
Multidrug-Resistant Organism (MDRO) Prevention in Acute Care Settings

Evelyn Donahoe, MPH, CIC
Mary Martin, MScPH, RN, BSN
Pam Bruhn, BSN, MAN, RN, ANP



PUBLIC HEALTH DIVISION
Healthcare-Associated Infections (HAI) Program

Overview

- Epidemiology of targeted MDROs
- Preparing to implement an MDRO Prevention Plan
- Recommended Strategies

Targeted MDROs

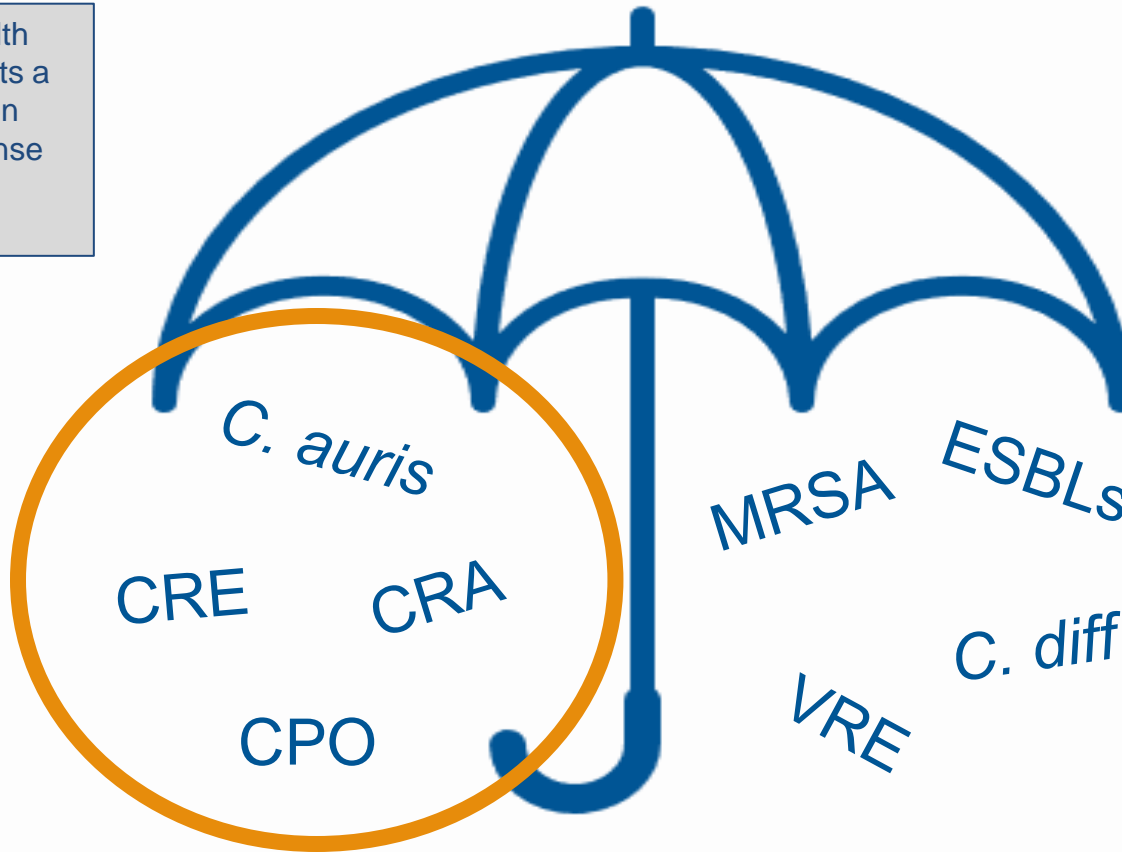
Epidemiology

There are many types of multidrug-resistant organisms (MDROs)



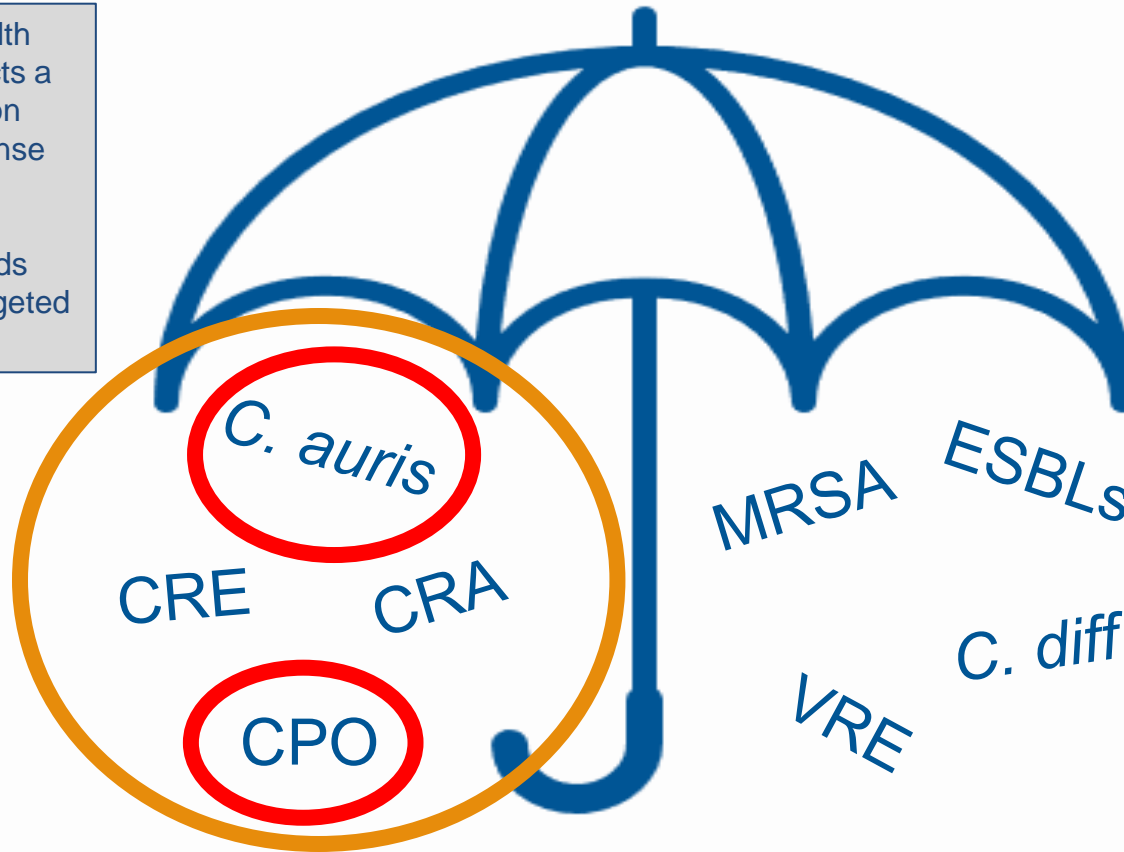
Public health focuses mainly on reportable MDROs, targeted MDROs, and outbreaks of any MDRO

- Local public health authority conducts a case investigation and leads response for reportable organisms



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- Local public health authority conducts a case investigation and leads response for reportable organisms
- OHA usually leads response for targeted organisms

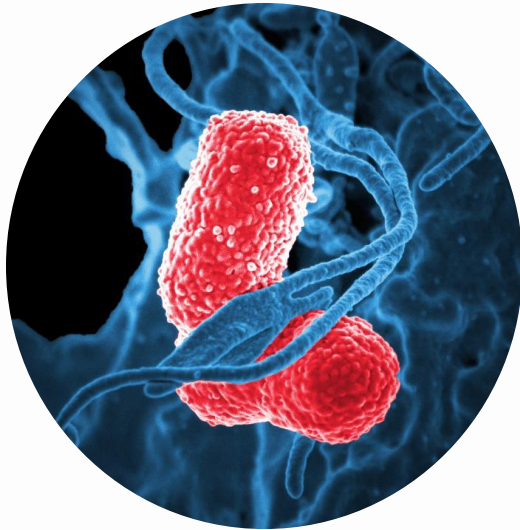


Public health focuses mainly on reportable MDROs, targeted MDROs and **outbreaks** of any MDRO



Two targeted MDROs:

Carbapenemase-producing organisms (CPO)



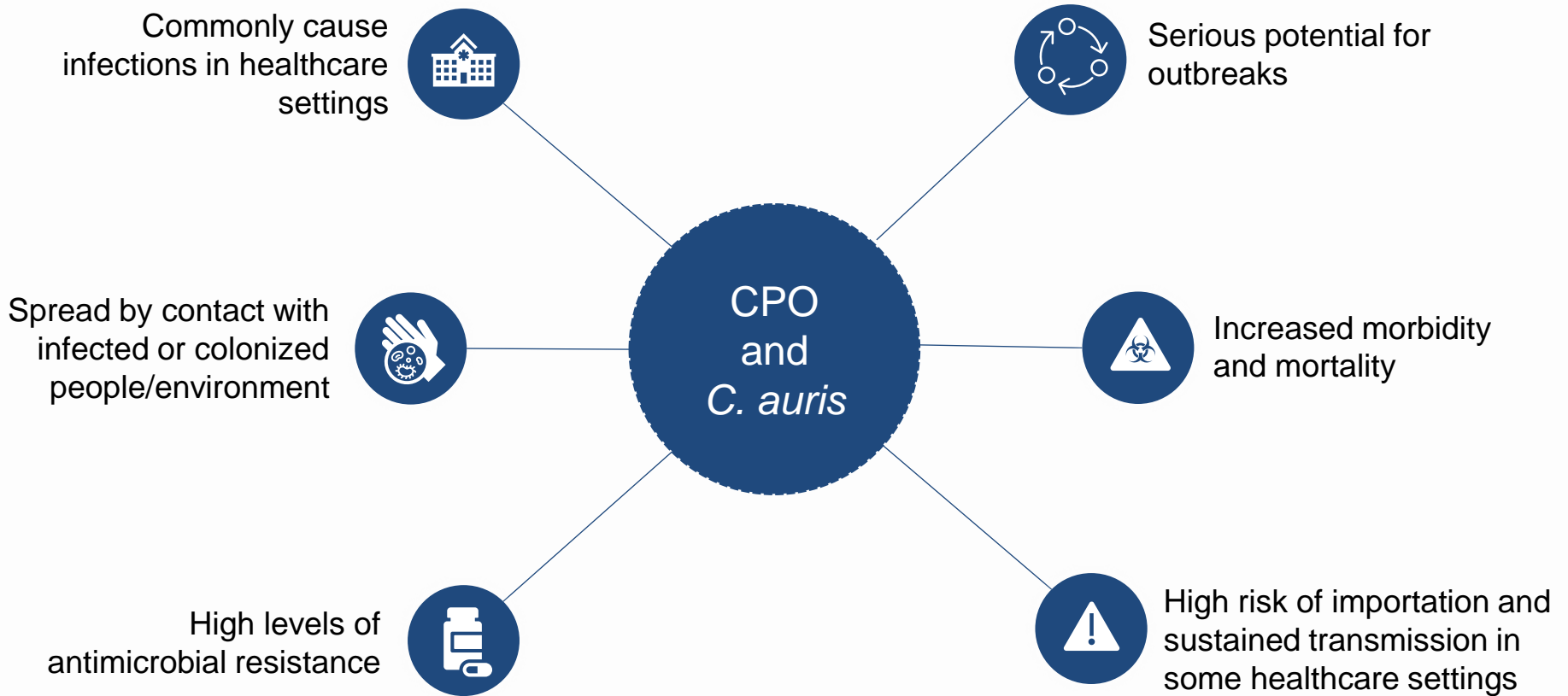
Carbapenem-resistant *Klebsiella pneumoniae*
source: CDC

Candida auris (*C. auris*)

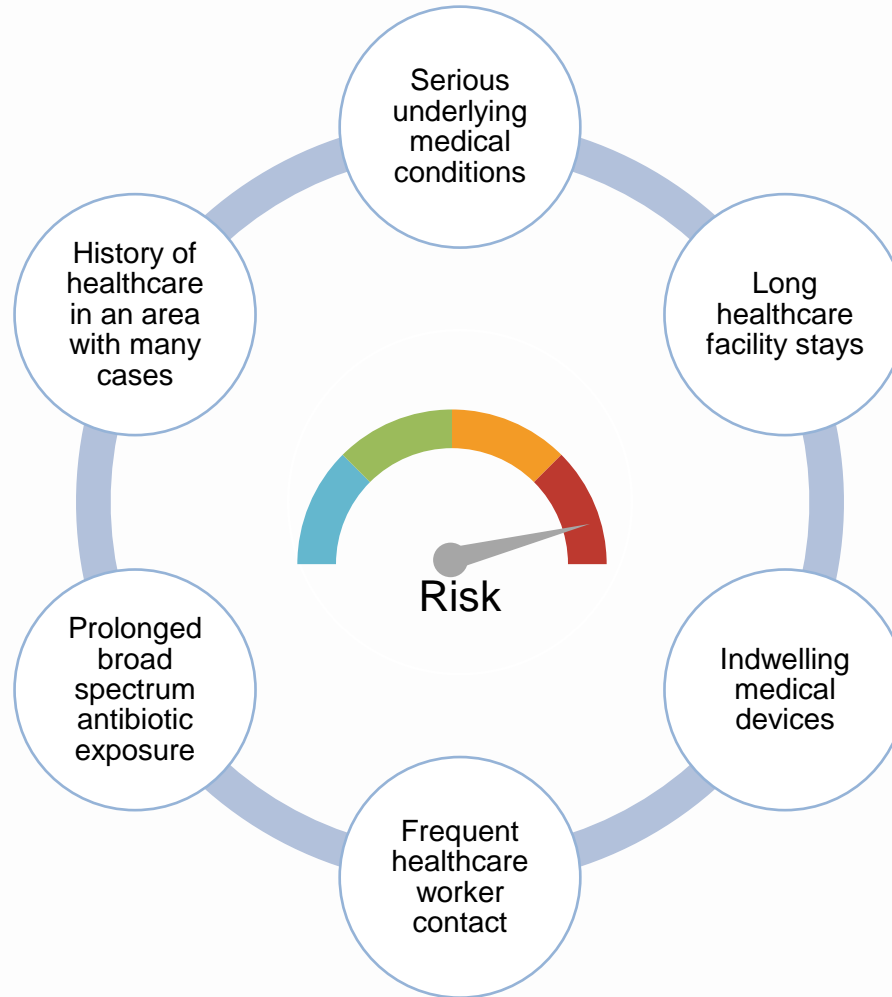


Candida auris
source: CDC

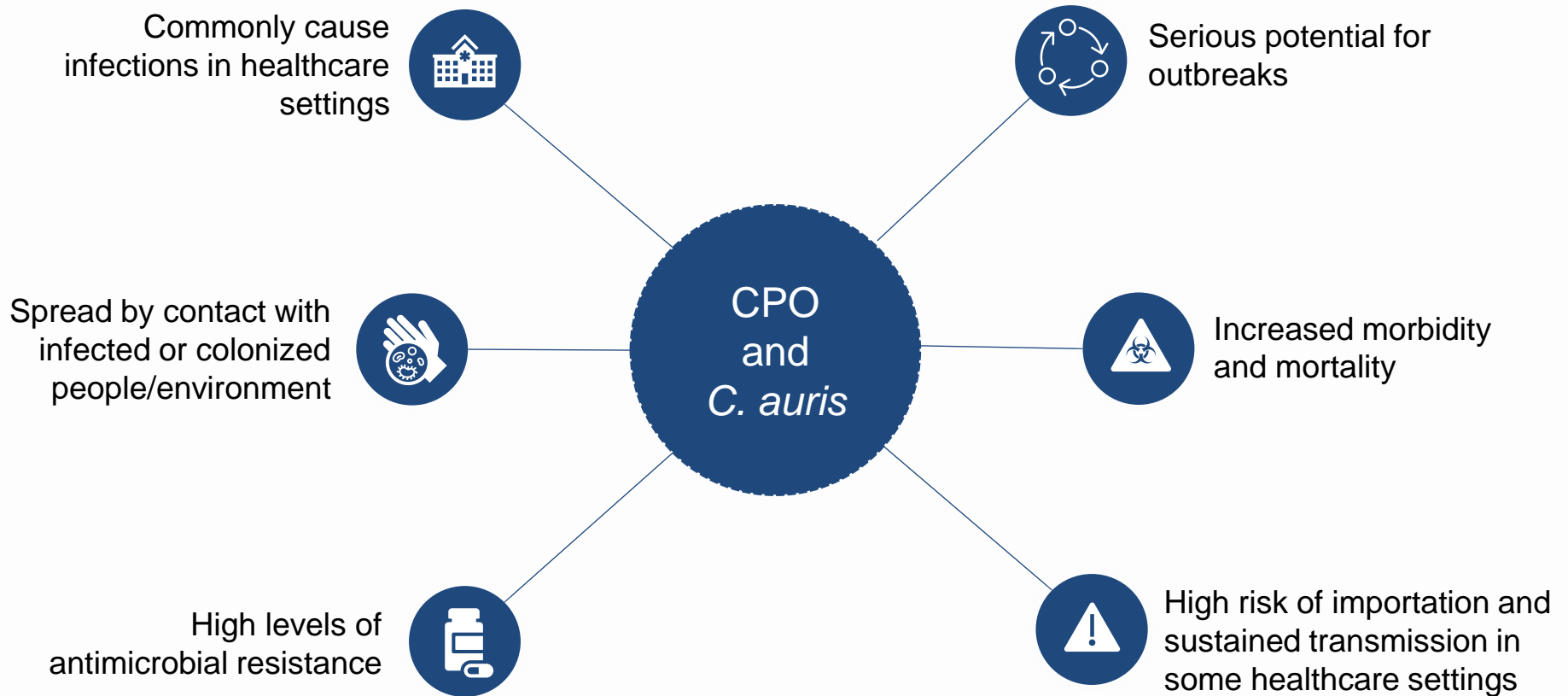
Both CPO and *C. auris*:



