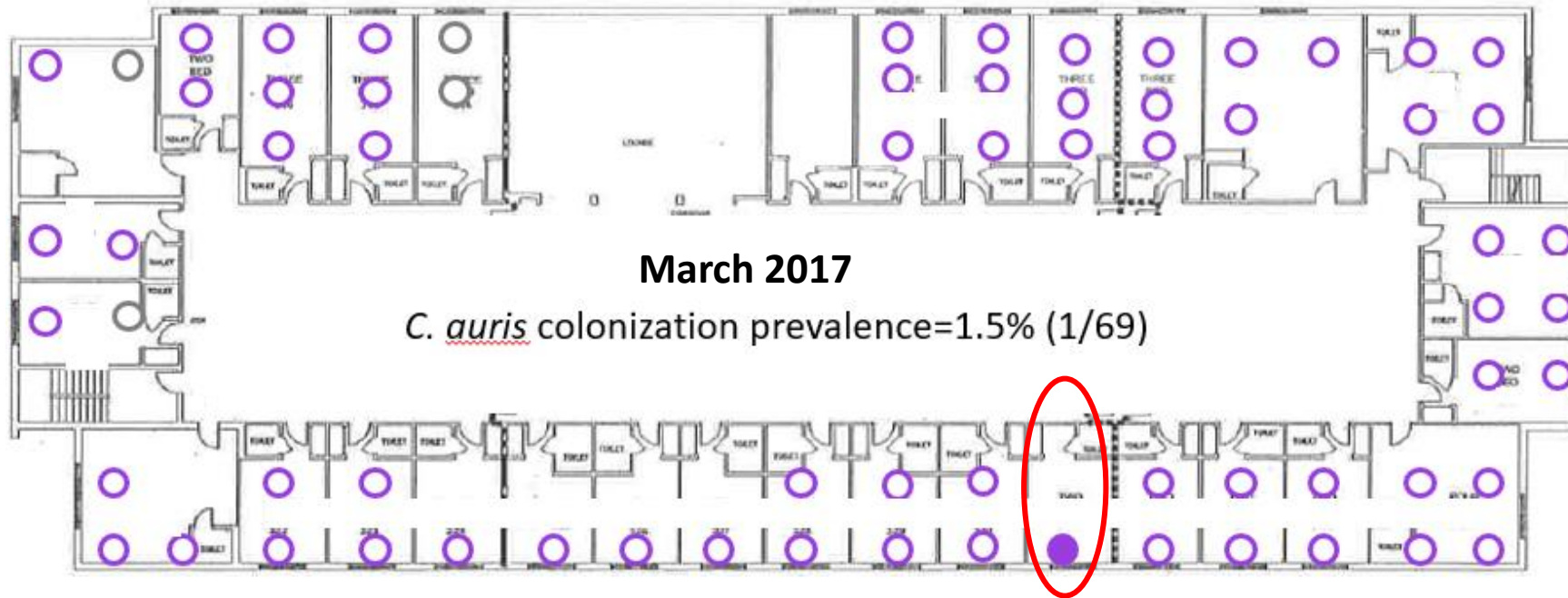
Pediatric cases

- Total <10 pediatric cases of *C. auris* have previously been identified in the United States
- In May, identified the first cluster of pediatric cases at a single facility
 - 3 cases from a single ICU in a hospital with adult *C. auris* cases
 - All <1 year of age and 2 had never left the hospital
 - All with bloodstream infections (and 2 with endocarditis)

