




Indiana
Department
of
Health

Welcome
to the
Healthcare Associated
Infections Antimicrobial
Resistance Webinar Series



Webinar Overview

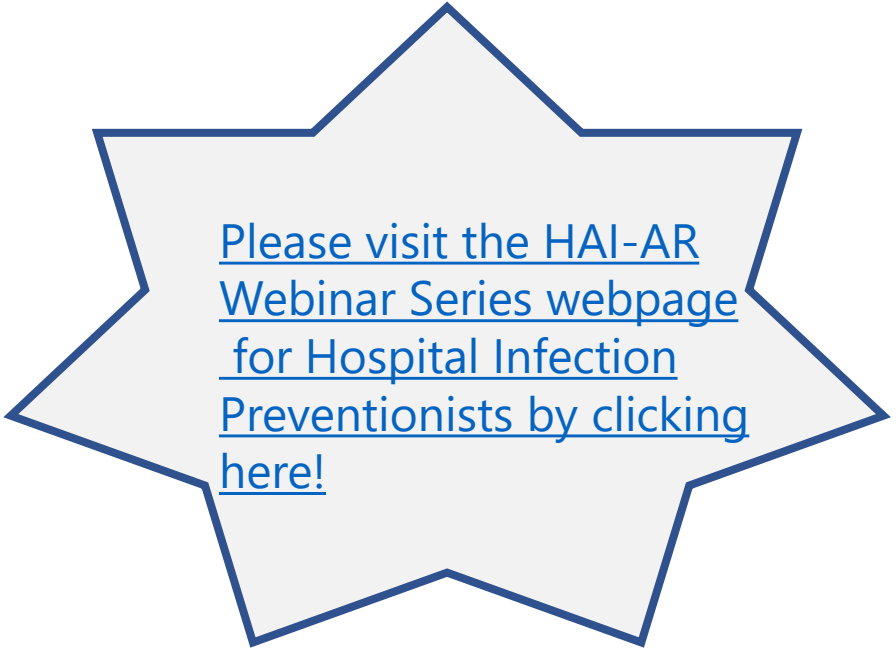
- Schedule – bi-monthly
- Intended audience – hospital infection preventionists
- Upcoming topics:
 - ~~The Three Rs – August 2021~~
 - ~~*Candida auris* – October 2021~~
 - ~~No webinar in December~~
 - MDROs – February 2022



[Please visit the HAI-AR Webinar Series webpage for Hospital Infection Preventionists by clicking here!](#)

2022 schedule

- MDROs – February 22, 2022
- Project Fristline – April 26, 2022
- Project Firstline Environmental Cleaning – June 28, 2022
- Project Firstline – August 30, 2022
- Enterics – October 25, 2022



[Please visit the HAI-AR Webinar Series webpage for Hospital Infection Preventionists by clicking here!](#)



Indiana
Department
of
Health

MULTIDRUG RESISTANT ORGANISMS

Hannah Gallion

February 22, 2022

OUR MISSION:

**To promote, protect, and improve
the health and safety of all Hoosiers.**

OUR VISION:

**Every Hoosier reaches optimal health
regardless of where they live, learn,
work, or play.**



Overview

- **Definitions**
- **Antibiotic resistance**
 - Spread
 - Mechanisms of action
 - Stewardship
- **Antibiotic Resistant Organisms**
 - AR threats
 - Carbapenem resistant organisms (CRO)
- **Infection Control and Prevention**

Definitions

- **Multidrug-resistant organism (MDRO)** - an organism that is resistant to one or more agent in at least three classes of antibiotics, or that exhibits a classification of resistance that is of epidemiological concern (e.g. MRSA, VRE, ESBL, CRE)
- **Carbapenem** - class of antibiotics (often thought of as the last line antibiotics)
- **Carbapenemase** - enzyme produced by bacteria that breaks down most antibiotics, including carbapenem antibiotics

Antibiotic resistance

Intrinsic resistance

- The organism is naturally resistant to the antibiotic mechanism of action
 - Example: Porins in the cell wall are naturally too small to allow passage of the antibiotic.