Risk factors for CPO and *Candida auris*



Both CPO and *Candida auris*: emerging pathogen threats in Oregon



Patients can be colonized or infected with MDROs

Clinical Cases

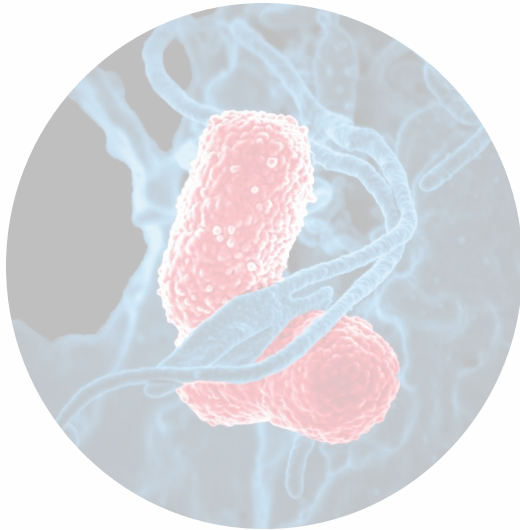
- MDRO causes an infection in the body
- Often causes symptoms
- Can spread the organism
- Poor outcomes: 1 in 3 patients with invasive *C. auris* will die

Colonized Cases

- MDRO lives on or in a person's body
- Does not cause an infection, no symptoms
- Long periods of time
- Can spread the organism
- At greater risk of developing an infection

Two multidrug-resistant organisms of concern:

Carbapenemase-producing organisms (CPO)



Carbapenem-resistant *klebsiella pneumoniae*
source: CDC

Candida auris



Candida auris
source: CDC

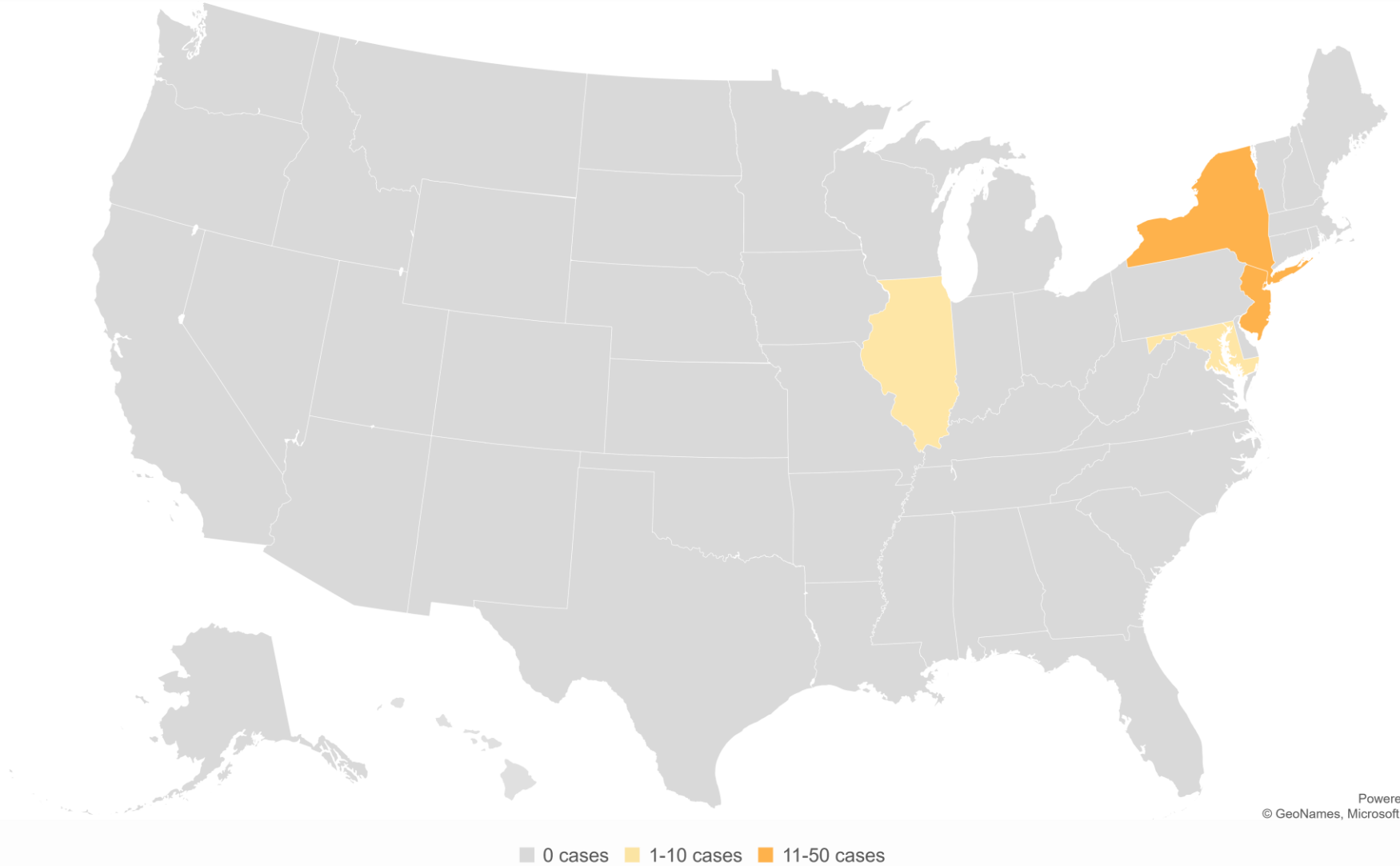
Candida auris

- Fungus (yeast)
- Some strains resistant to all classes of available antifungals
- Persistently colonizes patients and contaminates healthcare environments, allowing for easy spread
- First case in Oregon December 2021
 - Led to a large multi-facility outbreak investigation

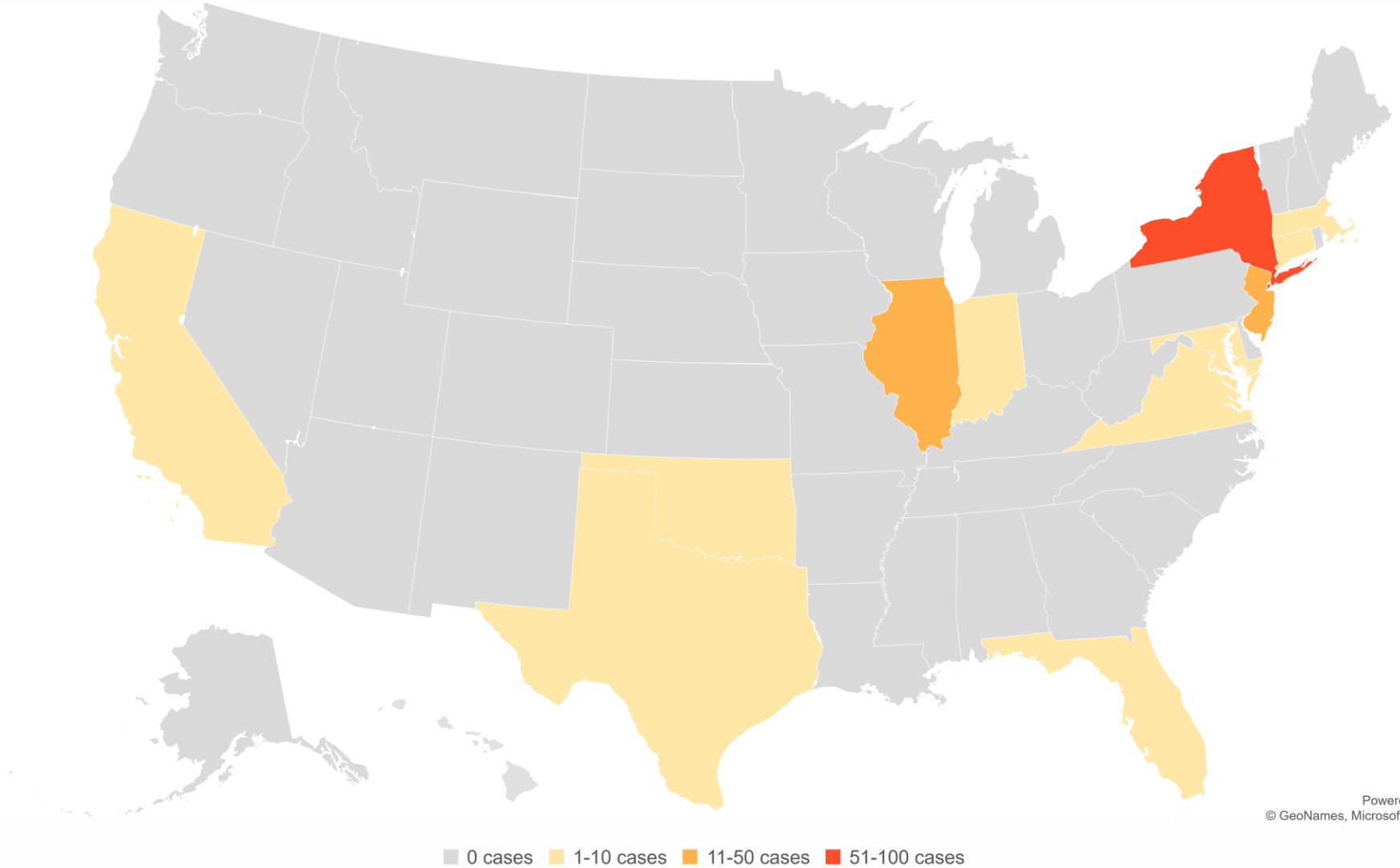


Candida auris
source: CDC

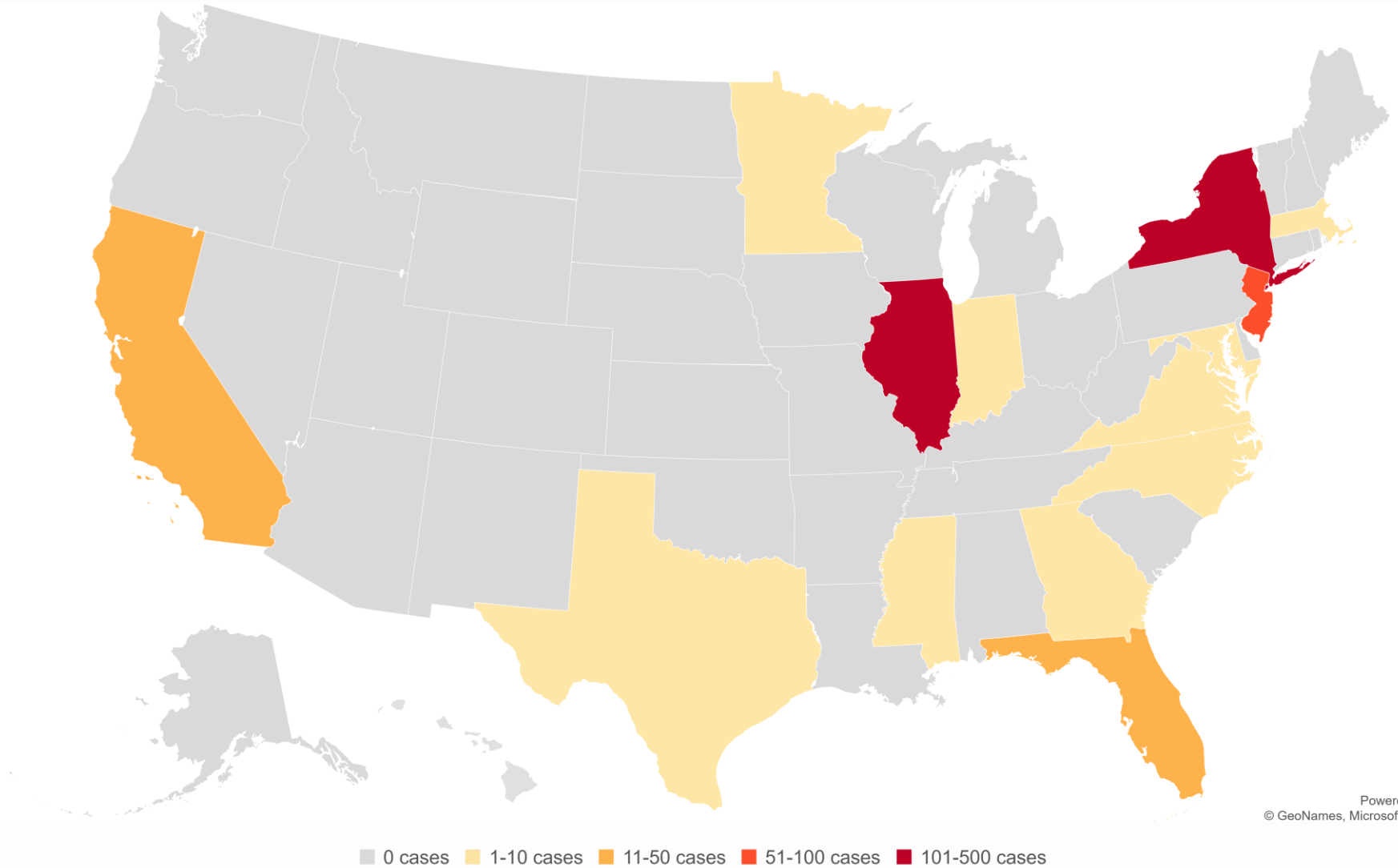
First reported clinical cases of *Candida auris* in the United States, 2013 - 2016



Reported clinical cases of *Candida auris*, 2017



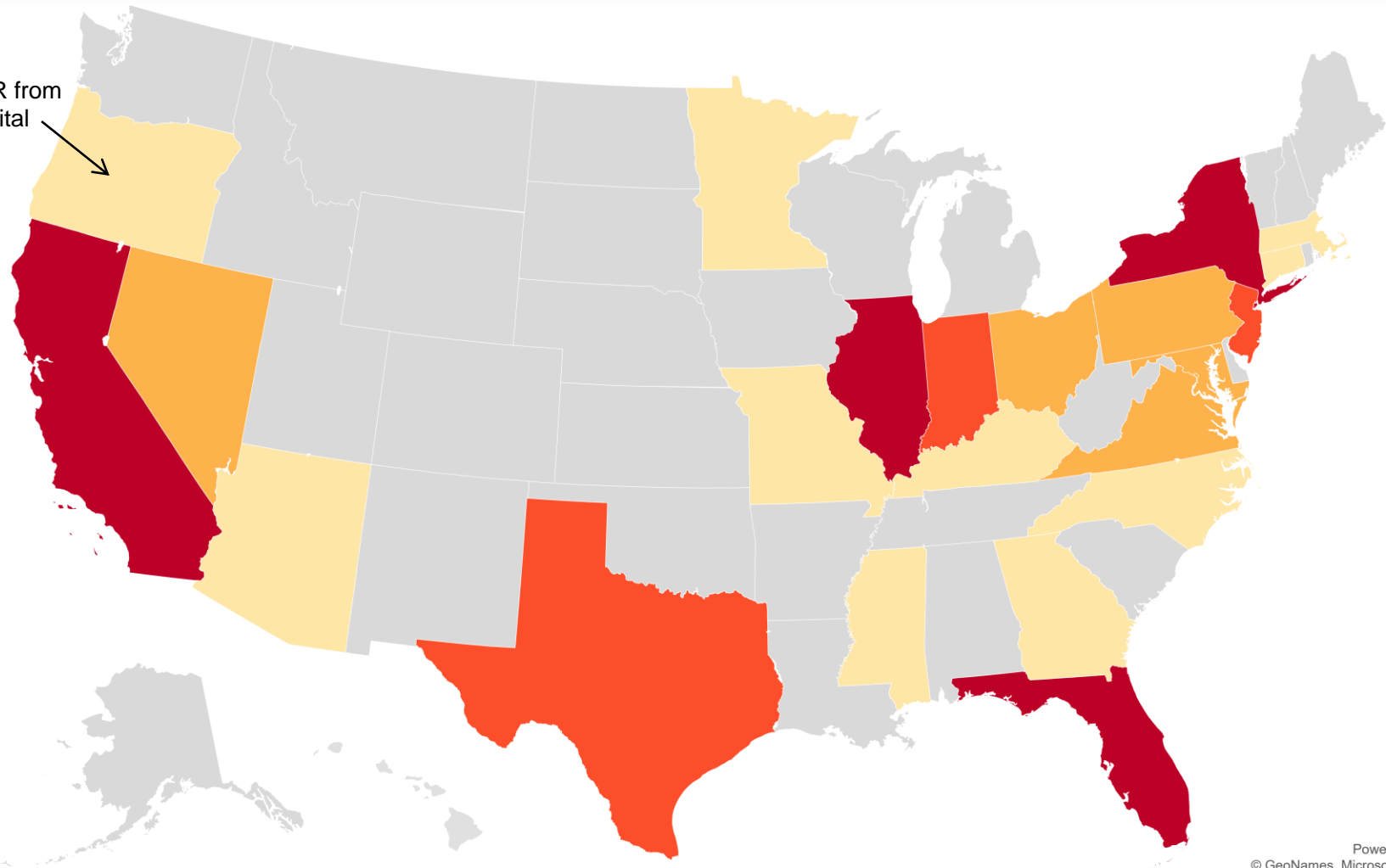
Reported clinical cases of *Candida auris*, 2019



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Reported clinical cases of *Candida auris*, 2021

3 cases in OR from a single hospital outbreak



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■ 0 cases ■ 1-10 cases ■ 11-50 cases ■ 51-100 cases ■ 101-500 cases

In 2021, 3 cases of *C. auris* in Oregon made local and national news

 USA Today

Oregon hospital reports outbreak of rare superbug Candida ...