Concerning for transmission from adult patients through shared exposures



C. auris spreads throughout units, not just to roommates



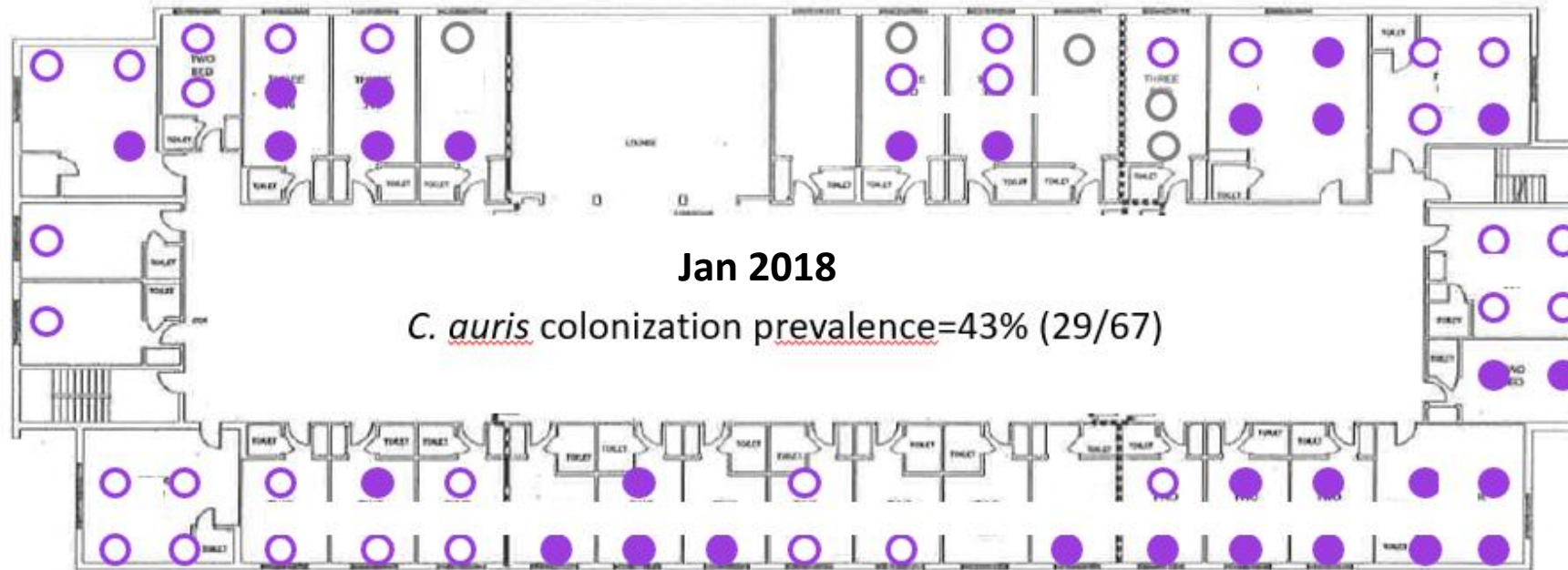
- *C. auris* positive
- Screened negative for *C. auris*
- Not tested for *C. auris* (refused or not in room)

vSNF = skilled nursing facility with ventilator units; PPS = point-prevalence survey



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C. auris spreads throughout units, not just to roommates