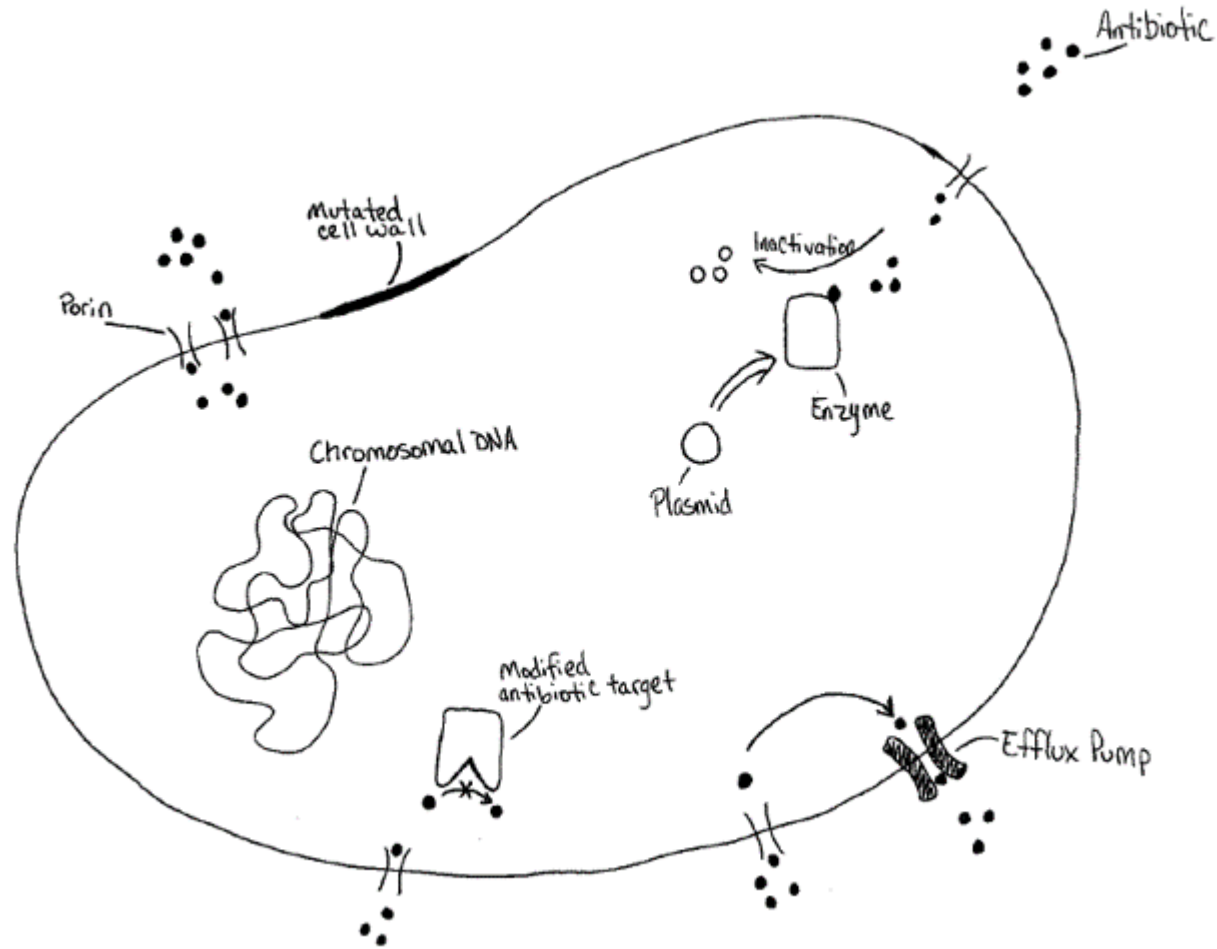
Acquired resistance

- Vertical gene transfer
 - Example: Porin size
- Horizontal gene transfer
 - Example: Carbapenemase

