CPO Special Edition

HAI High Sign *Special Edition*

Carbapenemase-Producing Organisms

News from the Virginia Department of Health

Healthcare-Associated Infections and Antimicrobial Resistance Program

In this issue:

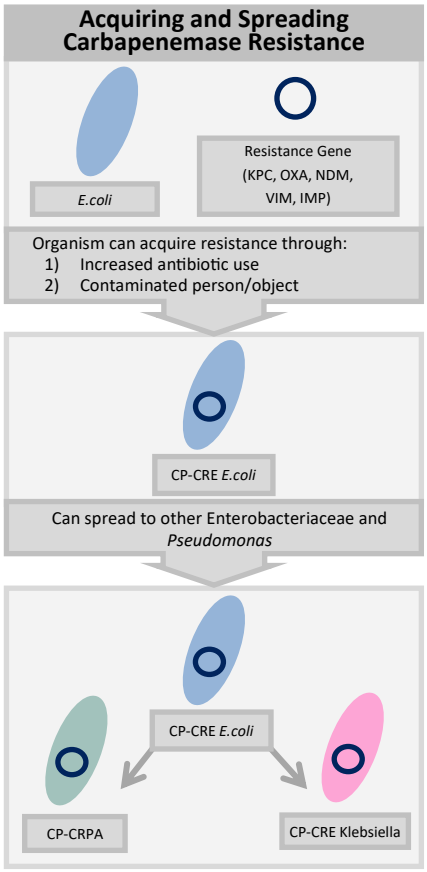
The Problem with Carbapenemase-Producing Organisms (CPOs)

Every year about 2 million Americans get infections from antibiotic resistant germs, and more than 23,000 die from their infections[1]. These germs can arise from one of four resistance mechanisms: 1) Destruction of the antibiotic (e.g., carbapenemases), 2) Efflux pumps, 3) Target site alteration, or 4) Decreased permeability of the antibiotic. Carbapenemases are concerning because the carbapenemase production gene is encoded on a bacterial plasmid that can easily transfer between organisms, allowing resistance to spread silently and quickly. **When carbapenem-resistant Enterobacteriaceae (CRE) and carbapenem-resistant *Pseudomonas aeruginosa* (CRPA) produce carbapenemases, they are referred to as CP-CRE and CP-CRPA**. These infections can easily spread from patient to patient, and from facility to facility. With no treatment options, these infections are the most serious antibiotic resistant infections and can often lead to death. VDH is committed to preventing CPOs.

[1] Antibiotic/Antimicrobial Resistance. Atlanta (GA): Centers for Disease Control and Prevention. 2018. https://www.cdc.gov/drugresistance/index.html

Known Carbapenemase Resistance Genes

1. *Klebsiella pneumoniae* carbapenemase (KPC)
2. Oxacillinase carbapenemase (OXA)
3. New Delhi metallo-beta-lactamase (NDM)
4. Verona Integron-encoded metallo-beta-lactamase (VIM)
5. Imipenemase metallo-beta-lactamase (IMP)



To prevent MDROs the CDC Containment Strategy should be utilized.

The Containment Strategy has been recommended and used in all healthcare settings.

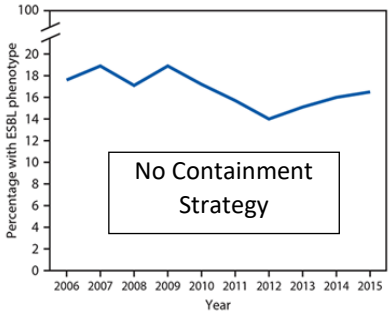
Isolate Submission and Reportable Diseases

As of November 2018, all CPO infection and colonization must be reported to the local health department. For more information on the reportable disease regulations and reporting CPOs, please visit the VDH webpage on CPO reporting interpretive guidance.