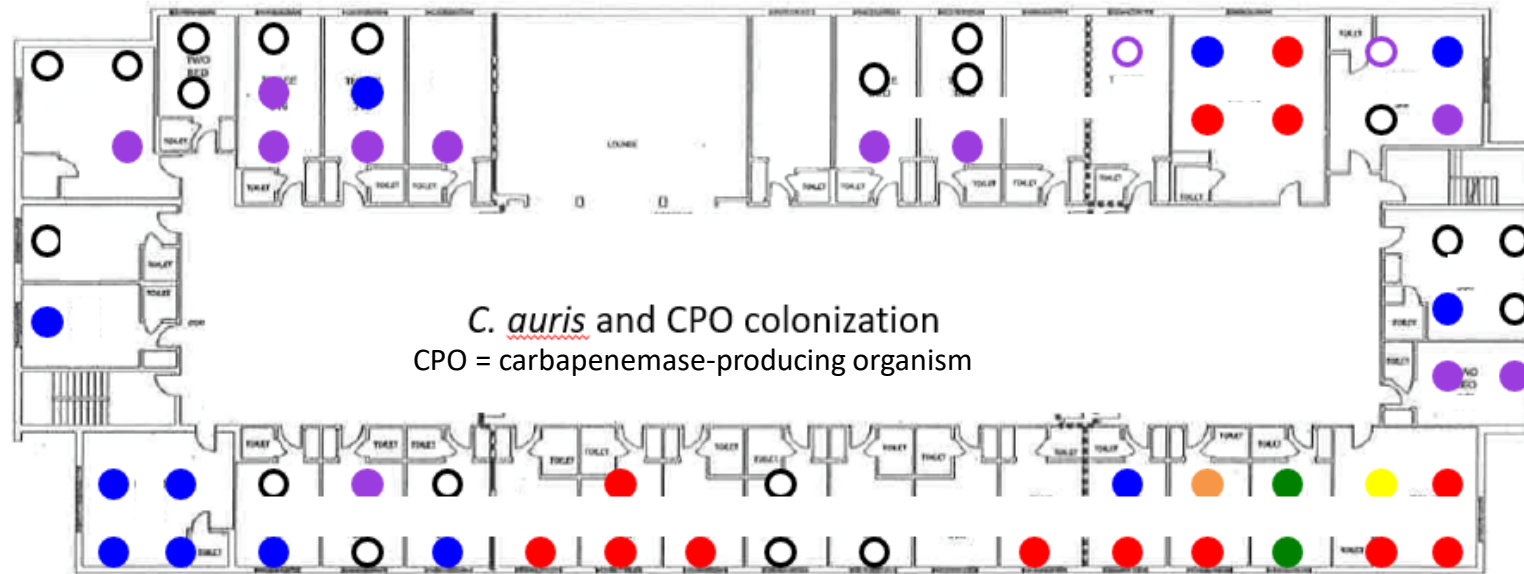


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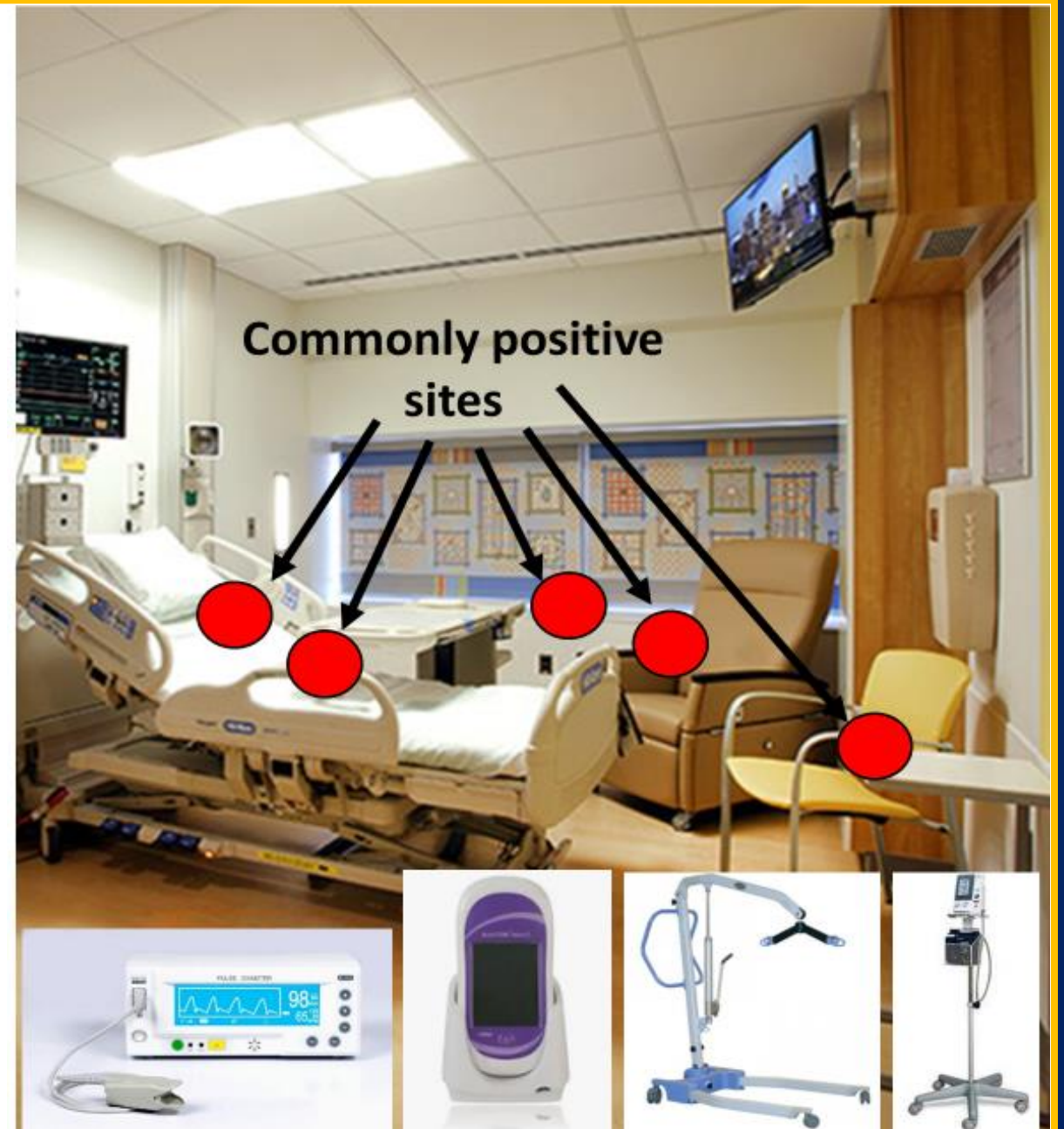
- *C. auris*
- *C. auris* and KPC
- KPC or CRE with unknown mechanism of resistance
- *C. auris*, KPC, and NDM
- *C. auris*, VIM-CRPA, and KPC
- *C. auris* and KPC-CRPA
- Screened negative for *C. auris*, but not tested for CRE
- Screened negative for CRE and *C. auris*

Many patients have other MDROs too



C. auris persists in the environment

- Contaminates surfaces and medical equipment
- Can survive over a month
- Some common disinfectants (quaternary ammonia compounds) don't work



Preventing spread of *C. auris*



Battling Spread of *C. auris* and MDROs

- Early detection of people who are infected or colonized with MDROs
- Strong infection control
- Communications about MDRO status within and between facilities



Inter-facility infection control transfer form

Inter-facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer.
Please attach copies of latest culture reports with susceptibilities if available.