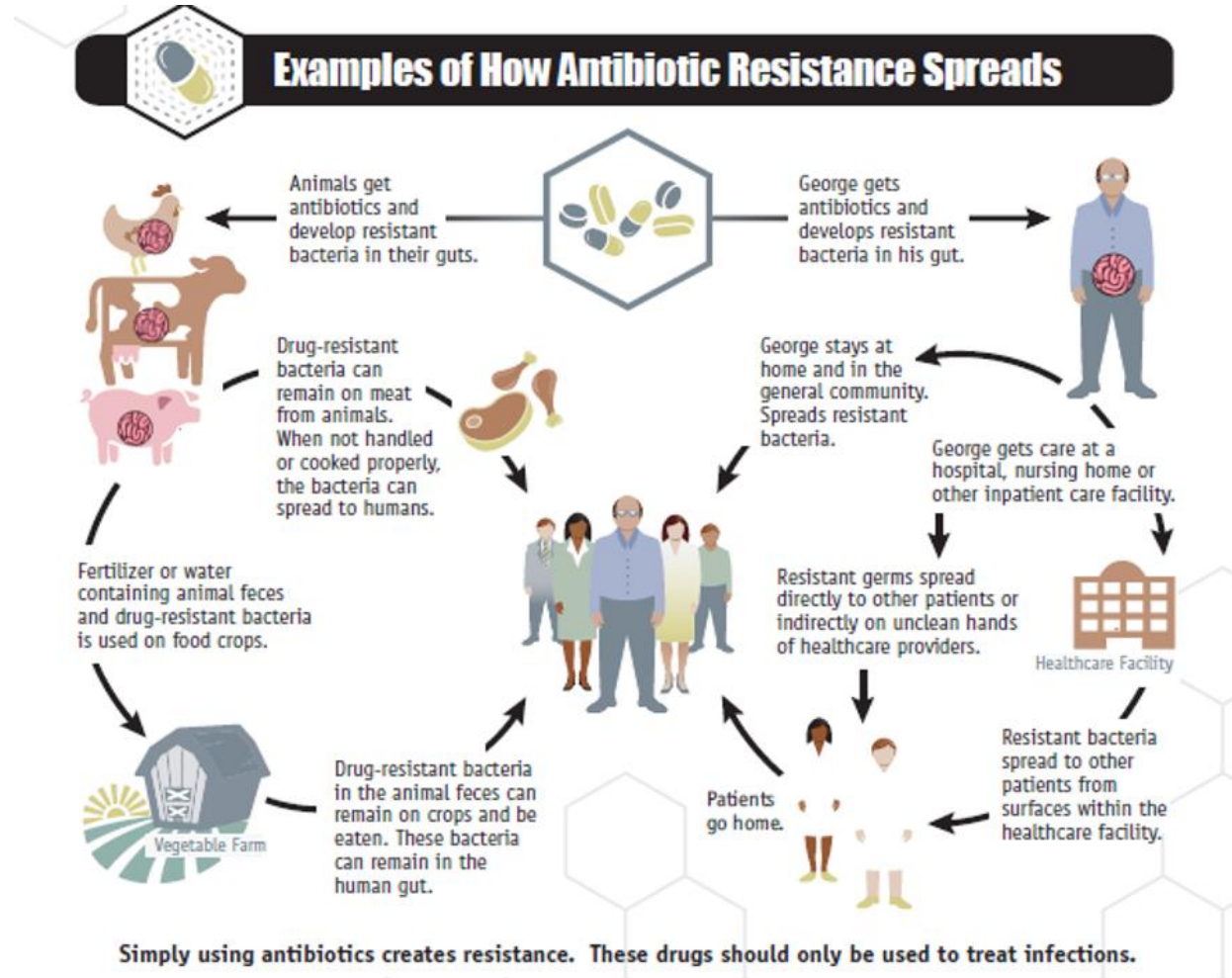
Antibiotic resistance: How it happens



AR mechanisms

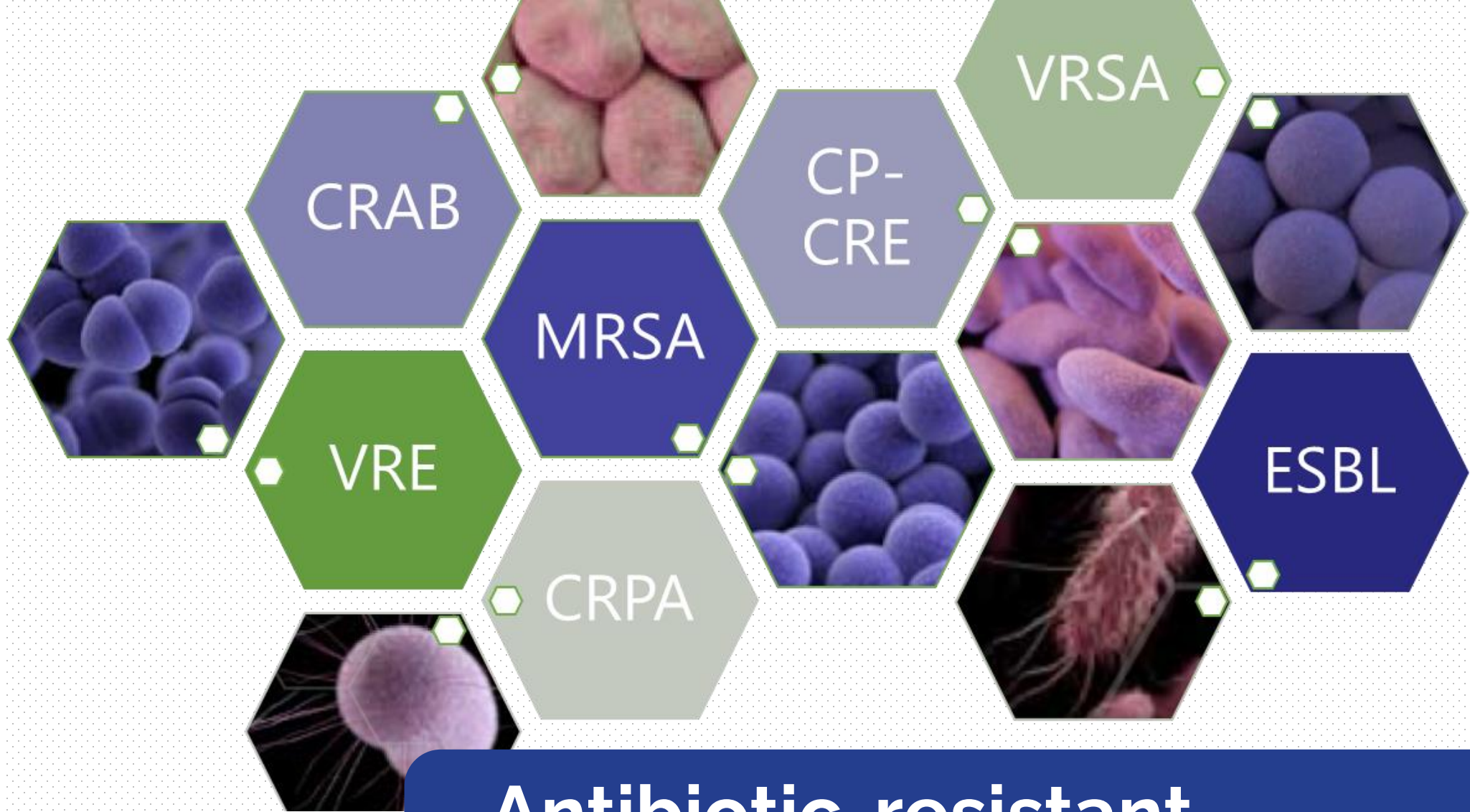


How antibiotic resistance spreads



Antibiotic stewardship

- Antibiotic stewardship is a set of commitments and activities designed to improve the treatment of infections and reducing the negative health impacts of antibiotic use.
- The CDC has issued “core elements” of antibiotic stewardship for:
 - Hospitals
 - Long-term care
 - Outpatient



Antibiotic-resistant organisms

AR threats

- Vancomycin-resistant Enterococcus (VRE)
- Vancomycin-resistant *Staphylococcus aureus* (VRSA)
- *Clostridioides difficile*
- Emerging resistance
- Carbapenem-resistant *Enterobacterales* (CRE)
- Carbapenemase-producing organisms (CPO)