The risk of infection to otherwise healthy people is "extremely low." Since 2013, about 1,150 clinical cases of *Candida auris* have been...

 KTVZ

Oregon reports first 3 cases of drug-resistant 'superbug' ...

Oregon reports first 3 cases of drug-resistant 'superbug' fungus *Candida auris* ... PORTLAND, Ore. (KTVZ) — The Oregon Health Authority said late...

Gizmodo


Deadly Superbug Yeast Sickens Patients at Oregon Hospital

Dec 29, 2021 — Three people at the hospital have contracted the hardy fungus known as **Candida auris**, which is often resistant to multiple drugs.

 FOX 5 New York

Oregon hospital reports rare, fungal outbreak

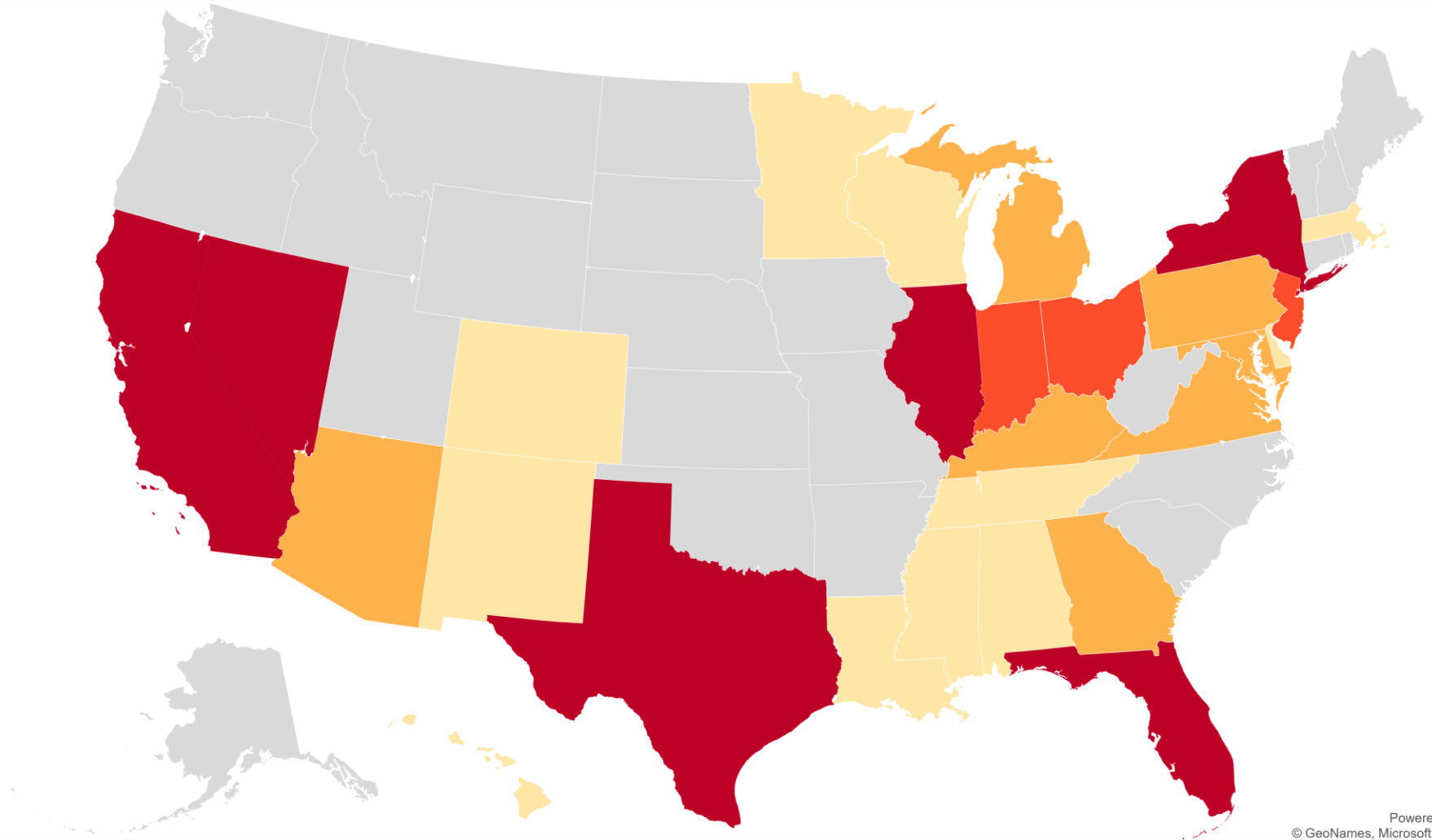
Health officials said the first-ever *Candida auris* case found in Oregon was detected at the hospital Dec. 11 and confirmed Dec.

 Oregon Live

Oregon records 1st cases of rare, serious fungal infection *Candida auris* in 3 Salem patients

Since 2013, more than 1,150 clinical cases of *Candida auris* have been identified in the United States. No cases of the fungus identified in...

Reported clinical cases of *Candida auris*, 2022

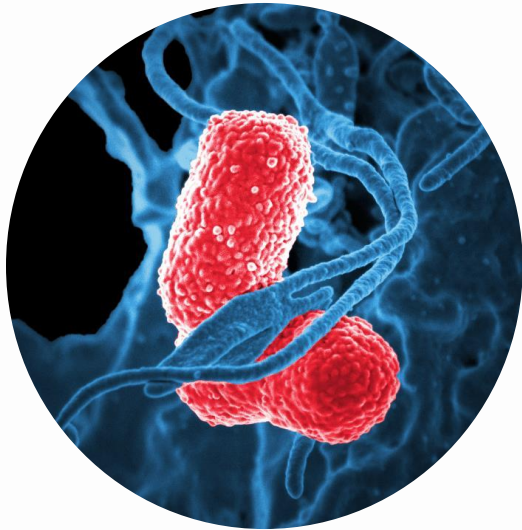


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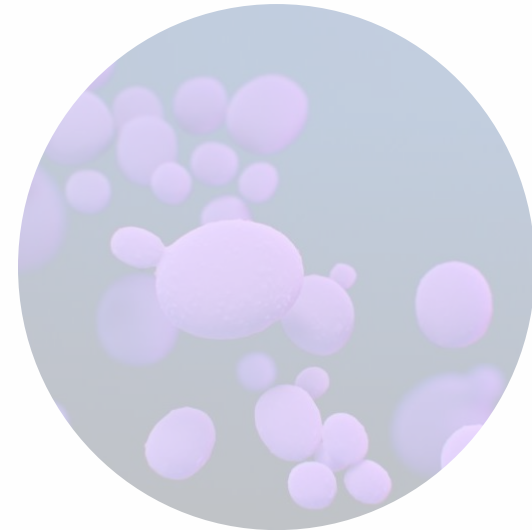
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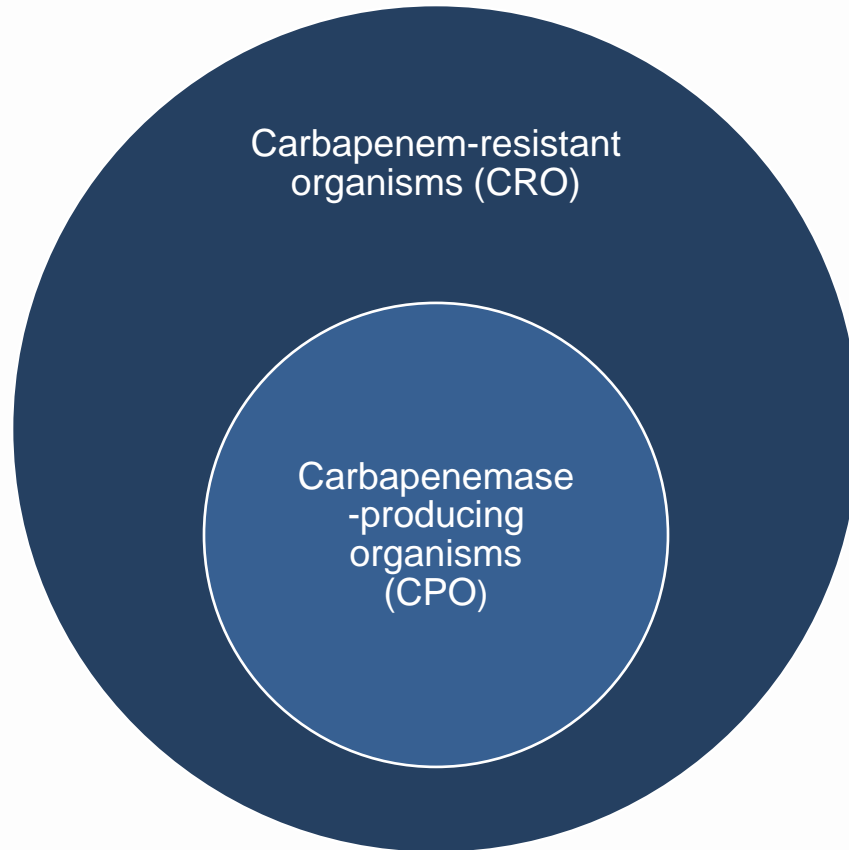
Carbapenem-resistant *Klebsiella pneumoniae*
source: CDC

Candida auris



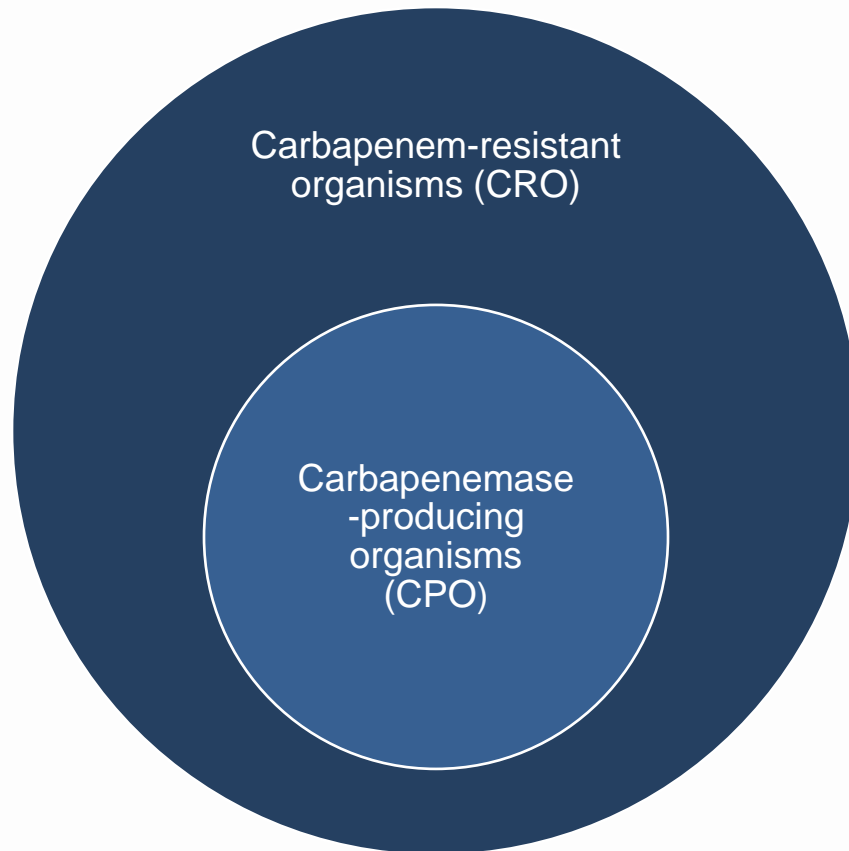
Candida auris
source: CDC

Carbapenemase producing organisms (CPO) are a type of carbapenem-resistant organism (CRO)



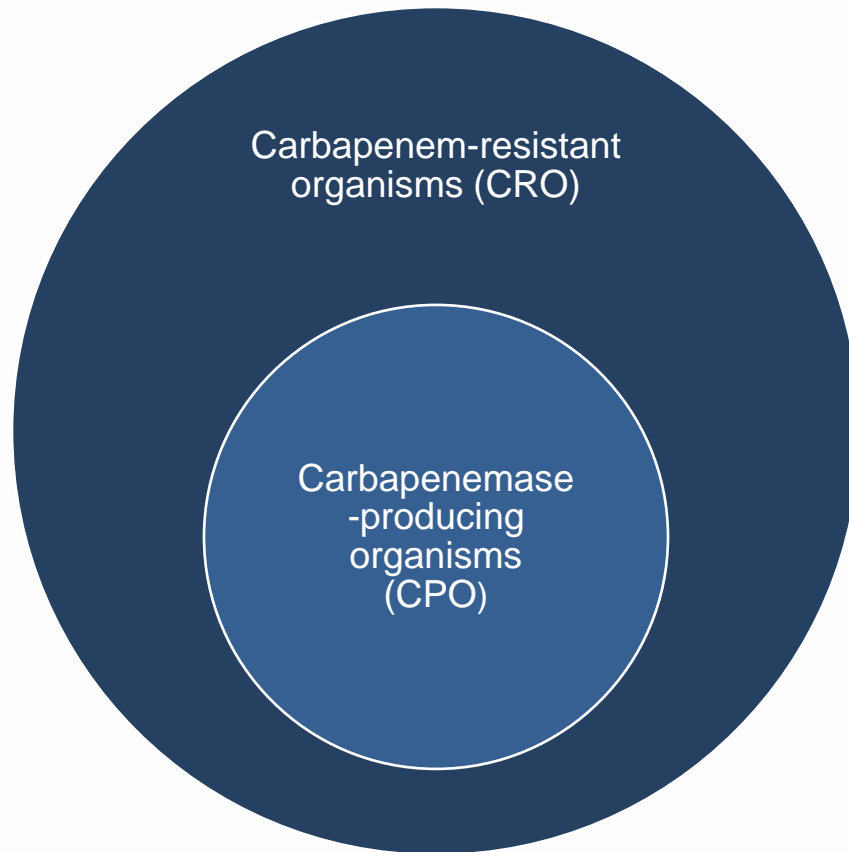
- Carbapenems are a class of antibiotics
 - Ertapenem, Meropenem, Imipenem
 - “Last line of defense”
 - Often used to treat infections resistant to other types of antibiotics
 - Can be difficult to treat
- Organisms that develop carbapenem resistance:
 - Gram negative bacteria
 - Enterobacterales: *E. coli*, Enterobacter
 - *Acinetobacter* species
 - *Pseudomonas aeruginosa*

Carbapenemase producing organisms (CPO) are a type of **carbapenem**-resistant organism (CRO)