Sending Healthcare Facility:

Patient/Resident Last Name	First Name	Date of Birth	Medical Record Number

Name/Address of Sending Facility	Sending Unit	Sending Facility Phone

Sending Facility Contacts	Contact Name	Phone	E-mail
Transferring RN/Unit			
Transferring physician			
Case Manager/Admin/SW			
Infection Preventionist			

Does the person* currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other potentially transmissible infectious organism?	Colonization or history (Check if YES)	Active infection on Treatment (Check if YES)
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Vancomycin-resistant <i>Enterococcus</i> (VRE)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Clostridioides difficile</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Acinetobacter</i> , multidrug-resistant	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Enterobacteriaceae (e.g., <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i>) producing-Extended Spectrum Beta-Lactamase (ESBL)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Carbapenem-resistant Enterobacteriaceae (CRE)	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Pseudomonas aeruginosa</i> , multidrug-resistant	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
<i>Candida auris</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other, specify (e.g., lice, scabies, norovirus, influenza):	<input type="checkbox"/> Yes <input type="checkbox"/> No	<input type="checkbox"/> Yes <input type="checkbox"/> No

Does the person* currently have any of the following? (Check here if none apply)

<input type="checkbox"/> Cough or requires suctioning	<input type="checkbox"/> Central line/PICC (Approx. date inserted <input type="text"/>)
<input type="checkbox"/> Diarrhea	<input type="checkbox"/> Hemodialysis catheter
<input type="checkbox"/> Vomiting	<input type="checkbox"/> Urinary catheter (Approx. date inserted <input type="text"/>)
<input type="checkbox"/> Incontinent of urine or stool	<input type="checkbox"/> Suprapubic catheter
<input type="checkbox"/> Open wounds or wounds requiring dressing change	<input type="checkbox"/> Percutaneous gastrostomy tube
<input type="checkbox"/> Drainage (source): <input type="text"/>	<input type="checkbox"/> Tracheostomy

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Inter-facility Infection Control Transfer Form

Is the person* currently in Transmission-Based Precautions? NO YES

Type of Precautions (check all that apply) Contact Droplet Airborne

Other:

Reason for Precautions:

Is the person* currently on antibiotics? NO YES (current use)

Antibiotic, dose, route, freq.	Treatment for:	Start date	Anticipated stop date	Date/time last dose

Vaccine	Date administered (If known)	Lot and Brand (If known)	Year administered (If exact date not known)	Does the person* self-report receiving vaccine?
Influenza (seasonal)				<input type="checkbox"/> Yes <input type="checkbox"/> No
Pneumococcal (PPSV23)				<input type="checkbox"/> Yes <input type="checkbox"/> No
Pneumococcal (PCV13)				<input type="checkbox"/> Yes <input type="checkbox"/> No
Other:				<input type="checkbox"/> Yes <input type="checkbox"/> No

*Refers to patient or resident depending on transferring facility

Name of staff completing form (print):

Signature: Date:

If information communicated prior to transfer:

Name of individual at receiving facility:

Phone of individual at receiving facility:

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https://www.cdc.gov/hai/prevent/prevention_tools.html



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MSDH *C. auris* inter-facility infection control transfer letters

Patient name: _____
Date of birth: _____

Affix patient label here

NOTICE

Candida auris Positive

This patient requires enhanced barrier precautions

This patient is colonized or infected with *Candida auris* (*C. auris*). *C. auris* is a difficult to detect fungus that can cause life-threatening infections and has caused long-lasting outbreaks in healthcare facilities (HCFs). It is easily spread, hard to remove from the environment, and often very resistant to antifungal medications.

Enhanced Barrier Precautions should be instituted while the patient is in your facility

Based on guidance from the Mississippi State Department of Health (MSDH), implementation of Transmission-Based Precautions is necessary to prevent transmission within your facility, which can lead to outbreaks. Contact Precautions should be implemented by all HCFs, including long-term acute care hospitals (LTACHs), as the primary option. For long-term management of these patients in residential facilities, Enhanced Barrier Precautions may be an option. Contact MSDH for additional guidance or refer to the CDC guidance available at <https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html> for further details.