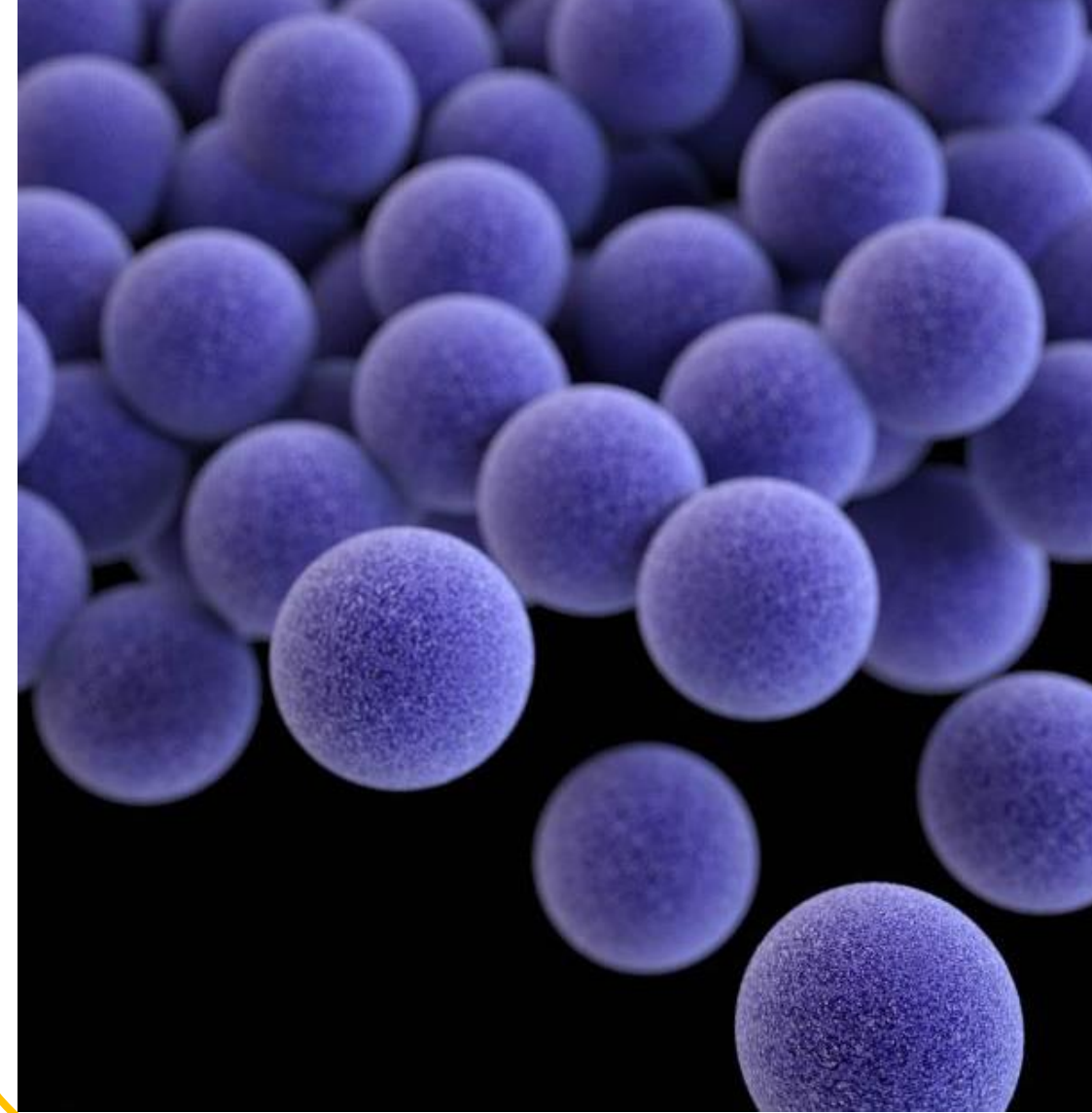
VRE

- Enterococci are bacteria normally found in human intestines
- Most VRE infections are healthcare-associated
- VRE is spread from person to person
- VRE can also be transmitted through the environment via contaminated surfaces or equipment