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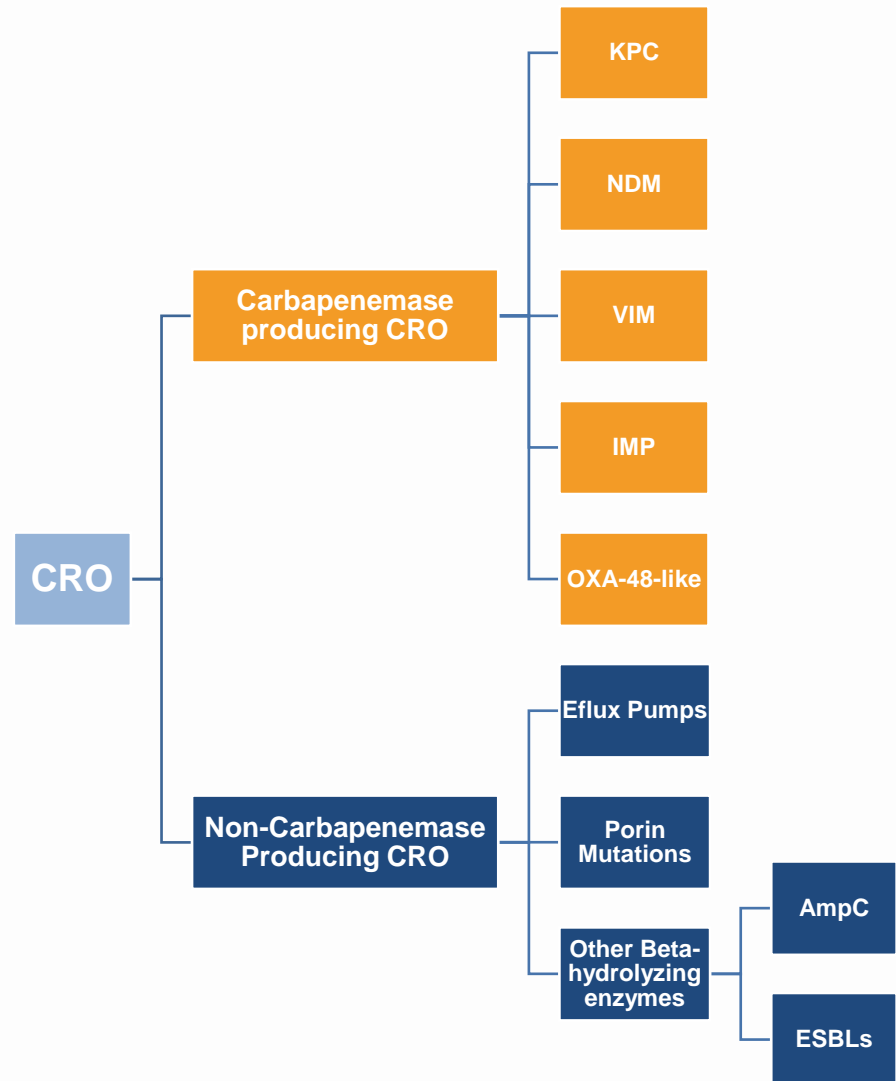
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Carbapenem-resistant Enterobacterales (CRE) identified by Oregon laboratories, Nov 2010 - Dec 2022



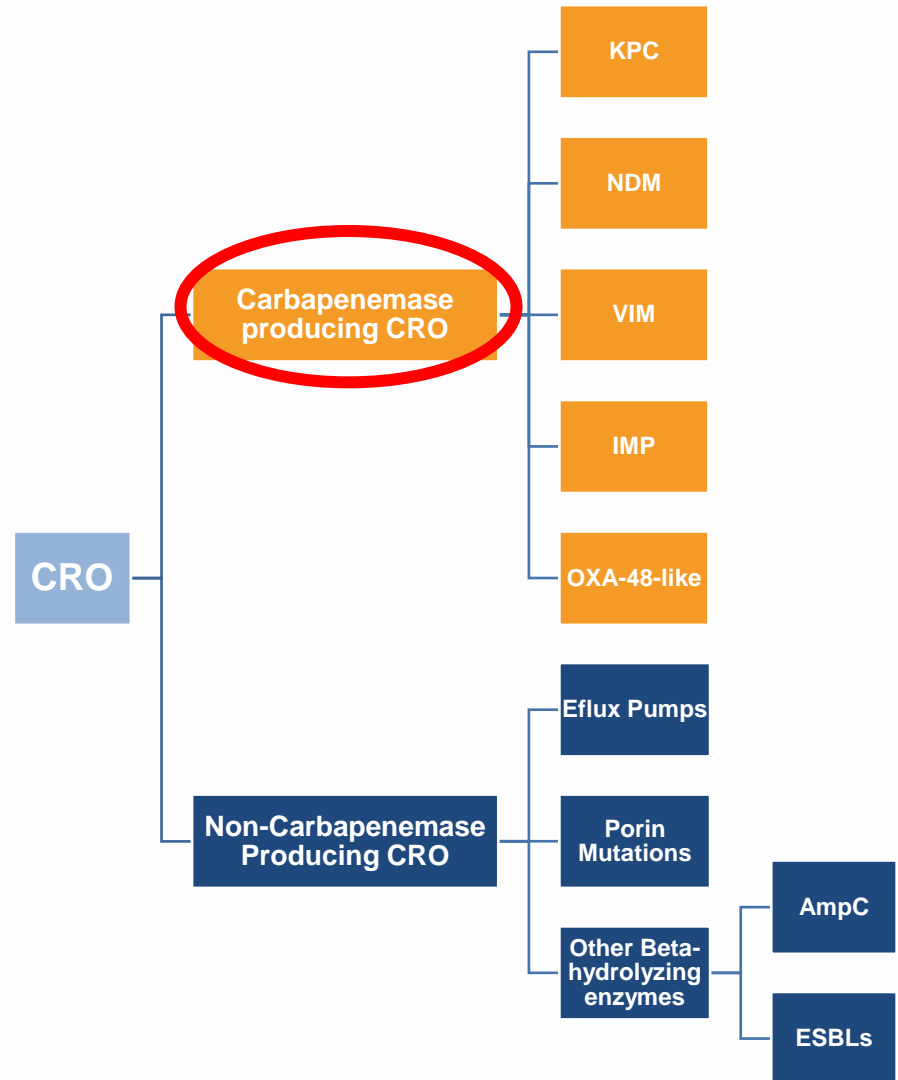
Not all Carbapenem-resistant Organisms (CRO) are equal

- Some types of resistance are especially concerning



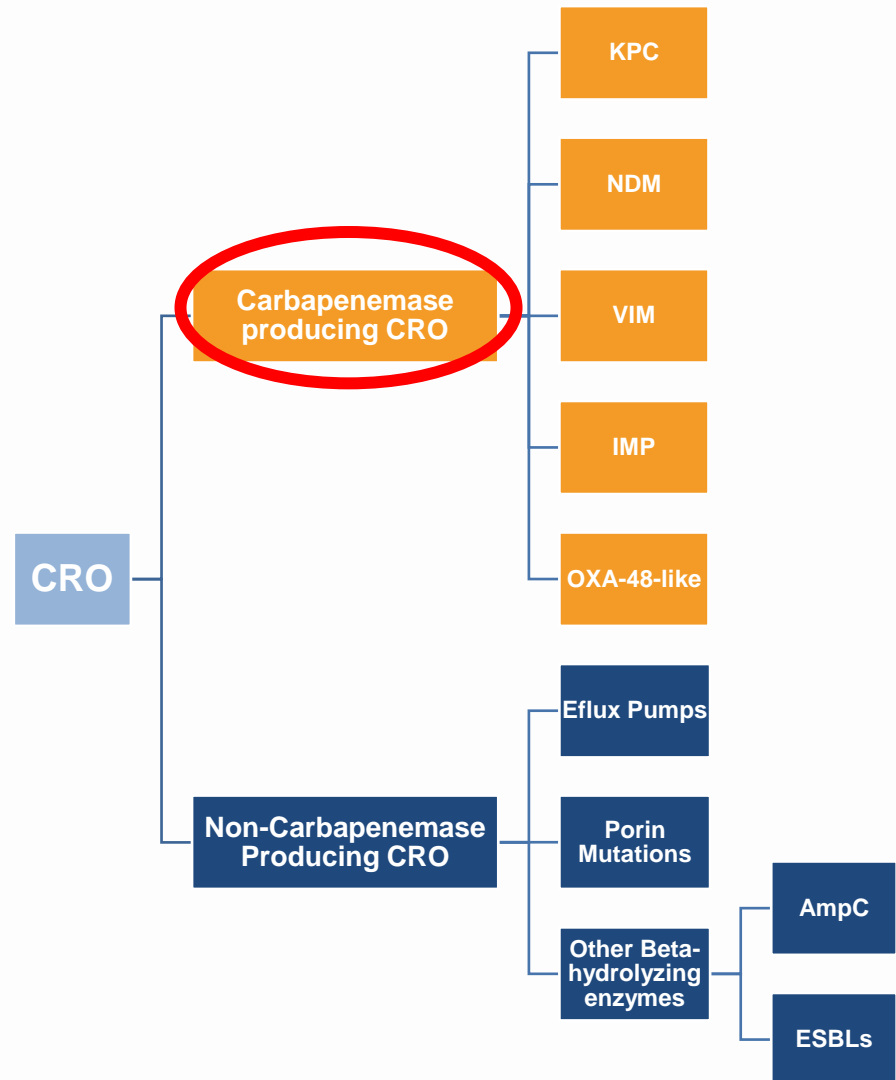
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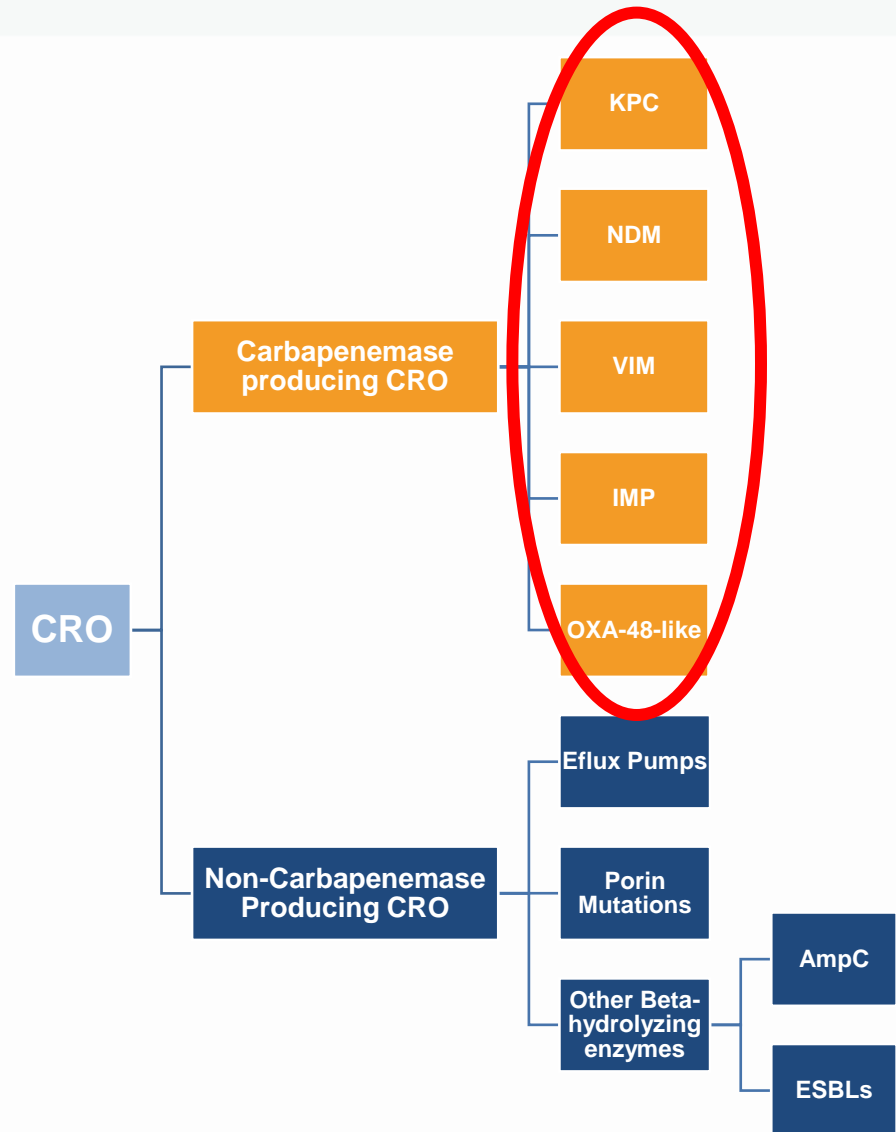
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- Some types of resistance are especially concerning
- Carbapenemases are proteins that degrade carbapenem antibiotics
- CRO that make carbapenemases are called carbapenemase-producing organisms or CPO
 - Sometimes named after specific type of bacteria, e.g., carbapenemase-producing carbapenem-resistant *Acinetobacter Baumannii* (CP-CRAB)



Not all Carbapenem-resistant Organisms (CRO) are equal

- Some types of resistance are especially concerning
- Carbapenemases are proteins that degrade carbapenem antibiotics
- CRO that make carbapenemases are called carbapenemase-producing organisms or CPO
- **There are different kinds of carbapenemases**
 - But they all do basically the same thing: degrade carbapenem antibiotics



Carbapenemases can spread antibiotic resistance among bacteria

- Carbapenemases exist on plasmids
- Can be easily shared among bacteria
- Leads to rapid spread of antibiotic resistance

Plasmid Exchange – Horizontal Gene Transfer

The donor bacteria extends its pilus and upon contact with another cell, both cells form a pore (channel) between the two cells. The plasmid (mobile DNA instructions for antibiotic resistance) is transferred from the donor bacterium to the recipient.