Information on Enhanced Barrier Precautions and Recommendations:

- Residents placed on Enhanced Barrier Precautions do not require a private room (though preferred if possible). These residents can participate in group activities if the following criteria are met:
 - Wounds are bandaged to prevent leakage of fluids.
 - Excretions like phlegm, urine, and stool are contained.
 - They can perform hand hygiene.
 - Dedicated wheelchairs should be used and clearly labeled with the resident's name.
- Healthcare personnel are required to wear a **gown and gloves** when performing **high-contact resident care activities** that provide opportunities for transfer of MDROs to staff hands and clothing. Examples of high-contact care activities include dressing, bathing/showering, transferring, providing hygiene, changing linens, changing briefs or assisting with toileting, device care or use (central line, urinary catheter, feeding tube, tracheostomy/ventilator), and wound care.
- Healthcare personnel should conduct diligent **hand hygiene** during and after contact with the resident or their environment; ensure **alcohol-based hand rub** is readily available.
- Disposable or dedicated patient-care equipment should be used whenever possible.
- Disinfectant effective against *Candida auris* ([List P](#)). Cleaning and disinfection should be performed according to the manufacturer's instructions for use. Examples include:
 - Shared equipment (e.g., stethoscopes, X-ray machines, scales, ventilators) should be thoroughly cleaned and disinfected after contact with this patient.
 - The resident's room should be cleaned/disinfected daily and terminally upon discharge.
 - Transport vehicles/equipment should be terminally cleaned/disinfected after use.
- Ensure **written and verbal communication** of the need for contact precautions for all intra- and inter-facility transfers. **Send a physical copy of this coversheet with the patient upon transfer.**

Containment of drug-resistant organisms including *C. auris* is a joint effort between healthcare facilities and public health partners. If your facility is not already working with the MSDH HAI/AR Program to coordinate activities for *C. auris* prevention, please contact the MSDH HAI/AR Program at 601-576-7725.

Patient name: _____
Date of birth: _____

Affix patient label here

NOTICE

Candida auris test pending

This patient requires enhanced barrier precautions while lab results are pending

This patient has been screened for *Candida auris* (*C. auris*), due to potential contact or as part of surveillance, and at this time the results are pending. *C. auris* is a difficult to detect fungus that can cause life-threatening infections and has caused long-lasting outbreaks in healthcare facilities (HCFs). It is easily spread, hard to remove from the environment, and often very resistant to antifungal medications.

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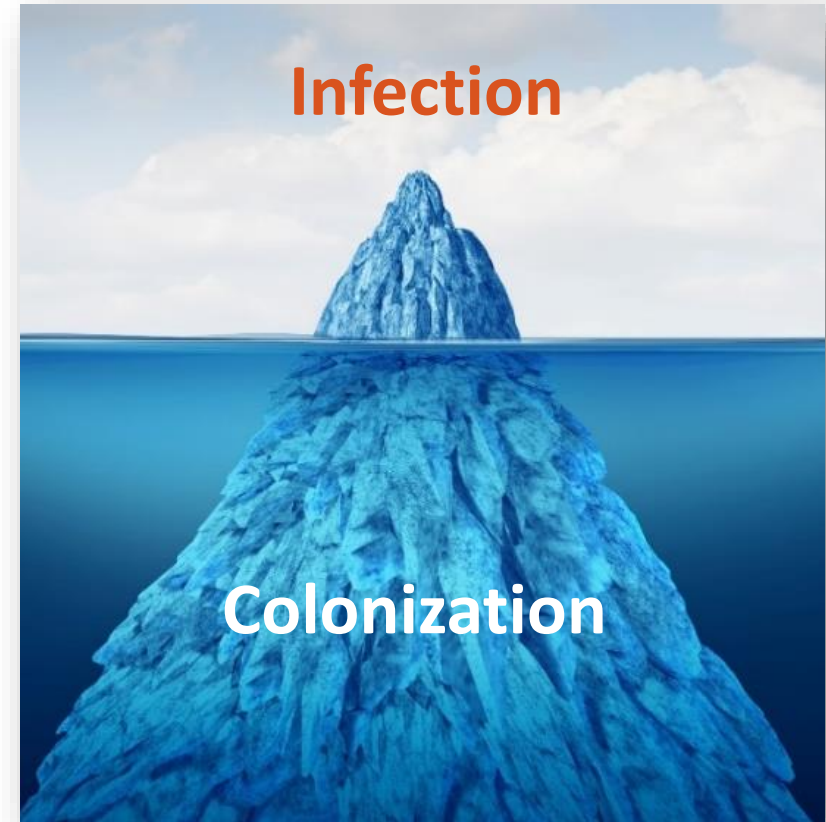
Detection of cases has been challenging