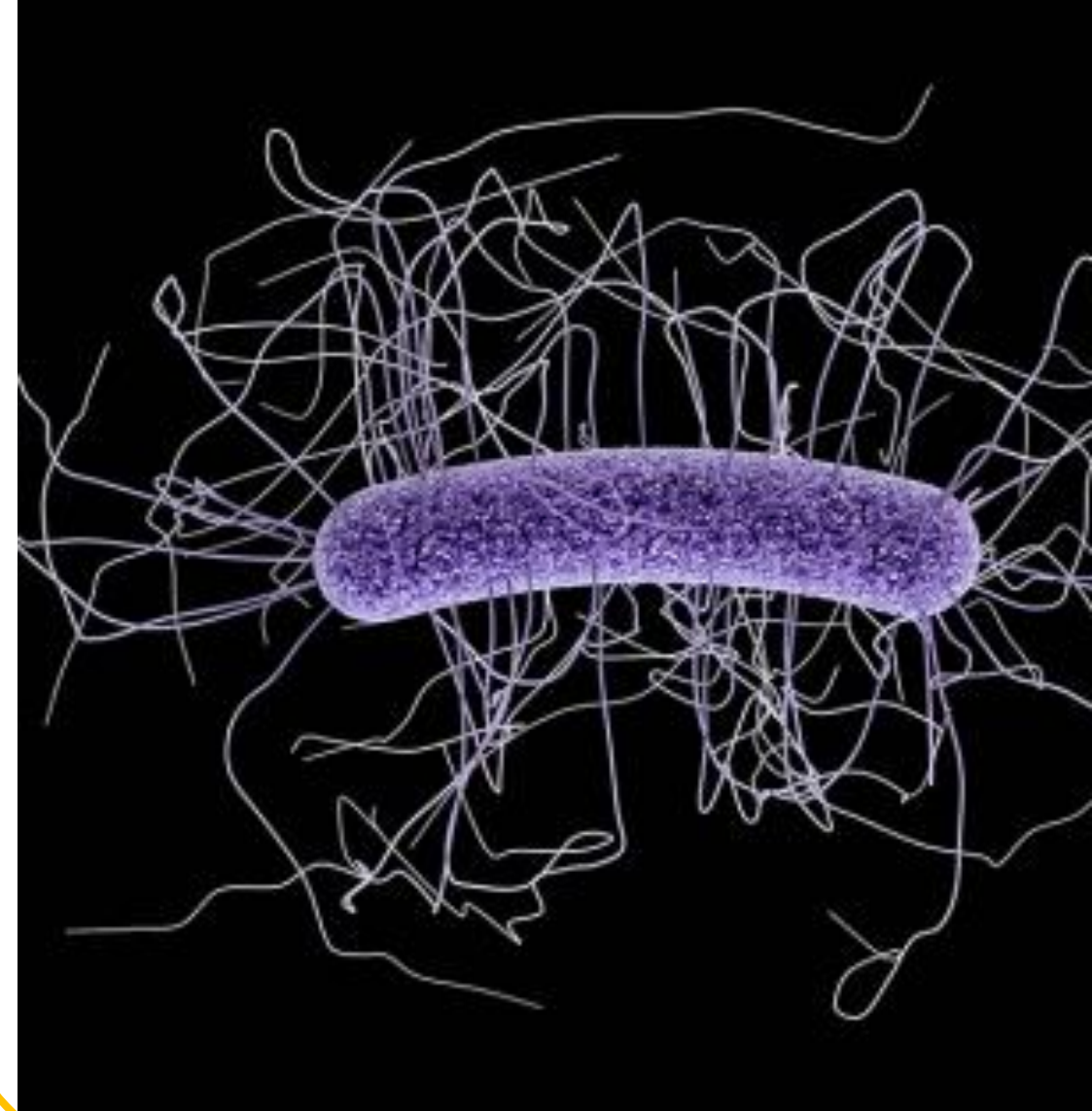
VRSA

- Uncommon, but problematic
 - 15 infections reported in the US
- All identified have the *vanA* gene, which is commonly found in VRE
- Risk factors
 - Underlying health conditions
 - Catheter use
 - History of MRSA infections
 - Recent exposure to antibiotics



C. diff

- *C. difficile* infections (CDI) most often occur in older adults who have had recent exposure to antibiotics
- *C. difficile*, to date, has not been found to be resistant to any antibiotics of clinical relevance
- Patients diagnosed with a CDI should be placed on contact precautions



Emerging resistance

- Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)
- Carbapenem-resistant *Acinetobacter baumannii* (CRAB)

CRPA

- *Pseudomonas* is commonly found in the soil and water.
- *Pseudomonas aeruginosa* can cause infections in the blood, lungs, or other parts of the body after surgery.



CRPA

CRPA can spread person-to-person via

- Contaminated hands
- Contaminated equipment
- Contaminated surfaces

Risk factors:

- Ventilator-dependent
- Invasive devices such as catheters
- Wounds from burns or surgery

CRAB

- *Acinetobacter* is commonly found in soil and water.
- *Acinetobacter baumannii* can cause infections in the blood, urinary tract, lungs, and in wounds.
- Can colonize a patient without causing infections



CRAB

CRAB can be spread person-to-person via

- Hands of care-givers or family
- Contaminated surfaces
- Shared equipment

Risk factors:

- Recent healthcare exposure (particularly ICU stays)
- Ventilator-dependent
- Invasive devices such as catheters
- Open wounds

CRE

Definition: Any *Enterobacterales* that are not susceptible (i.e. intermediate or resistant) to a carbapenem antibiotic

- *Enterobacterales* can be resistant to carbapenems through several resistance mechanisms
- Carbapenemase production is currently the most concerning



CRE

Risk factors:

- Recent healthcare exposure
 - ACH, LTC, LTACH
- Recent medical procedures
- Recent invasive device use
 - Mechanical ventilator, PICC line, Foley catheter
- Recent antibiotic use
- Prior history of MDRO colonization or infection

Carbapenemase-producing CRE (CP-CRE)

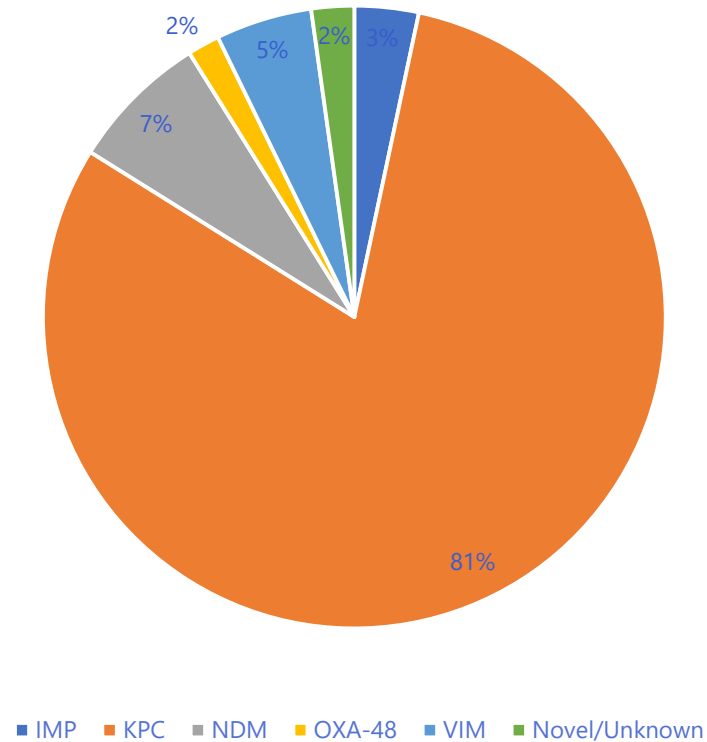
Definition:

Enterobacterales that are not susceptible (i.e. intermediate or resistant) to at least one carbapenem antibiotics AND one of the following:

- Positive for carbapenemase production by a phenotypic test
- Not susceptible to at least three carbapenem antibiotics
- OR:
 - Positive for a carbapenemase gene marker (KPC, NDM, VIM, OXA, IMP)

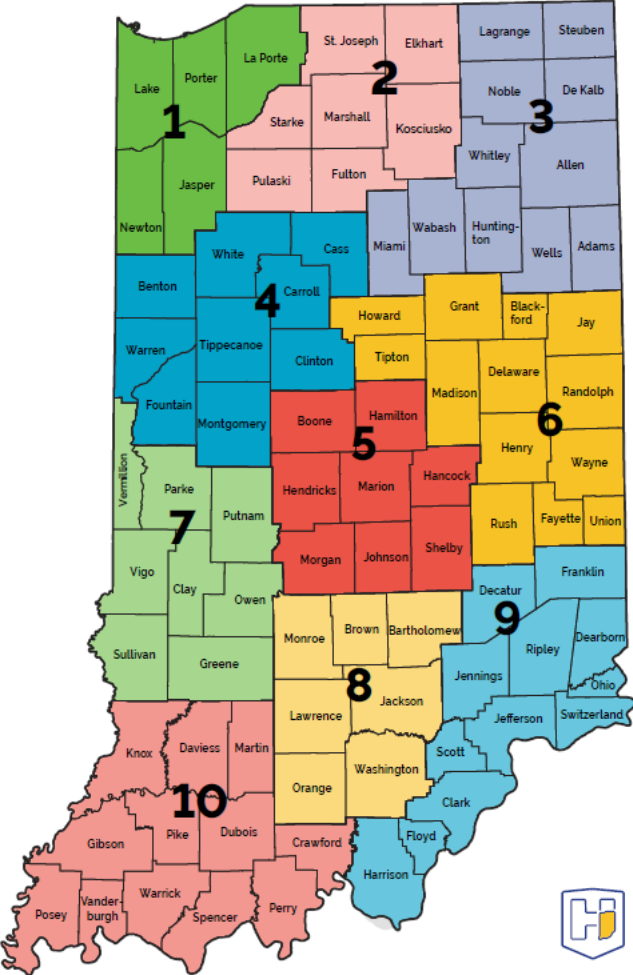
2021 Indiana CP-CRE cases

2021 CP-CRE Cases by Mechanism



2021 Indiana CP-CRE cases by district

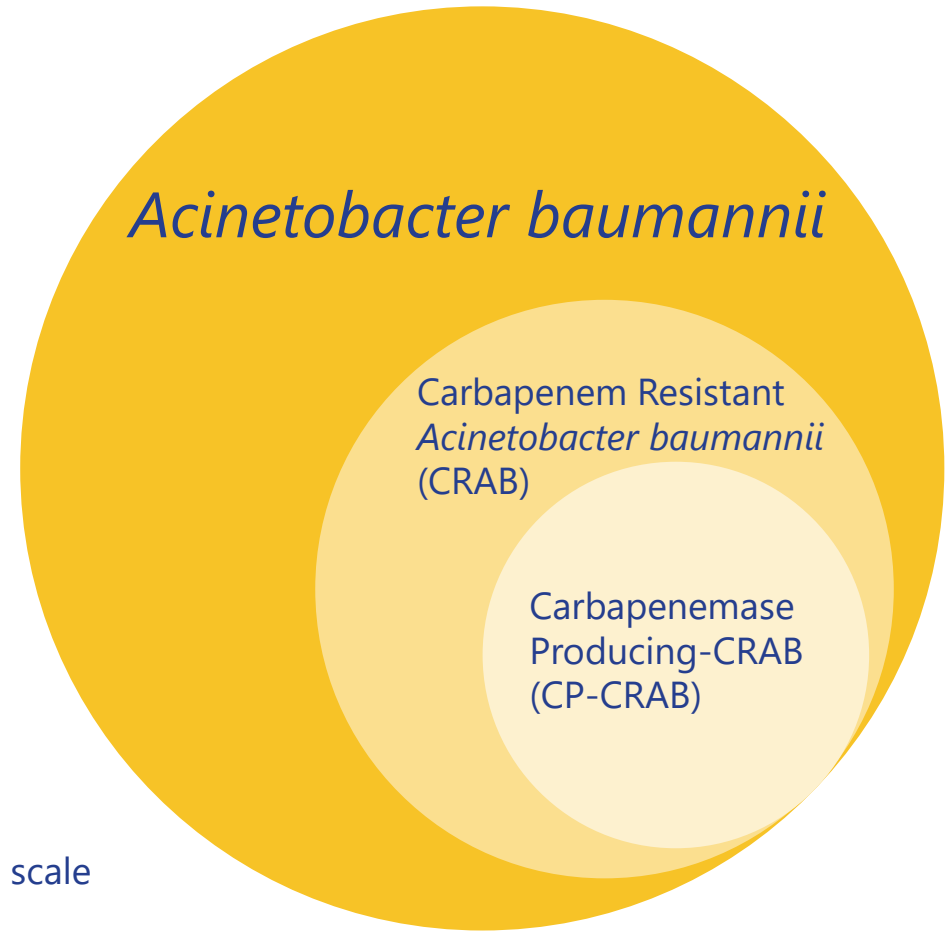
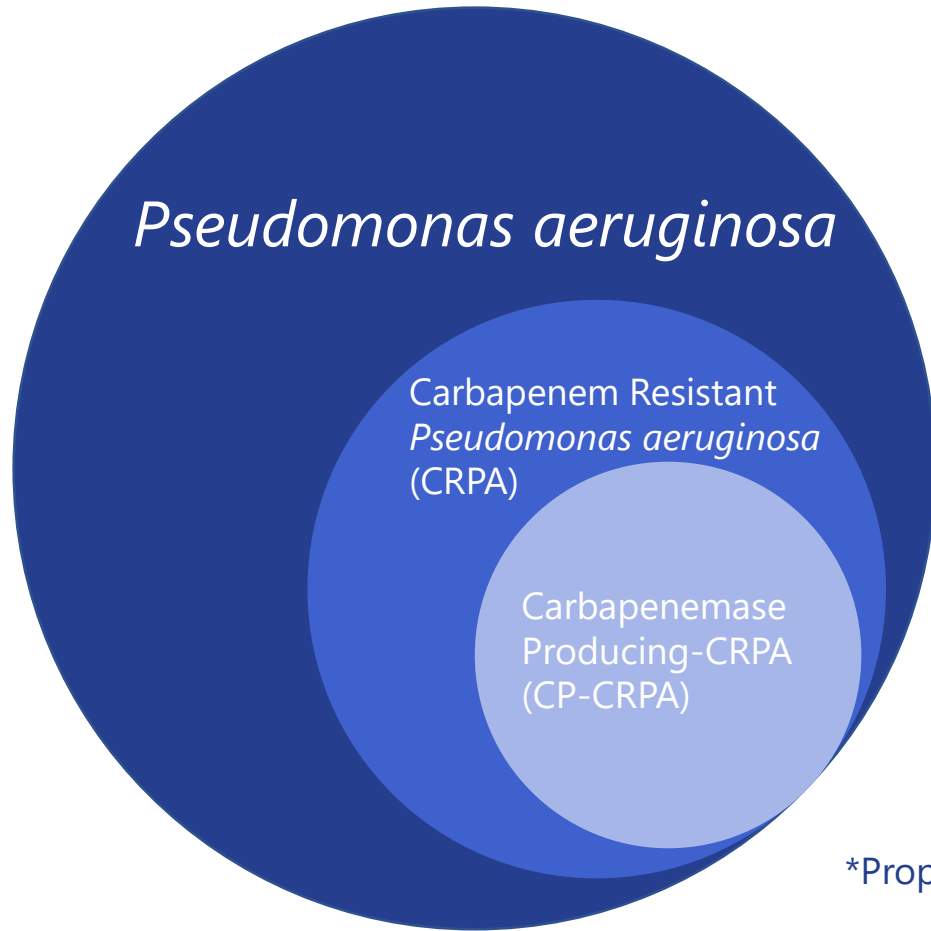
- District 1: 76
- District 2: 9
- District 3: 14
- District 4: <5
- District 5: 43
- District 6: 19
- District 7: 7
- District 8: <5
- District 9: 6
- District 10: <5



Data collected by the Indiana Department of Health



Carbapenemase-producing organisms



*Proportions not to scale

Facility level prevention strategies

- Hand hygiene ★
- Contact precautions ★
- Healthcare personnel education
- Smart use of invasive devices
- Laboratory notification
- Inter-facility communication ★
- Antibiotic stewardship
- Environmental cleaning
- patient and staff cohorting ★
- Screening contacts of CRE s ★
- Active surveillance testing ★
- Chlorhexidine bathing

Hand hygiene

When caring for patients with MDROs, healthcare personnel should follow standard hand hygiene practices.

Wearing gloves is **NOT** a substitute for hand hygiene.

Alcohol-based hand sanitizer (ABHR) is effective against most MDROs, including *Candida auris* and is the preferred method for cleaning hands when they are not visibly soiled.

Soap and water should be used for *C. diff* and when hands are visibly soiled.

Contact precautions

When to use:

- All patients infected or colonized with a novel or targeted MDRO

*See Appendix A – Type and duration of Precautions Recommended for Selected Infections and Conditions of the CDC Guideline for Isolation Precautions

What to use:

- Gloves
- Gown
- Dedicated or disposable equipment (Clean and disinfect reusable equipment before use on another person.)