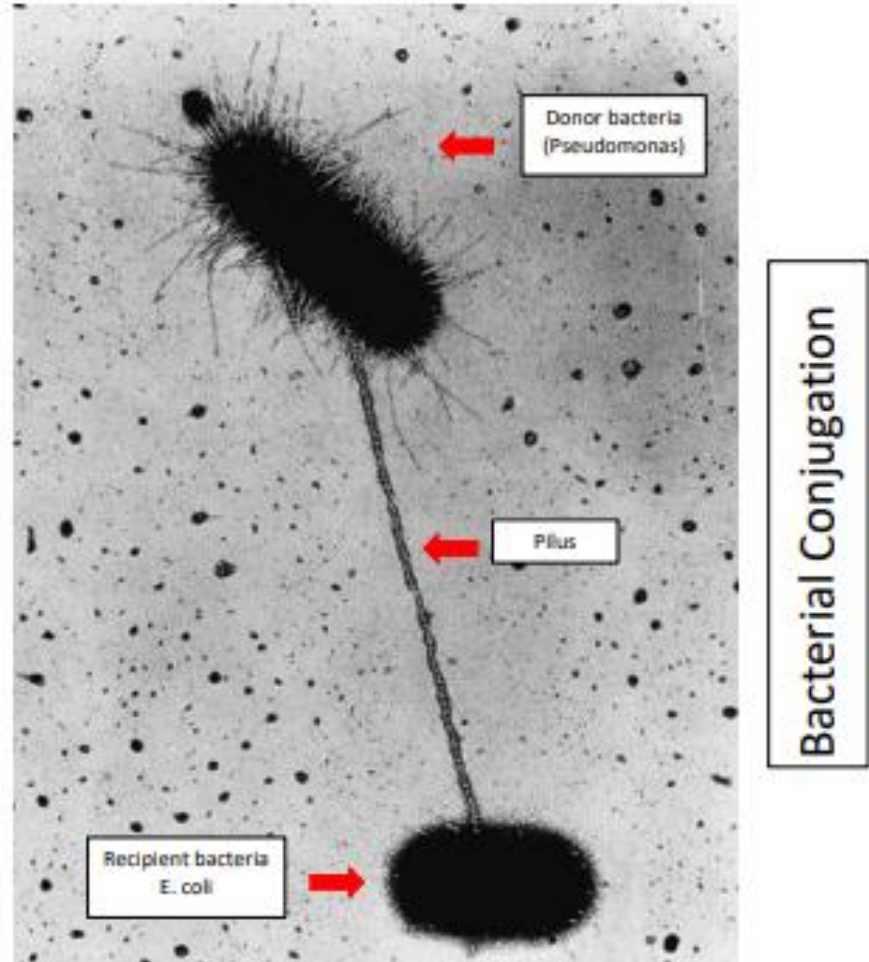
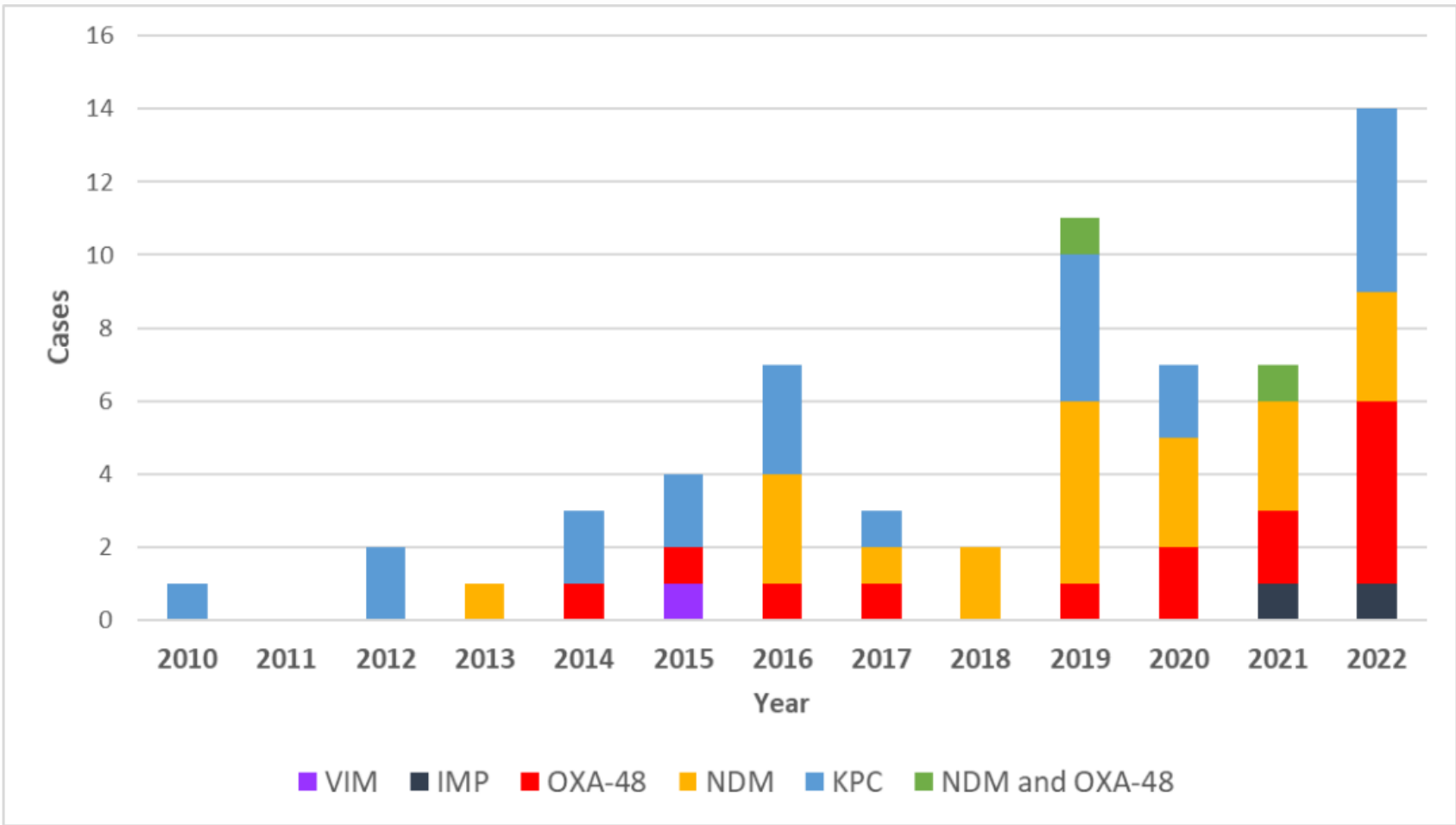
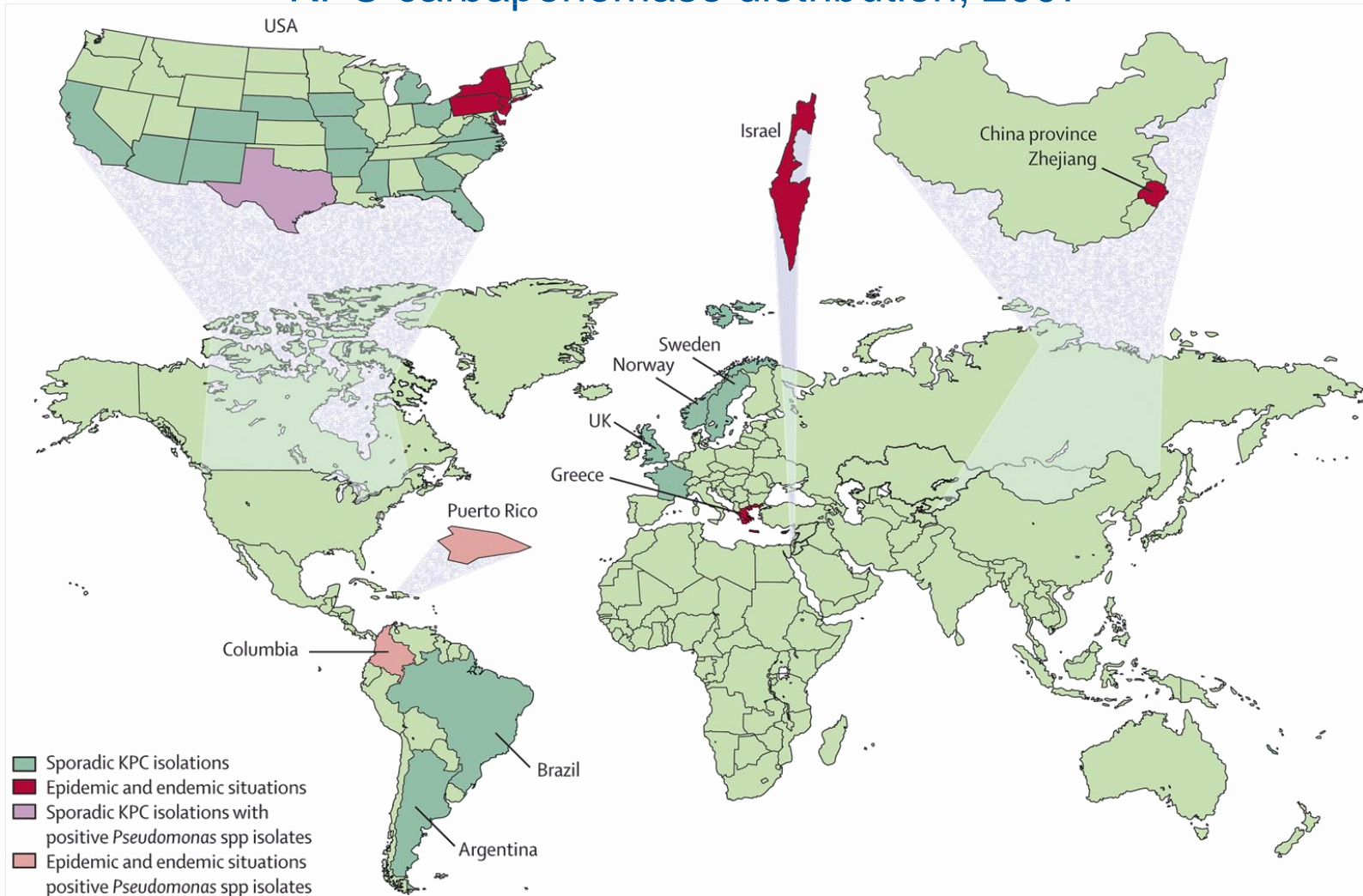


Image:
<https://www.nlm.nih.gov/exhibition/fromdnatobeer/exhibition-tinkering-with-DNA.html>

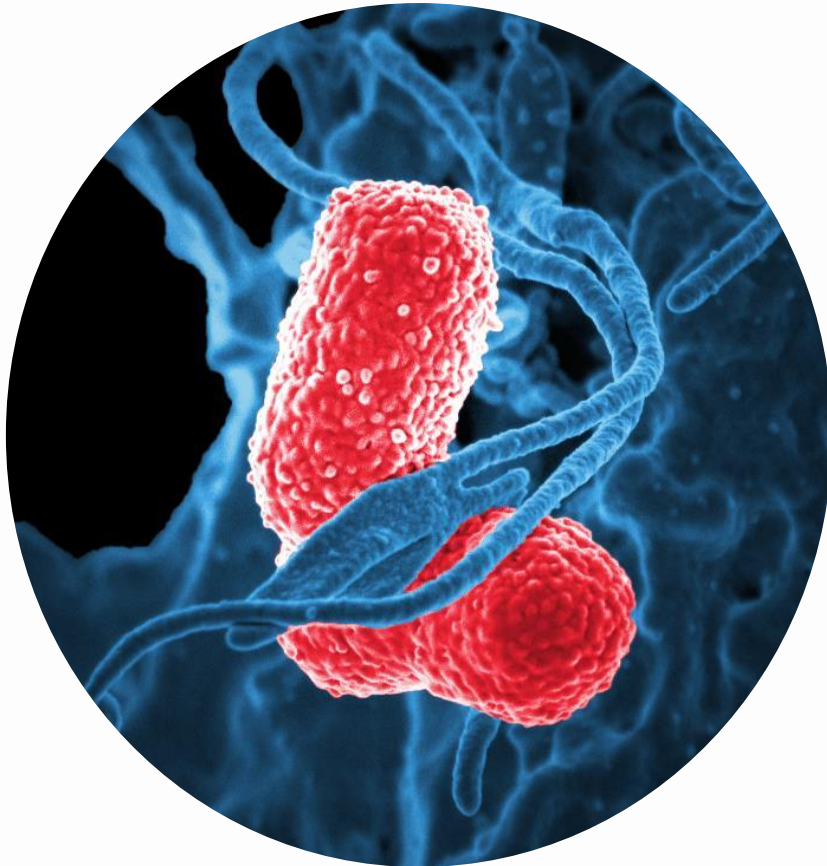
Carbapenemase-producing Carbapenem-resistant Enterobacterales (CP-CRE) identified by Oregon laboratories, 2010 - Dec 2022



KPC carbapenemase distribution, 2007



Carbapenemase producing organisms (CPO)



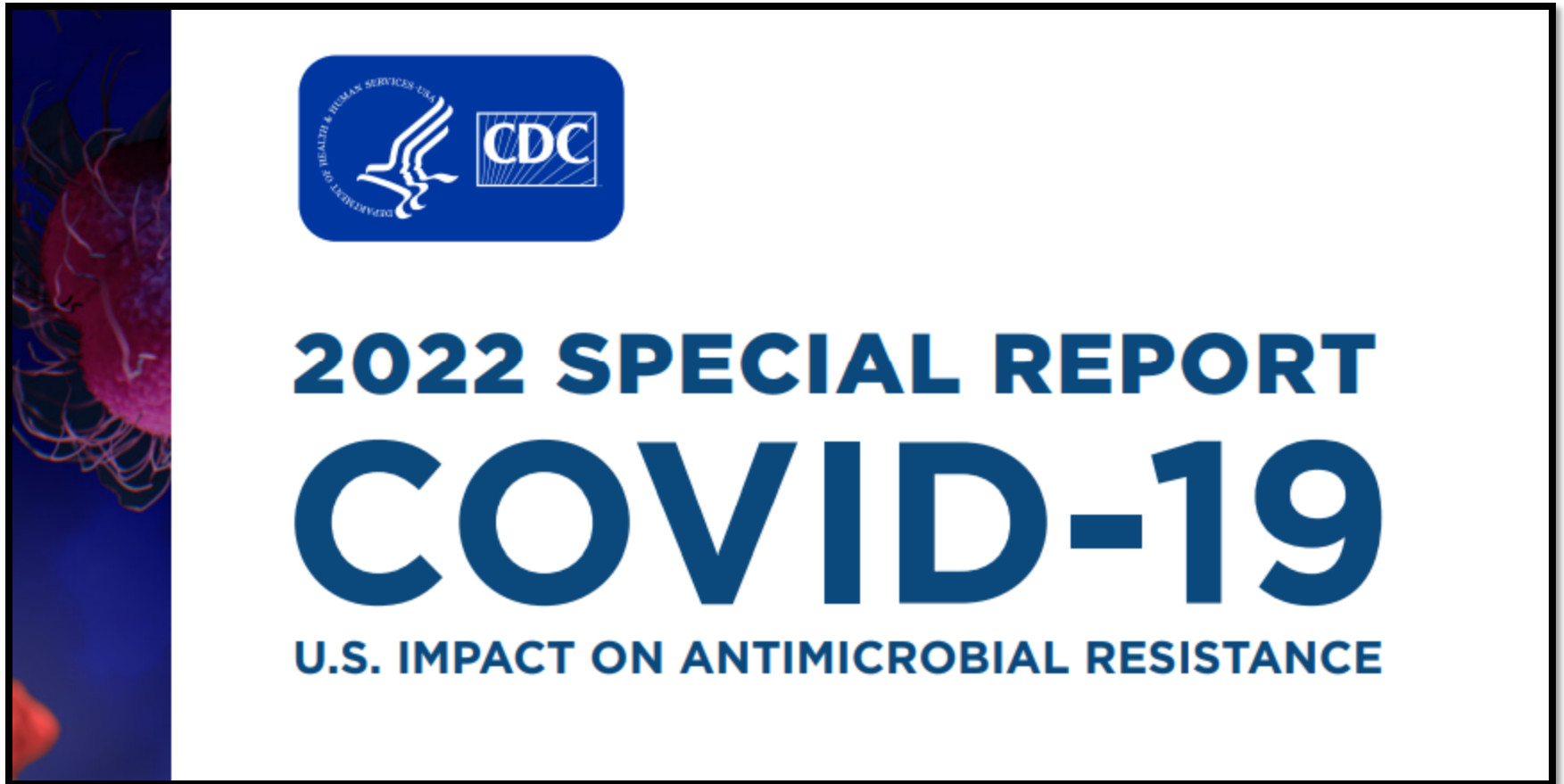
Carbapenem-resistant *Klebsiella pneumoniae*

source: CDC

HEALTHCARE ASSOCIATED INFECTIONS PROGRAM
PUBLIC HEALTH DIVISION

- Resistant to carbapenem antibiotics (last line of defense)
- Produce carbapenemases
 - Proteins that degrade carbapenems
- Resistance can quickly spread among bacteria

Pandemic has led to increase in antimicrobial resistance





Available data show an alarming increase in resistant infections starting during hospitalization, growing at least 15% from 2019 to 2020.

- Carbapenem-resistant *Acinetobacter* (+78%)
- Antifungal-resistant *Candida auris* (+60%)*
- Carbapenem-resistant Enterobacterales (+35%)
- Antifungal-resistant *Candida* (+26%)
- ESBL-producing Enterobacterales (+32%)
- Vancomycin-resistant Enterococcus (+14%)
- Multidrug-resistant *P. aeruginosa* (+32%)
- Methicillin-resistant *Staphylococcus aureus* (+13%)

	Resistant Pathogen	2017 Threat Estimate	2018 Threat Estimate	2019 Threat Estimate	2017-2019 Change	2020 Threat Estimate and 2019-2020 Change
URGENT	Carbapenem-resistant <i>Acinetobacter</i>	8,500 cases 700 deaths	6,300 cases 500 deaths	6,000 cases 500 deaths	Stable*	7,500 cases 700 deaths Overall: 35% increase* Hospital-onset: 78% increase*
	Antifungal-resistant <i>Candida auris</i>	171 clinical cases†	329 clinical cases	466 clinical cases	Increase	754 cases Overall: 60% increase
	<i>Clostridioides difficile</i>	223,900 infections 12,800 deaths	221,200 infections 12,600 deaths	202,600 infections 11,500 deaths	Decrease	Data delayed due to COVID-19 pandemic
	Carbapenem-resistant Enterobacterales	13,100 cases 1,100 deaths	10,300 cases 900 deaths	11,900 cases 1,000 deaths	Decrease*	12,700 cases 1,100 deaths Overall: Stable* Hospital-onset: 35% increase*

Targeted MDROs in a skilled nursing facility

a case study from Chicago

Chicago Case Study: ventilator unit in a skilled nursing facility (SNF)

JOURNAL ARTICLE

Regional Emergence of *Candida auris* in Chicago and Lessons Learned From Intensive Follow-up at 1 Ventilator-Capable Skilled Nursing Facility ^{FREE}

Massimo Pacilli ✉, Janna L Kerins, Whitney J Clegg, Kelly A Walblay, Hira Adil, Sarah K Kemble, Shannon Xydis, Tristan D McPherson, Michael Y Lin, Mary K Hayden ... Show more

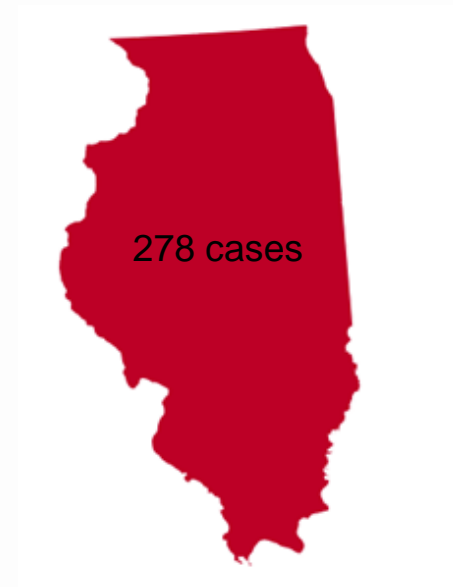
Clinical Infectious Diseases, Volume 71, Issue 11, 1 December 2020, Pages e718–e725, <https://doi.org/10.1093/cid/ciaa435>