- **Clinical specimens**

- Laboratory ability to identify these organisms correctly
- Enhanced detection methods (e.g., identify the species of all *Candida* or yeast species from any specimen type)

- **Colonization screening**

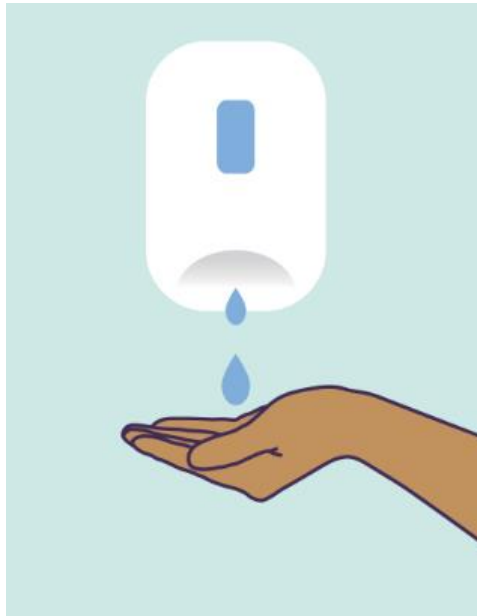
- Admission screening of high-risk patients
- Point prevalence survey (PPS)
- Discharge screening for outbreak facilities



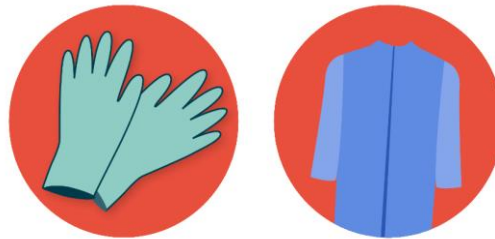
The type of screening and target population should be based on local epidemiology



Prevention strategies: back to the basics



Hand Hygiene



Transmission-based precautions & Personal Protective Equipment



Environmental Cleaning & Disinfection

***C. auris* specific cleaning and disinfection products**

- First choice:
 - **List P:** Antimicrobial Products Registered with EPA for Claims Against *Candida auris*
- Second choice:
 - **List K:** EPA's Registered Antimicrobial Products Effective Against *C. diff* Spores

<https://www.epa.gov/pesticide-registration/list-p-antimicrobial-products-registered-epa-claims-against-candida-auris>



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Improving infection prevention and control (IPC) compliance

- Making supplies readily available
- Educating and training staff regularly
- Conducting routine audits (e.g., observations, fluorescent marking)



Facilities shouldn't wait until they have a case!



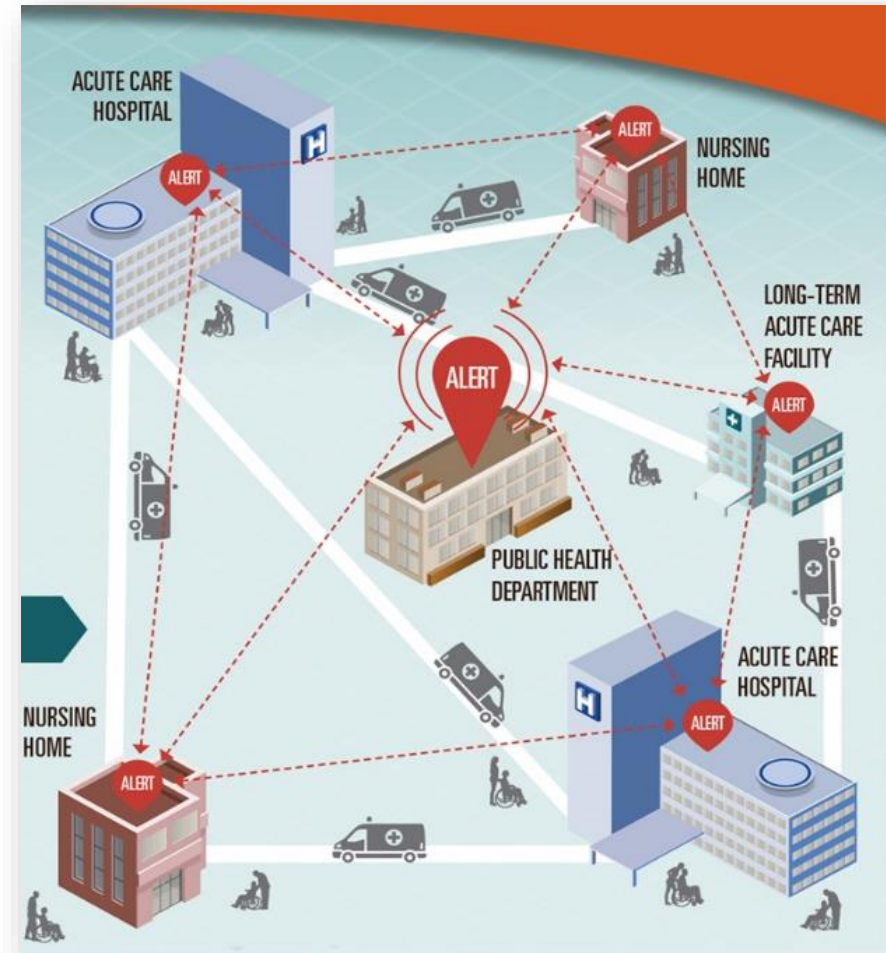
Strengthen IPC and consider using disinfectants effective against *Candida auris*