Inter-facility communication



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 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 Colonization Active infection of positive culture of a multidrug-resistant organism (MDRO) or other or history 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"/> Yes
Vancomycin-resistant <i>Enterococcus</i> (VRE)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Clostridioides difficile</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Acinetobacter</i> , multidrug-resistant	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Enterobacteriaceae (e.g., <i>f. coli</i> , <i>Klebsiella</i> , <i>Proteus</i>) producing-Yes Extended Spectrum Beta-Lactamase (ESBL)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Carbapenem-resistant Enterobacteriaceae (CRE)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Pseudomonas aeruginosa</i> , multidrug-resistant	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Candida auris</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
COVID-19 Choose a Test Type: <input type="checkbox"/> PCR <input type="checkbox"/> POC Antigen	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Other, specify (e.g., scabies, norovirus, influenza):	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes



Eric J. Holcomb
Governor
Kristina M. Box, MD, FACOG
State Health Commissioner

Inter-Facility Infection Control Transfer Form

This inter-facility infection control patient transfer form can assist in fostering communication during transitions of care for patients infected with MDROs, COVID-19, etc. The discharging facility should complete this transfer form and sign at the bottom after all fields are completed. Attach copies of pertinent records and latest laboratory reports to send with the patient to the receiving facility. This form has been adapted from the Centers for Disease Control and Prevention (CDC).

promote, protect, and improve the health and safety of all Hoosiers.

North Meridian Street • Indianapolis, Indiana 46204 • 317-233-1325 • health.in.gov
equal opportunity employer.



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

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

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

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

Other:

Reason for Precautions:

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
COVID-19				<input type="checkbox"/> Yes <input type="checkbox"/> No
Other: <input type="text"/>				<input type="checkbox"/> Yes <input type="checkbox"/> No

*Refers to patient or resident depending on transferring facility

Required PPE

Name of staff completing form (print):

Signature:

If information communicated prior to transfer:

Name of individual at receiving facility:

Phone of individual at receiving facility:

Patient and staff cohorting

- Patients on contact precautions should be placed in a single room whenever possible.
- When single rooms are not available, people with the same MDROs may be housed together in the same room.
- If multiple patients with an MDRO are present, consider cohorting to one wing or unit.
- Consider cohorting healthcare personnel who provide the most regular care to these patients during a shift.


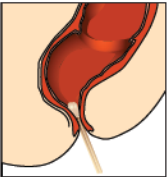
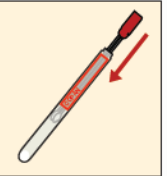

Screening for CP-CRE

Recommended for:

- Roommates of those with a positive CP-CRE test
- Units when a CP-CRE patient was not under contact precautions

Rectal Specimen Collection

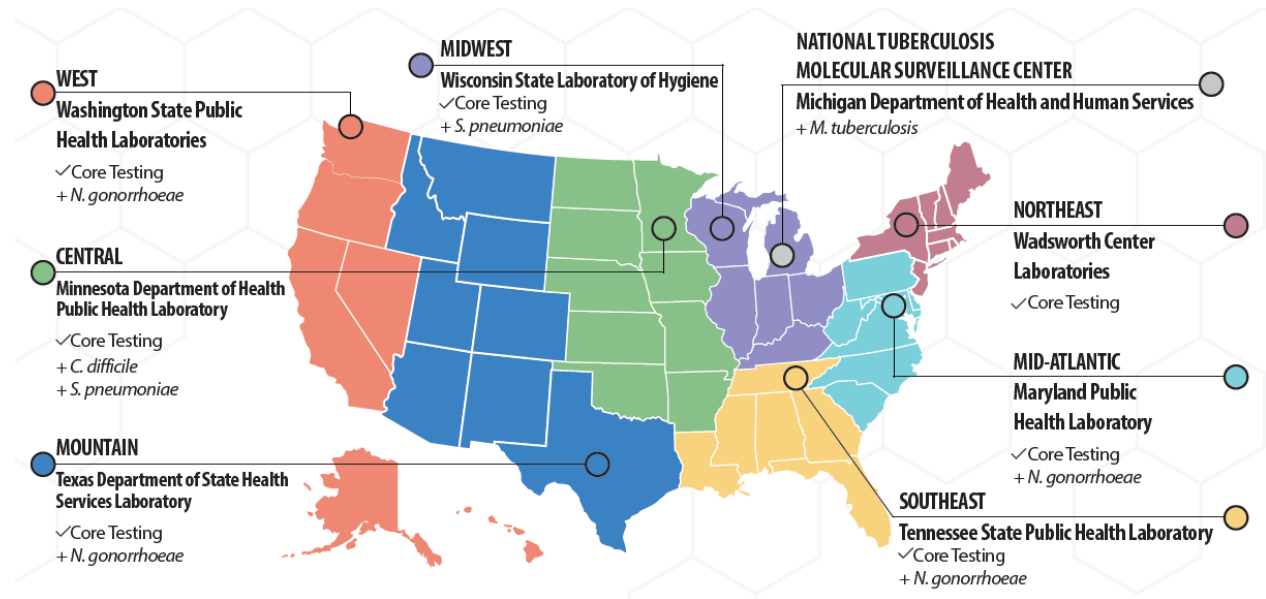
- Xpert Carba-R Assay

- 1 Use Cepheid Collection Device #900-0370 to collect the specimen.

- 2 Carefully insert both swab tips approximately 1 cm beyond the anal sphincter and rotate gently.

- 3 Place the swab pair back into the original transport tube.

- 4 Swabs in the transport tube can be stored at 15-28°C for up to five days.


© 2016 Cepheid In Vitro Diagnostic Medical Device IVD 301-6980, Rev. A October 2016 Cepheid. A better way.

Screening process

- Work with IDOH to determine who will be screened and when:
 - Testing laboratories have limited capacity and stick to a strict schedule
- IDOH will order kits from the AR Lab Network (ARLN) Wisconsin
- Kits can be shipped to either IDOH directly or to the facility where screening is to occur



Questions?

CONTACT:

Hannah Gallion

AR Epidemiologist

hgallion@isdh.in.gov

317-233-1306