Chicago ventilator SNF case study: statewide context

Number of clinical cases of *C. auris*
in Illinois, 2016



Number of clinical cases of *C. auris*
in Illinois, 2021



Chicago ventilator SNF case study

- In March 2017, **a single case of *Candida auris*** was identified at a SNF with a ventilator unit in Chicago

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- **“Did not identify any colonized residents** other than the previously known case-patient”

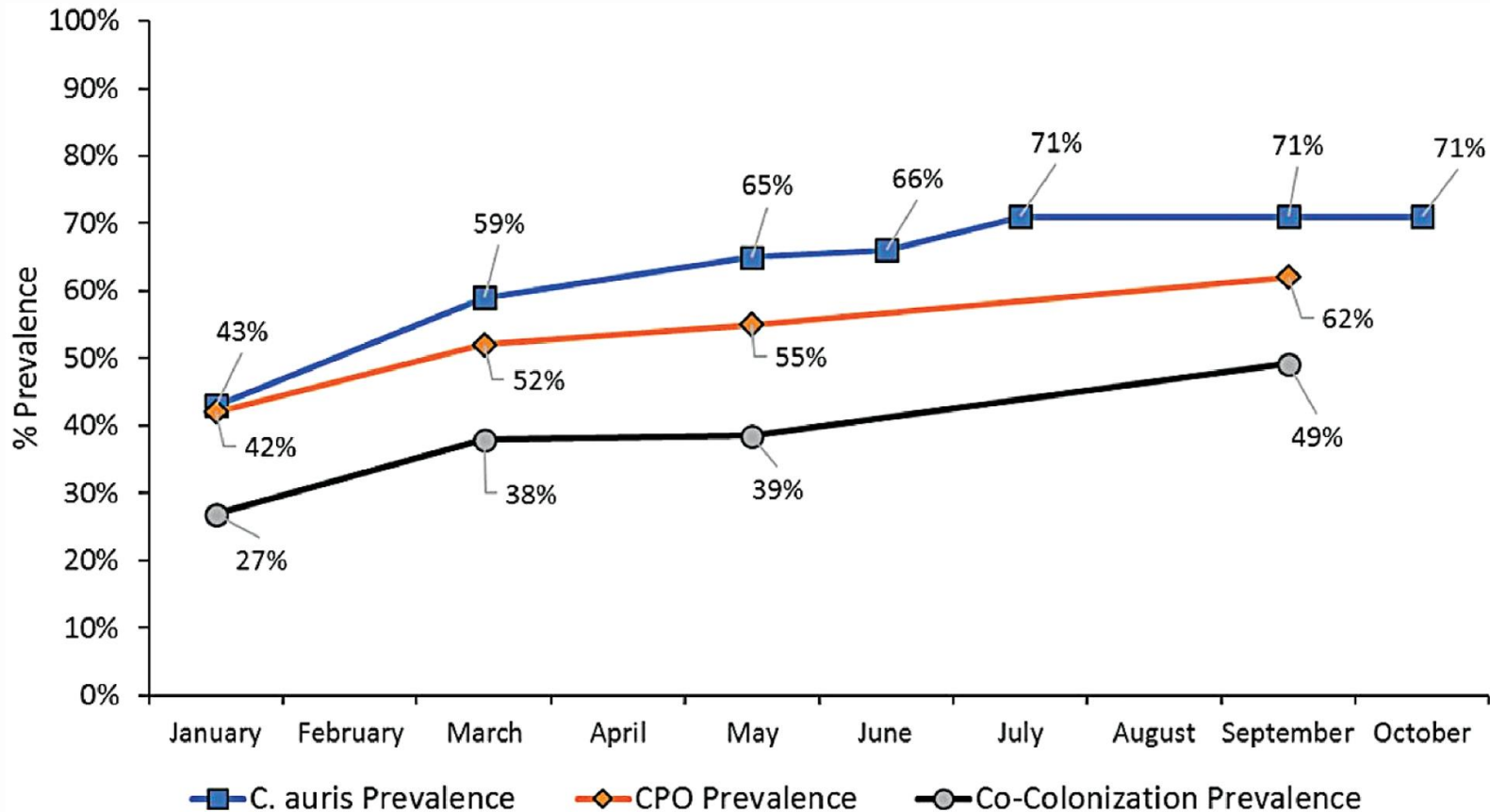
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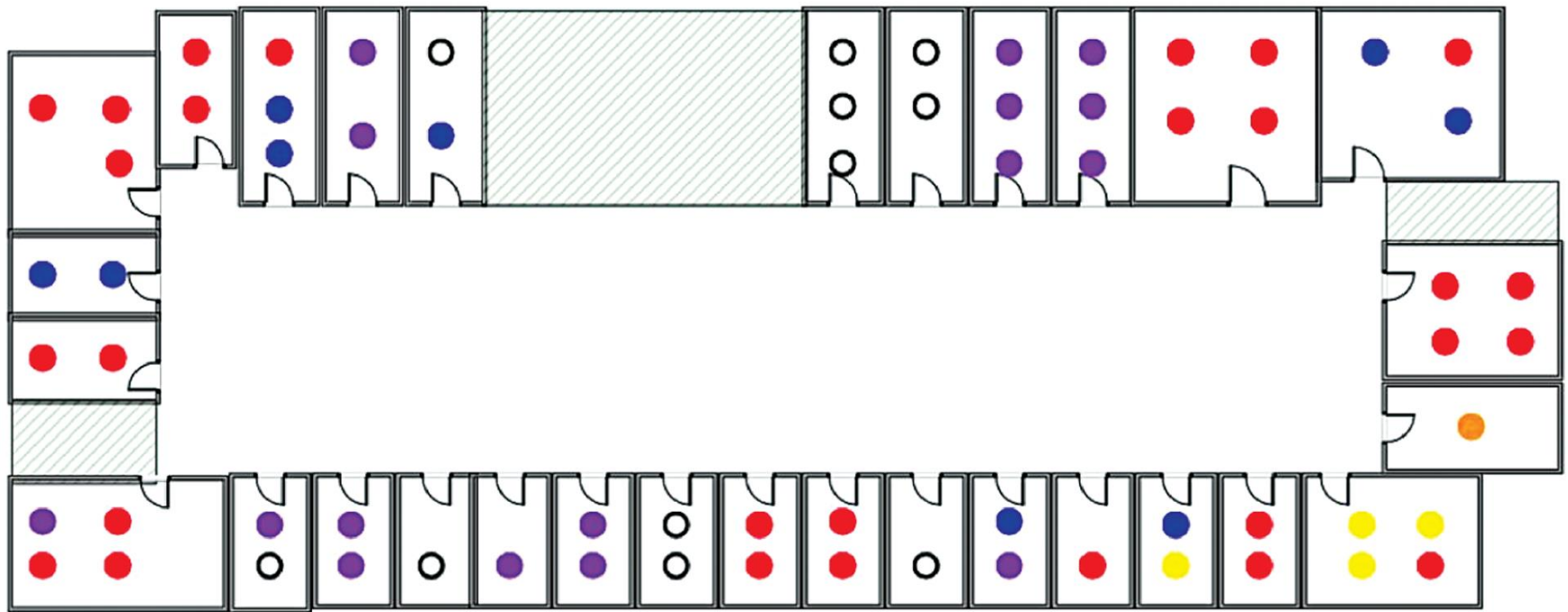
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- “Did not identify any colonized residents other than the previously known case-patient”
- Throughout 2018, conducted multiple point prevalence surveys for both *C. auris* and carbapenemase-producing organisms (CPO)
- **Fall 2018:**
 - **71% *Candida auris* prevalence**
 - **61% CPO prevalence**

Candida auris and CPO prevalence in a Chicago SNF ventilator unit, January to October 2018



Resident *Candida auris* and CPO colonization status and room assignment in a Chicago SNF ventilator unit, October 2018



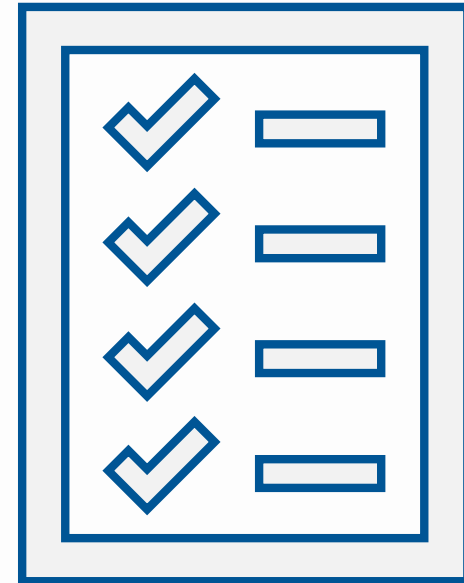
- Resident colonized with *C. auris* (16)
- Resident colonized with *C. auris* and *bla_{KPC}* CPO (28)
- Resident colonized with *bla_{KPC}* CPO (9)
- Resident colonized with *C. auris*, *bla_{KPC}*, and *bla_{NDM}* CPO (1)
- Resident colonized with *C. auris*, *bla_{KPC}*, and *bla_{VIM}* CPO (4)
- Residents with no evidence of *C. auris* or CPO colonization (11)

Break!

We'll reconvene in 5 minutes

Preparing to Implement an MDRO Prevention Plan

What steps does our facility need to take to develop and implement an MDRO Prevention Plan?



Steps to Include

- ❑ Determining the MDRO(s) that will be the focus of the prevention activities
- ❑ Evaluating your laboratory capacity and surveillance
- ❑ Prioritizing where to begin implementation
- ❑ Defining outcome and process measures

Preventing Targeted MDROs in Oregon

Six Strategies

CDC recommends six steps for all MDRO prevention plans

1. Conduct education
2. Improve infection prevention and control (IPC)
3. Detect colonized individuals through surveillance
4. Improve interfacility communication
5. Improve antimicrobial stewardship
6. Respond to cases

CDC recommends six steps for all MDRO prevention plans

1. Conduct education

- For all staff, including environmental services
- OHA can help link to resources and materials

2. Improve infection prevention and control (IPC)
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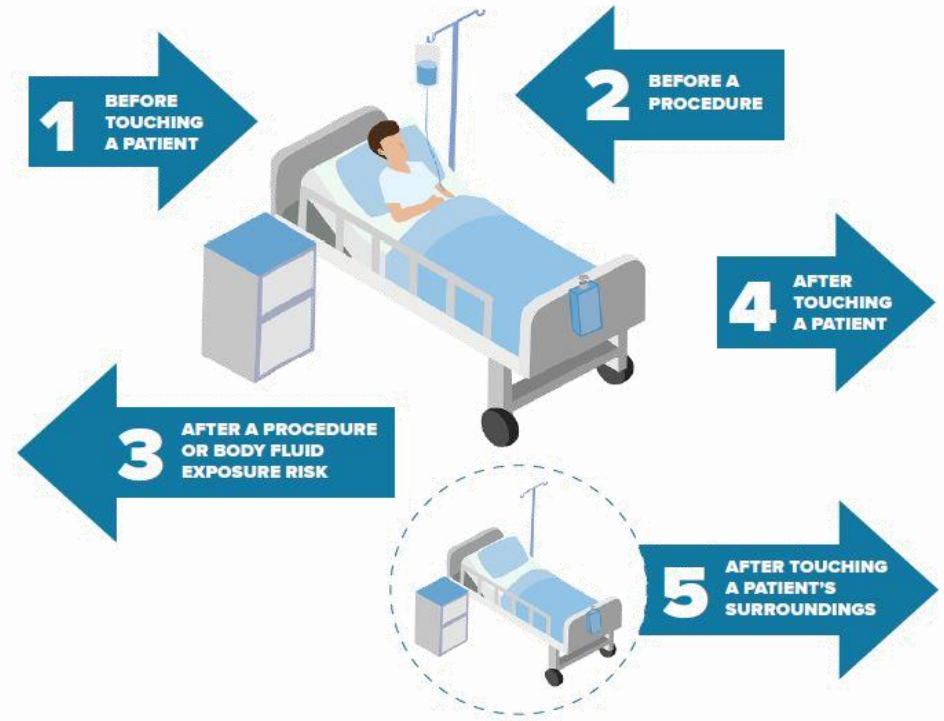
CDC recommends six steps for all MDRO prevention plans

1. Conduct education
- 2. Improve infection prevention and control (IPC)**
 - Request a proactive MDRO-focused ICAR
 - Collaborative, not regulatory
3. Detect colonized individuals through surveillance
4. Improve interfacility communication
5. Improve antimicrobial stewardship
6. Respond to cases

Hand Hygiene

- **Alcohol-based hand sanitizer (ABHS) is the preferred hand hygiene method** for when hands are not visibly soiled.
- If hands are visibly soiled, wash with soap and water.
- Wearing gloves is not a substitute for hand hygiene.
- Staff need to have access to Hand Hygiene!

5 Moments for HAND HYGIENE



Transmission Based Precautions

- Standard precautions
- All healthcare providers in all settings should use **contact precautions** for known or suspected cases of *Candida auris* and CPO



Environmental Disinfection

- Daily and terminal cleaning and disinfecting reduce transmission
- Engage EVS leadership
- Focus efforts on:
 - reusable equipment
 - shared mobile equipment (e.g., glucometers, blood pressure cuffs).
- Avoid equipment sharing to the extent possible
 - Designate equipment for those colonized or infected with CPO or *C. auris*

Environmental Disinfection and Cleaning

CDC Environmental Checklist for Monitoring Terminal Cleaning

Date:			
Unit:			
Room Number:			
Staff Initials:			

High-touch Room Surfaces	Cleaned	Not Cleaned	Not Present in Room
Bed Rails & Controls			
Tray Table			
IV Pole			
Call Button/ Box			
Telephone			
Bedside Table Handles			
Chair			
Room Sink			
Room Light Switch			
Room Inner Doorknob			
Bathroom Inner Doorknob			
Bathroom Light Switch			
Bathroom Handrail by Toilet			
Bathroom Sink			
Toilet Seat			
Toilet Flush Handle			
Toilet Bedpan Cleaner			
IV Pump Controls			
Monitor Controls			
Monitor Touch Screens			
Monitor Cables			

Mark the Monitoring Method Used				
Direct Observations	Swab Cultures	Fluorescent Gel	ATP System	Agar Slide Cultures

6

Environmental Disinfection

- Use an Environmental Protection Agency (EPA)–registered disinfectant effective against *C. auris* before you have a case
- Refer to EPA’s List P for a current list of EPA-approved products for *C. auris*.
- Important to follow all manufacturer’s directions for use
 - including applying the product for the correct contact time

How to Read a Disinfectant Label

Read the entire label.
The label is the law!

Note: Below is an **example** of information that can be found on a disinfectant label

Active Ingredients: What are the main disinfecting chemicals?

EPA Registration Number: U.S. laws require that all disinfectants be registered with EPA.

Directions for Use (Instructions for Use): Where should the disinfectant be used?

Directions for Use (Healthcare Organisms): What germs does the disinfectant kill? What types of surfaces can the disinfectant be used on? How do I properly use the disinfectant?

Contact Time: How long does the surface have to stay wet with the disinfectant to kill germs?

Signal Words (Caution, Warning, Danger): How risky is this disinfectant if it is swallowed, inhaled, or absorbed through the skin?

Precautionary Statements: How do I use this disinfectant safely? Do I need PPE?

First Aid: What should I do if I get the disinfectant in my eyes or mouth, on my skin, or if I breathe it in?

Storage & Disposal: How should the disinfectant be stored? How should I dispose of expired disinfectant? What should I do with the container?

ACTIVE INGREDIENTS:
Alkyl (60% C14, 30% C16, 5% C12, 5% C18) 10.0%
Dimethyl Benzyl Ammonium Chloride 50.0%
OTHER INGREDIENTS: 50.0%
TOTAL: 100.0%

EPA REG NO. 55555-55-55555

CAUTION

Directions for Use

INSTRUCTIONS FOR USE: It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

For Disinfection of Healthcare Organisms:
Staphylococcus aureus,
Pseudomonas aeruginosa.

To Disinfect Hard, Nonporous Surfaces:
Pre-wash surface.
Mop or wipe with disinfectant solution.
Allow solution to stay wet on surface for at least 10 minutes.
Rinse well and air dry.

PRECAUTIONARY STATEMENTS: Hazardous to humans and domestic animals. Wear gloves and eye protection.

CAUSES MODERATE EYE IRRITATION. Avoid contact with eyes, skin or clothing. Wash thoroughly with soap and water after handling. Avoid contact with foods.

FIRST AID: IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. **IF ON SKIN OR CLOTHING:** Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes.

POISON CONTROL: Call a Poison Control Center (1-866-366-5048) or doctor for treatment advice.