...even in facilities/units without cases



We are all connected

- Healthcare facilities exist in intricate networks of patient sharing
- What one facility does or does not do can affect a whole region
- Coordinated communication between facilities and with health departments is essential



Important steps

- Assess and ensure good IPC practices, even before having a case or transmission
- Consider using List P disinfectants
- Strengthen communication and public health reporting practices
- Ensure *C. auris* identification from clinical specimens (even non-sterile sites)
- Assess local risk for transmission or new introductions
- Screening based on local epidemiology
- **Be proactive and early to prevent or mitigate spread**



Educational links & resources

<https://www.cdc.gov/hai/containment/guidelines.html>

<https://www.cdc.gov/fungal/candida-auris/health-professionals.html>

<https://www.cdc.gov/fungal/candida-auris/c-auris-infection-control.html>

<https://www.cdc.gov/fungal/covid-fungal.html>

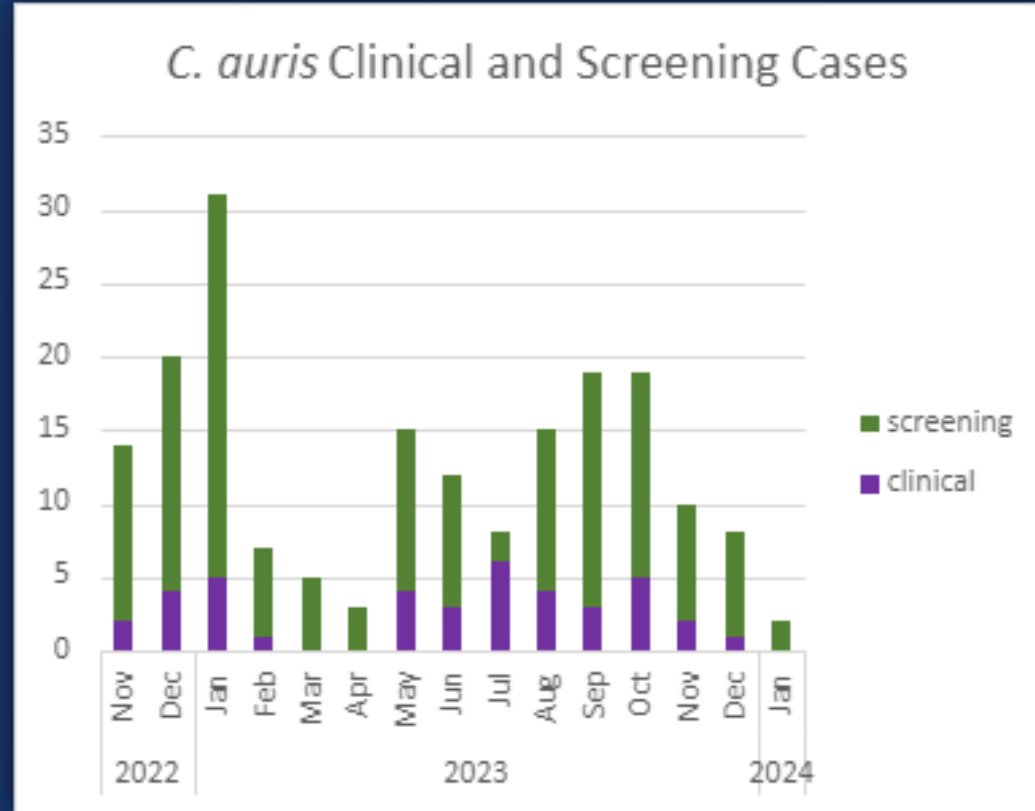
https://www.cdc.gov/hai/prevent/prevention_tools.html#anchor1561576800