STORAGE AND DISPOSAL: Store this product in a cool, dry area away from direct sunlight and heat. When not in use keep center cap of lid closed to prevent moisture loss. Nonrefillable container. Do not reuse or refill this container.

EXP. MFG. DATE: YYYY
6 55555 55555 5

U.S. Department of Health and Human Services
Centers for Disease Control and Prevention

PROJECT FIRSTLINE

EPA
United States
Environmental Protection Agency

WWW.CDC.GOV/PROJECTFIRSTLINE

Commonly used *Candida auris* Disinfectants



Oxivir 1 Wipes
 Dwell Time: 1 Minute for
 Hard Non-porous Surfaces
 Active Ingredients:
 Hydrogen Peroxide
 EPA Reg No.: 70627- 77

CaviWipes 1
 Dwell Time: 1 Minute for
 Hard Non-porous Surfaces
 Active Ingredients:
 Isopropyl Alcohol and
 Quaternary Ammonium
 EPA Reg No.: 46781-13



Sani-Cloth Germicidal Wipes
 Dwell Time: 2 Minutes for
 Hard Non-porous Surfaces
 Active Ingredients: Isopropyl
 Alcohol and Quaternary
 Ammonium
 EPA Reg No.: 9480-4

Missed opportunities: Commonly identified culprits for spread

Common Culprit	Potential Solutions
MDRO transmission via contaminated equipment	<ul style="list-style-type: none"> Establish a system that clearly differentiates clean vs. dirty equipment Routinely train relevant staff in disinfection protocols (don't forget night shift)
MDRO biofilm present in or around sink. Sink splash zone results in contamination of equipment, medications, bedding, etc.	<ul style="list-style-type: none"> Ensure sinks routinely disinfected Create splash zone of 3 feet to avoid contamination of medications, equipment etc.
MDRO contaminates HCP hands and spread between patients.	<ul style="list-style-type: none"> Create hard-to-miss opportunities for hand hygiene
Gloves or gown PPE worn from patient-to-patient	<ul style="list-style-type: none"> Ensure easy access to PPE where staff need it Carefully monitor shared rooms

CDC recommends six steps for all MDRO prevention plans

1. Conduct education
2. Improve infection prevention and control (IPC)
- 3. Detect colonized individuals through surveillance**
 - Admission screening of high-risk patients
4. Improve interfacility communication
5. Improve antimicrobial stewardship
6. Respond to cases

Admission screening of high-risk patients detects cases and prevents outbreaks

- **At risk defined as:** Out-of-state healthcare in the past year (includes international care)
 - Overnight acute or long-term care
 - Ambulatory surgery
 - Hemodialysis
- **Can use public health lab or private lab**
 - Public health: no cost for supplies or shipping
 - Fast result turnaround via online portal
- **Identifies cases on admission**
 - Cases can be put on appropriate precautions
 - Prevents outbreaks
 - Prevents large scale public health response to cases



Source: CDC

Admission screening of high-risk patients detects cases and prevents outbreaks

CPO Screening:

- One rectal swab “Q-tip”
- Collection < 1 minute

***C. auris* screening:**

- One swab for axilla/groin
composite specimen
- Collection < 1 minute

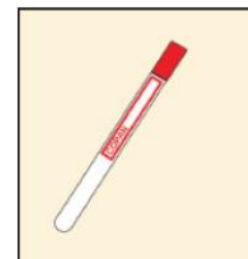
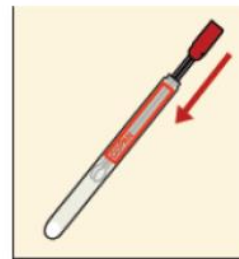
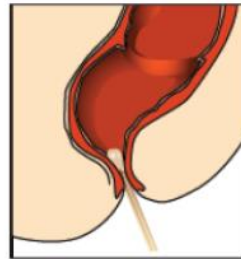
**About 10 minutes per patient
screened**



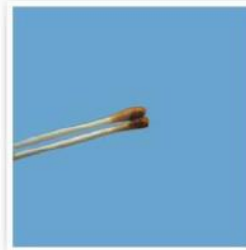
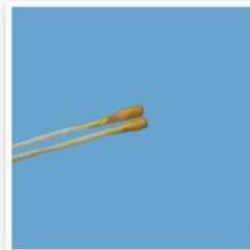
Source: CDC

Rectal swab for CPO

6. Collect specimen by carefully inserting both swab tips **approximately 1 cm beyond the anal sphincter and rotate gently, 2-3 times.**
 - a. Please reference the diagrams below to ensure proper collection.



Acceptable

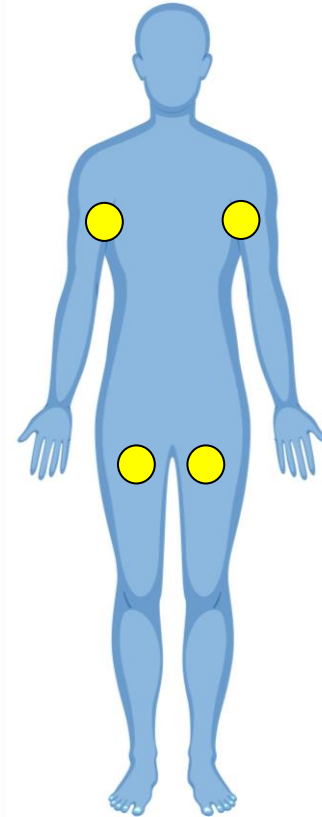


Unacceptable



Source: CDC

Axilla-Groin Swab for *Candida auris*



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Interfacility Transfer Communication

- Written communication
- Verbal communication
- Directly to those who will be caring for the patient
- Required for all patients who require transmission based precautions

Facility Logo

Inter-facility Infection Control Transfer Form

SENDING FACILITY TO COMPLETE FORM and COMMUNICATE TO ACCEPTING FACILITY

Please attach copies of latest culture reports with susceptibilities, if available

Patient/Resident Last Name <i>Print or place Patient Label</i>	First Name	Date of Birth
Sending Facility Name		
Sending Facility Unit		Sending Facility Phone #

Is the patient/resident currently on antibiotics? NO YES DX: _____

Does the patient/resident have pending cultures? NO YES

Is the patient/resident currently on precautions? NO YES

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

Does patient currently have an infection, colonization, or a history of a multidrug-resistant organism (MDRO), or have an infection with a pathogen requiring transmission-based precautions?	Colonization or history <i>Check if YES</i>	Active infection on treatment <i>Check if YES</i>
MRSA (methicillin-resistant <i>Staphylococcus aureus</i>)	<input type="checkbox"/>	<input type="checkbox"/>
VRE (Vancomycin-resistant <i>Enterococcus</i>)	<input type="checkbox"/>	<input type="checkbox"/>
<i>C. diff</i> (<i>Clostridiodes difficile</i> , formerly known as <i>Clostridium difficile</i> , CDI)	<input type="checkbox"/>	<input type="checkbox"/>
<i>Acinetobacter</i> spp., multidrug-resistant	<input type="checkbox"/>	<input type="checkbox"/>
Gram-negative organism resistant to multiple antibiotics* (e.g., <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i> spp.)	<input type="checkbox"/>	<input type="checkbox"/>
CRE (carbapenem-resistant <i>Enterobacteriales</i>)	<input type="checkbox"/>	<input type="checkbox"/>
SARS-CoV-2 (severe acute respiratory syndrome coronavirus 2)	<input type="checkbox"/>	<input type="checkbox"/>
<i>Candida auris</i>	<input type="checkbox"/>	<input type="checkbox"/>
Other**:	<input type="checkbox"/>	<input type="checkbox"/>

*Culture report with multiple antibiotics marked resistant (R); send copy of report with susceptibilities.

**Other: lice, scabies, shingles, norovirus, influenza, tuberculosis, etc.

Does the patient/resident currently have any of the following?

- | | |
|-------------------------------------------------|-------------------------------|
| Cough or requires suctioning | Central line/PICC |
| Diarrhea | Hemodialysis catheter |
| Vomiting | Urinary catheter |
| Incontinent of urine or stool | Suprapubic catheter |
| Open wounds or wounds requiring dressing change | Percutaneous gastrostomy tube |
| Drainage (source) _____ | Tracheostomy |

Notes:

Printed Name of Person completing form:	Signature:	Date:	Name and phone of individual at receiving facility who received information:



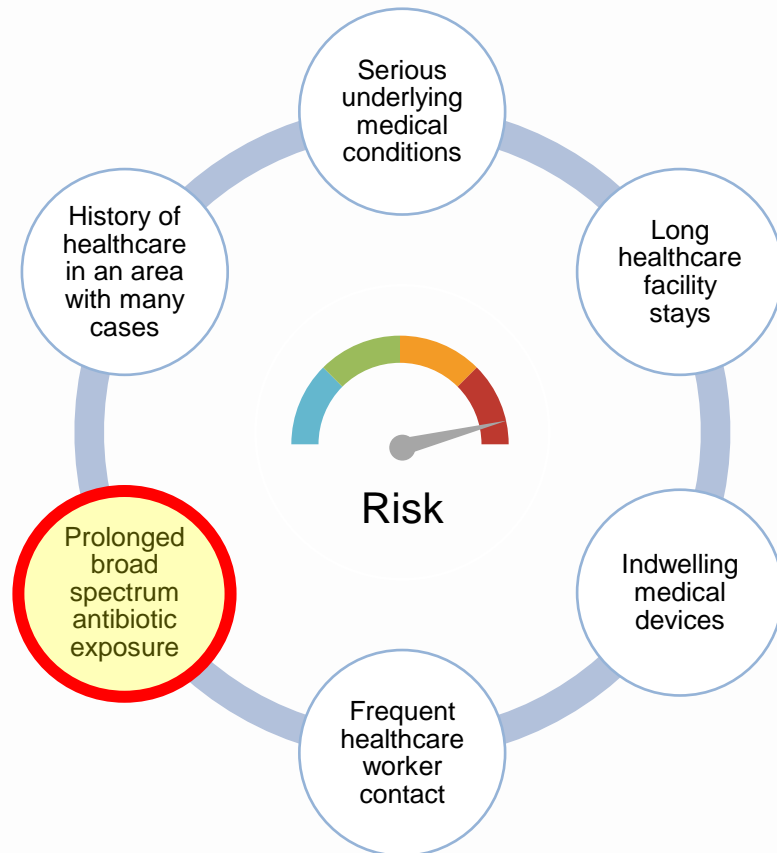
OHA (04/2023) adapted from CDC



CDC recommends six steps for all MDRO prevention plans

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Why Stewardship Matters

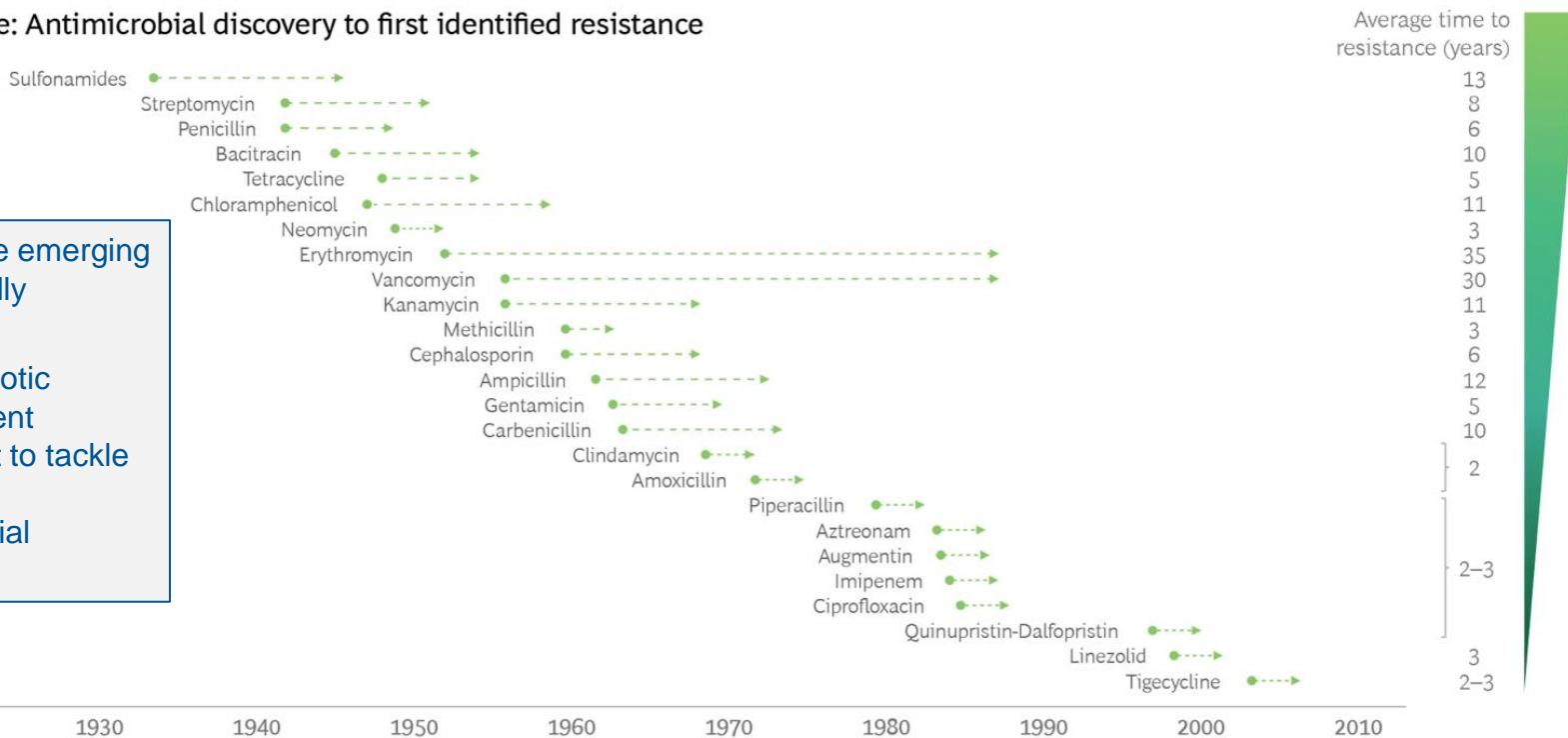


Source: Massimo et al, 2020

- CDC estimates that 30% of all antibiotics prescribed in US are unnecessary or inappropriate → **Modifiable risk factor**
- Antibiotic use leads to development of antibiotic resistance at individual and population level
 - The longer a patient is exposed to an antimicrobial the more likely they will become colonized with an organism resistant to that antimicrobial.
 - Even within a facility, higher antimicrobial use = higher rates of resistance.

MDROs increasing as antimicrobials options dwindling

Timeline: Antimicrobial discovery to first identified resistance



- Resistance emerging more rapidly
- New antibiotic development insufficient to tackle increasing antimicrobial resistance

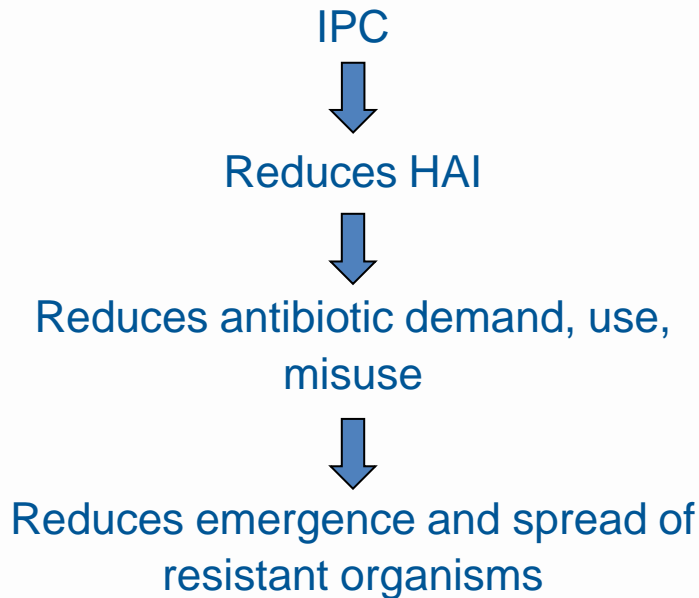
Sources: Cecchini, Langer, and Slawomirski, *Antimicrobial Resistance in G7 Countries and Beyond: Economic Issues, Policies and Options for Action* (OECD, 2015); BCG analysis.

Antimicrobial Stewardship:
Commitment to measure and improve antibiotic use

Fundamental to patient safety and high-quality healthcare

- Optimize Treatment
- Protect patients from unnecessary adverse events
 - Antibiotics are not without risk, risk should outweigh the benefit
 - Antibiotics are involved in 14% of adult Emergency Department visits for ADEs
- Combat antimicrobial resistance
 - When infected with resistant bacteria, patients often receive antimicrobials that are less effective and associated with more adverse events
 - Resistant infections associated with higher mortality, worse outcomes and longer hospital stays

Antibiotic stewardship and improving IPC go hand-in-hand



PROTECT YOUR PATIENTS, COMBAT ANTIBIOTIC RESISTANCE

Actions For Healthcare Providers

You can protect your patients from antibiotic-resistant germs such as bacteria and fungi, which can cause difficult and sometimes impossible to treat infections.