<https://www.cdc.gov/hai/pdfs/toolkits/Interfacility-IC-Transfer-Form-508.pdf>



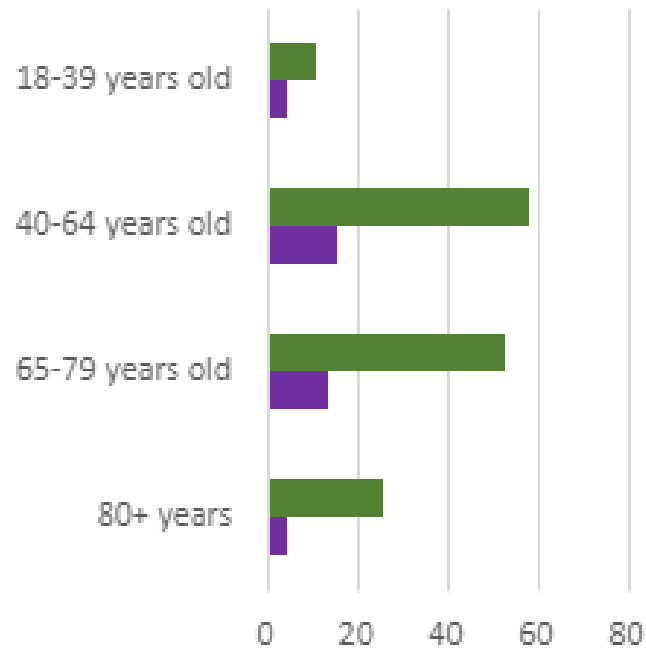
Mississippi cases and epidemiology

Total cases: **188** Screening: **148** clinical 21% Screening to Clinical: **12** Total Screened: **4243**
Deaths: **31** Clinical: **40** screening 79% % Invasive (of Clinical): **68%** % Positive: **2%**

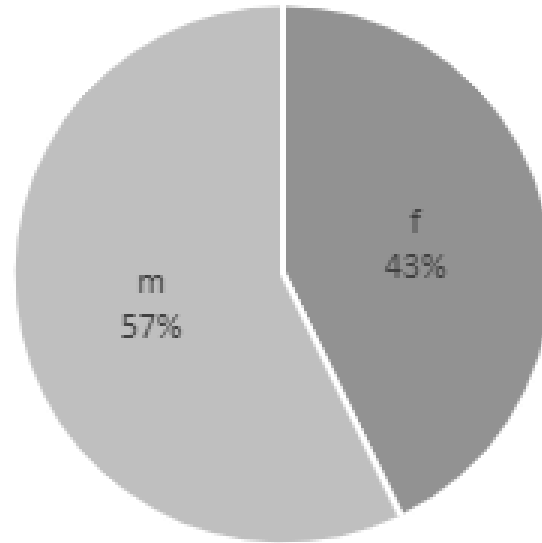


Mississippi cases and epidemiology

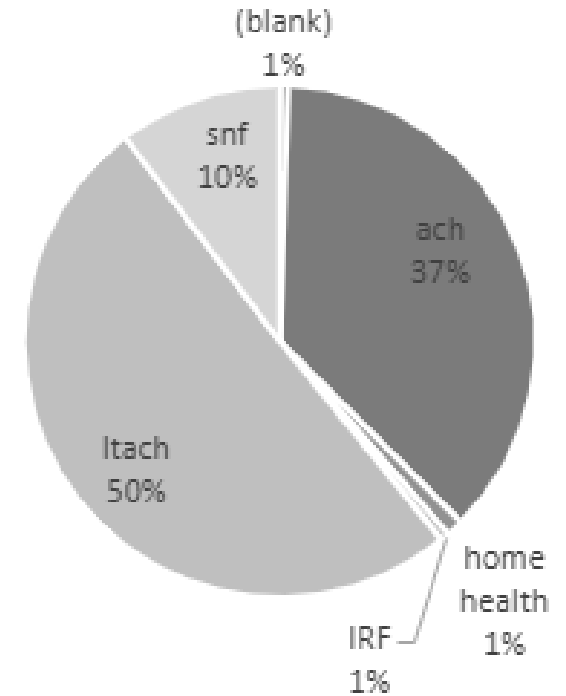
Cases by Age Group



Cases by Sex



Cases by Facility Type





MISSISSIPPI STATE DEPARTMENT OF HEALTH

Healthcare Associated Infections and Antimicrobial Resistance Program

Office of Epidemiology

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Southern Region



Questions?



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