Prevent Infections & the Spread of Germs

Follow infection prevention and control recommendations, including screening at-risk patients when indicated.

Ask patients if they recently received care in another facility or traveled to another country (germs can be spread easily across borders).

Ensure your patients receive recommended vaccines.

Alert receiving facilities when transferring patients who are colonized or infected with antibiotic-resistant germs.

Educate patients on ways to prevent spread.

Stay informed of current outbreaks.



Improve Antibiotic Prescribing

Follow clinical and treatment guidelines. Support CDC's Core Elements of Antibiotic Stewardship to ensure appropriate antibiotic use.

Consider fungal infections for patients with respiratory infections that do not respond to antibiotics.

Watch for signs and symptoms of sepsis. If you suspect sepsis, start antibiotics as soon as possible and reassess antibiotic therapy.

Perform appropriate diagnostic tests to guide antibiotic therapy, including correct drug, dose, and duration.



Be Alert & Take Action

Be aware of infections and resistance patterns in your facility and community.

Ensure you are notified by the lab immediately when antibiotic-resistant germs are identified in your patients.

Inform patients and families if they have an antibiotic-resistant infection, as well as sexual partners when appropriate (e.g. gonorrhea).

Know when to report cases and submit resistant isolates to the health department to help identify unusual resistance or treatment failures.

Antimicrobial Stewardship Programs – Core Elements Guide Optimal Use of Antibiotics

Core Elements of Hospital Antibiotic Stewardship Programs



Hospital Leadership Commitment

Dedicate necessary human, financial, and information technology resources.



Accountability

Appoint a leader or co-leaders, such as a physician and pharmacist, responsible for program management and outcomes.



Pharmacy Expertise (previously “Drug Expertise”):

Appoint a pharmacist, ideally as the co-leader of the stewardship program, to help lead implementation efforts to improve antibiotic use.



Action

Implement interventions, such as prospective audit and feedback or preauthorization, to improve antibiotic use.



Tracking

Monitor antibiotic prescribing, impact of interventions, and other important outcomes, like *C. difficile* infections and resistance patterns.



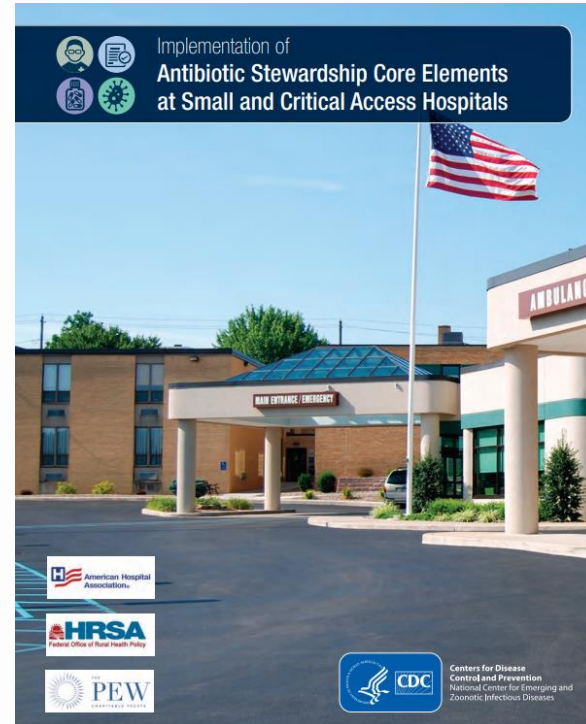
Reporting

Regularly report information on antibiotic use and resistance to prescribers, pharmacists, nurses, and hospital leadership.



Education

Educate prescribers, pharmacists, nurses, and patients about adverse reactions from antibiotics, antibiotic resistance, and optimal prescribing.



Stewardship Talking Points

- Create a sense of Urgency
 - “Our CDI rates are too high, and patients are at risk of being harmed”
 - “We are not compliant with the Joint Commission stewardship standard”
- Create a vision for change
 - Improve patient safety and outcomes
- Communicate regularly
 - Changing culture is a long, slow process
- Start with easier initiatives, create short-term wins, provide positive feedback
 - Target a specific infection – UTI, CAP
 - Time-outs
 - IV to PO protocols

CDC recommends six steps for all MDRO prevention plans

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3. Detect colonized individuals through surveillance
4. Improve interfacility communication
5. Improve antimicrobial stewardship
- 6. Respond to cases – what to expect if CPO or *C. auris* is detected at your hospital**
 - Responding to cases from clinical specimens
 - This is not how we respond to cases from surveillance

Responding to targeted MDROs in Oregon

CPO and *Candida auris*

Report CRE, CRA, CPO, and *C. auris* cases to public health within 24 business hours

- If your facility identifies a reportable MDRO, report them to local public health within 24 business hours
- Reportable MDROs in Oregon:
 - Carbapenem-resistant Enterobacterales
 - Carbapenem-resistant *Acinetobacter* species
 - Carbapenemase producing organisms
 - *Candida auris*
 - Pan non-susceptible (PanNS) organisms
- Also reportable:
 - Extrapulmonary nontuberculous mycobacterium (NTM)
 - Organisms of public health significance
 - Outbreaks of any HAI
 - Definition of 'outbreak' depends on organism – if in doubt, call your LPHA!

What to expect when CPO or *C. auris* are identified in your hospital:

Partner call

- Within 24 business hours of OHA being notified
- Will share case details and medical history, discuss recommendations and next steps
- Includes: OHA HAI subject matter experts and epis, reginal IP(s), LPHAs, facility staff

Responsive Screening

- Potential for broad (whole unit) or targeted screening depending on situation
- Recommendation made during partner call
- Screening scheduled for as soon as possible after partner call

Responsive onsite ICAR

- Collaborative, not regulatory
 - Provide setting specific recommendations to strengthen IPC
 - Focus on areas and content related to case patient(s)

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What if transmission is suspected... ?

Partner call

- Within 24 business hours of OHA being notified
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Responsive Screening **additional cases detected**

- Potential for broad (whole unit) or targeted screening depending on situation
- Recommendation made during partner call
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Responsive onsite ICAR

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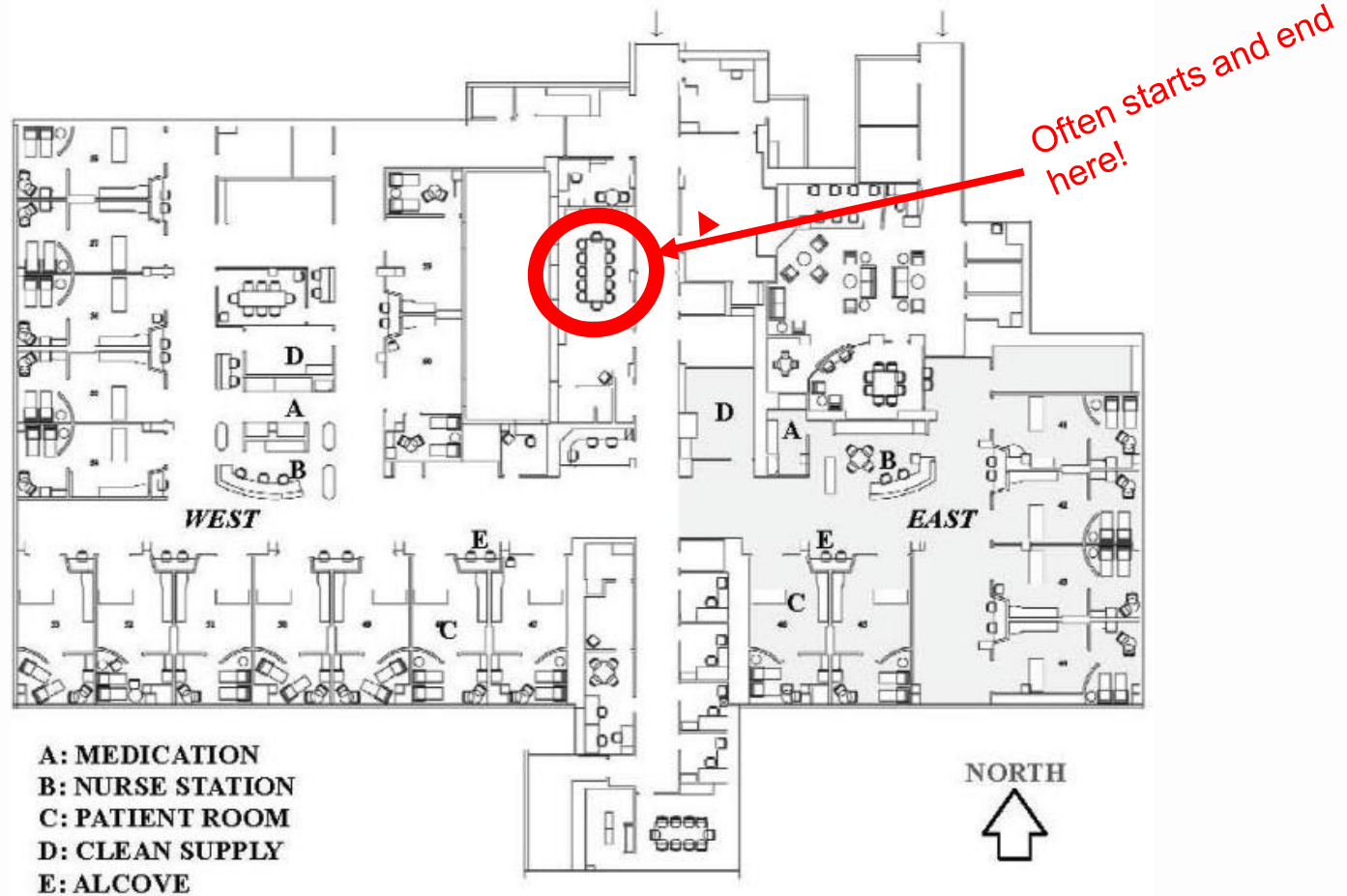
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What does an onsite response look like?



Often starts in a conference room or common area

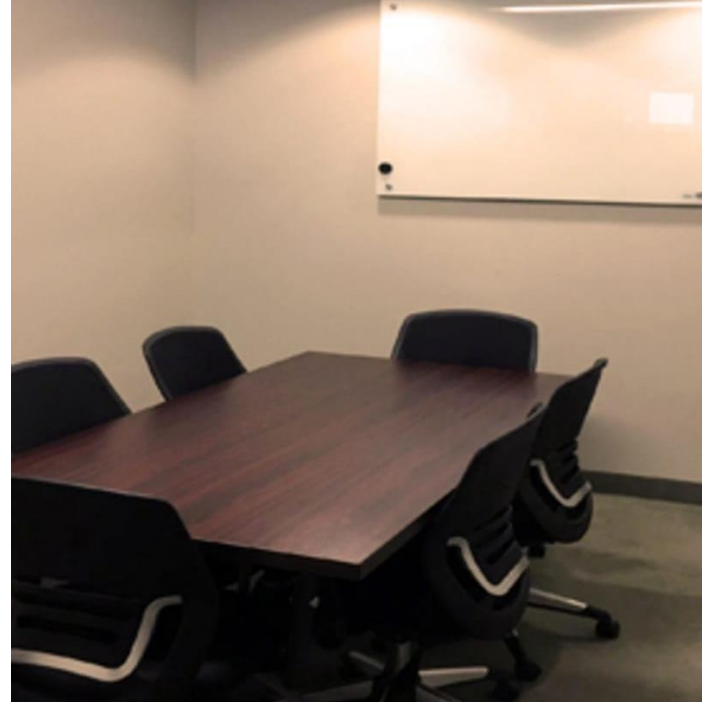


- Meet with staff
- Provide just in time training
- Discuss plan/steps
- Answer questions
- Get supplies ready

We borrow a facility cart and go door to door to collect swabs

- Door to door
- Facility staff collects swabs
- OHA staff provide resources:
 - Swab and shipping supplies
 - Consent scripts
 - Patient FAQs
 - Toolkit
 - Etc.
- OHA staff onsite to assist
- Appropriate PPE





Often ends
back in the
conference
room

- Package collected swabs for shipment to state or regional lab
- Debrief if needed



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Targeted MDRO Prevention: Summary

- Carbapenemase-producing organisms (CPO) and *Candida auris* are serious emerging pathogen threats
- Report these organisms to public health as soon as possible
- These organisms CAN be safely managed and prevented
- Implementing prevention measures prevents cases, outbreaks, and the need for large-scale response
- The OHA HAI Team is here to support you!

Questions? Contact us!

Evelyn Donahoe, MPH, CIC

MDRO Epidemiologist

evelyn.donahoe2@oha.oregon.gov

971-378-5807

Heather Hertzelt, MPH

MDRO Epidemiologist

heather.hertzelt2@oha.oregon.gov

971-346-0724

Lex Zhang, MPH, CIC

HAI Epi and Data Systems Manager

alexia.y.zhang@oha.oregon.gov

971-271-0071

Pam Bruhn, VSN, MAN, RN, ANP

Region 9 Infection Preventionist

pam.s.bruhn@oha.oregon.gov

971-337-4876

Mary Martin, MScPH, BSN, RN

HAI Region 2 Infection Preventionist

mary.e.martin@oha.oregon.gov

503-847-6287

Liz Breitenstein, PharmD, RPh

Antimicrobial Stewardship Pharmacist

elizabeth.breitenstein@oha.oregon.gov

503-509-8819

Additional Resources

- **CDC *Candida auris* website**
 - <https://www.cdc.gov/fungal/candida-auris/index.html>
- **OHA CRO Toolkit (being updated now)**
 - https://www.oregon.gov/oha/PH/DISEASES/CONDITIONS/DISEASESAZ/CRE1/cre_toolkit.pdf
- **OHA CRE/CRO Investigative Guidelines (being updated now)**
 - https://www.oregon.gov/oha/PH/DISEASES/CONDITIONS/COMMUNICABLEDISEASE/REPORTINGCOMMUNICABLEDISEASE/REPORTINGGUIDELINES/Documents/CRE_lguide.pdf
- **OHA *Candida auris* Investigative Guidelines**
 - under development
- **CDC MDRO Containment Webinar Series**
 - <https://www.vdh.virginia.gov/haiar/mdro-containment-webinar-series/#:~:text=The%20webinar%20will%20be%20held,a%20question%20and%20answer%20session.>
- **CDC Targeted MDRO Containment Guidance**
 - <https://www.cdc.gov/hai/pdfs/mdro-guides/Health-Response-Contain-MDRO-508.pdf>
- **CDC Targeted MDRO Prevention Guidance**
 - <https://www.cdc.gov/hai/pdfs/mdro-guides/Health-Response-Prevent-MDRO-508.pdf>

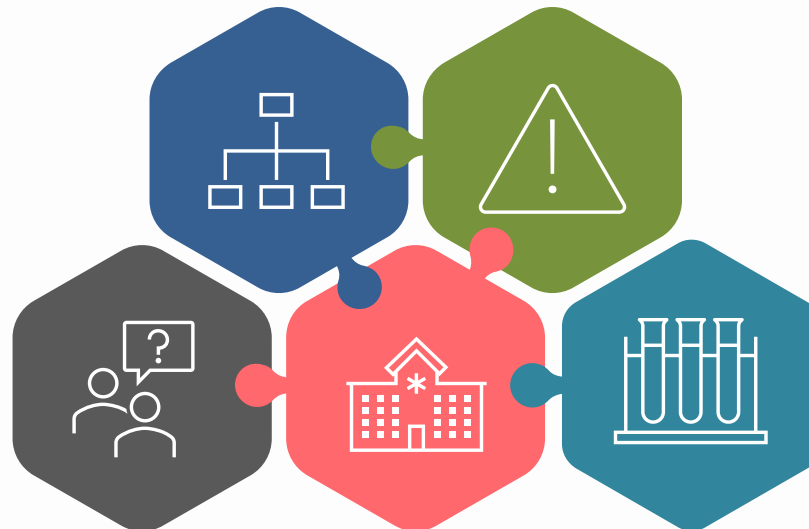
OHA is working to prevent CPO and *C. auris* cases in Oregon

Expanding HAI team

Including an additional dedicated epidemiologist for multidrug-resistant organism surveillance and response

Supporting local public health

By providing targeted training and webinars on CPO and *C. auris* prevention and response



Antibiotic Resistance Information Exchange

ARIE alerts emergency departments and skilled nursing facilities when a patient with an MDRO is admitted, launched in October 2022

New state lab technology

Validating new technology at the Oregon State Public Health Laboratory for improved CPO testing capabilities

Working closely with facilities

Who are most at risk of encountering a CPO and/or *C. auris* case, and who are most at risk of an outbreak