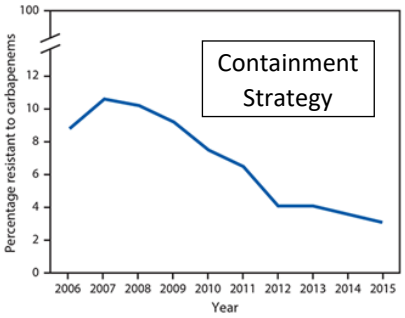
The Containment Strategy for MDROs

Evidence the Containment Strategy Works

According to the 2018 *CDC Vital Signs* report, National Healthcare Safety Network (NHSN) data from the CDC show increased detection and aggressive early response decreases antibiotic resistance threats compared to a non-aggressive strategy.



% *E. coli* and *K. pneumoniae* isolates from selected HAIs with ESBL phenotype reported as non-susceptible to extended-spectrum cephalosporins



% *E. coli* and *K. pneumoniae* isolates from selected HAIs reported as resistant to a carbapenem

What is the Containment Strategy?

Goal

- Slow spread of novel or rare multidrug-resistant organisms or mechanisms

Response

- Systematic, aggressive response to a SINGLE case of high concern of antimicrobial resistance

Approach

- Response activities are tiered (see below) based on organism/mechanism attributes

CPO Tiers

Tier 1

CDC Definition

- Resistance mechanisms novel to the U.S.
- Organisms for which no current treatment options exist (pan-resistant) that have potential to spread within a region

In Virginia:

- Novel resistance mechanisms
- Pan-resistant isolates

Tier 2

CDC Definition

- MDROs primarily found in healthcare settings but not found regularly in the region; organisms might be found more commonly in other areas in the U.S.

In Virginia:

- CP-CRE with NDM, VIM, IMP, OXA
- CP-CRPA with KPC, NDM, VIM, IMP, OXA

Tier 3

CDC Definition

- MDROs that are already established in the U.S. and have been identified before in the region but are not thought to be endemic

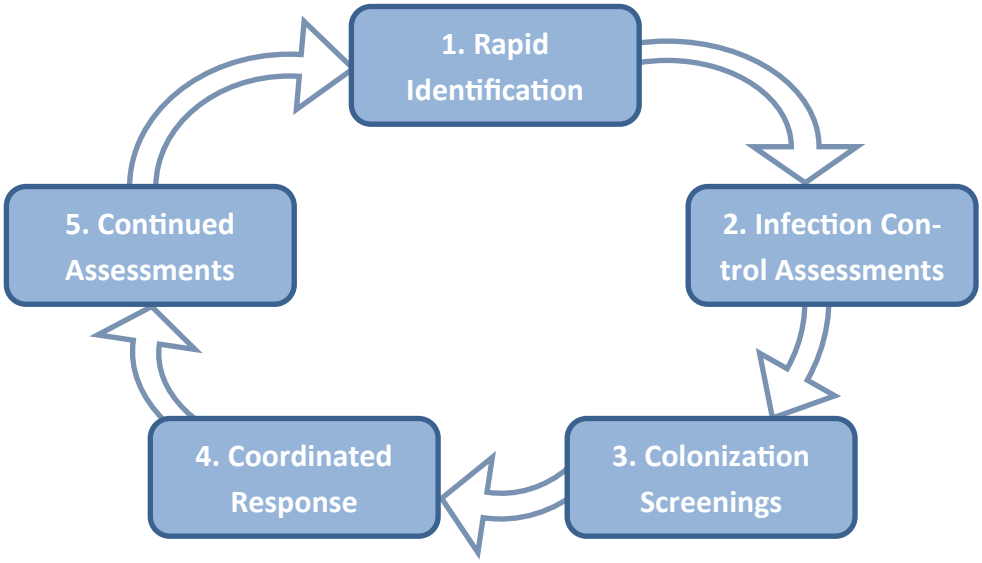
In Virginia:

- CP-CRE with KPC

The Containment Strategy for CPOs

Containment Strategy in Practice for CPOs

For CRE alone, the CDC estimates the Containment Strategy can reduce infections by 76%. It includes five elements:

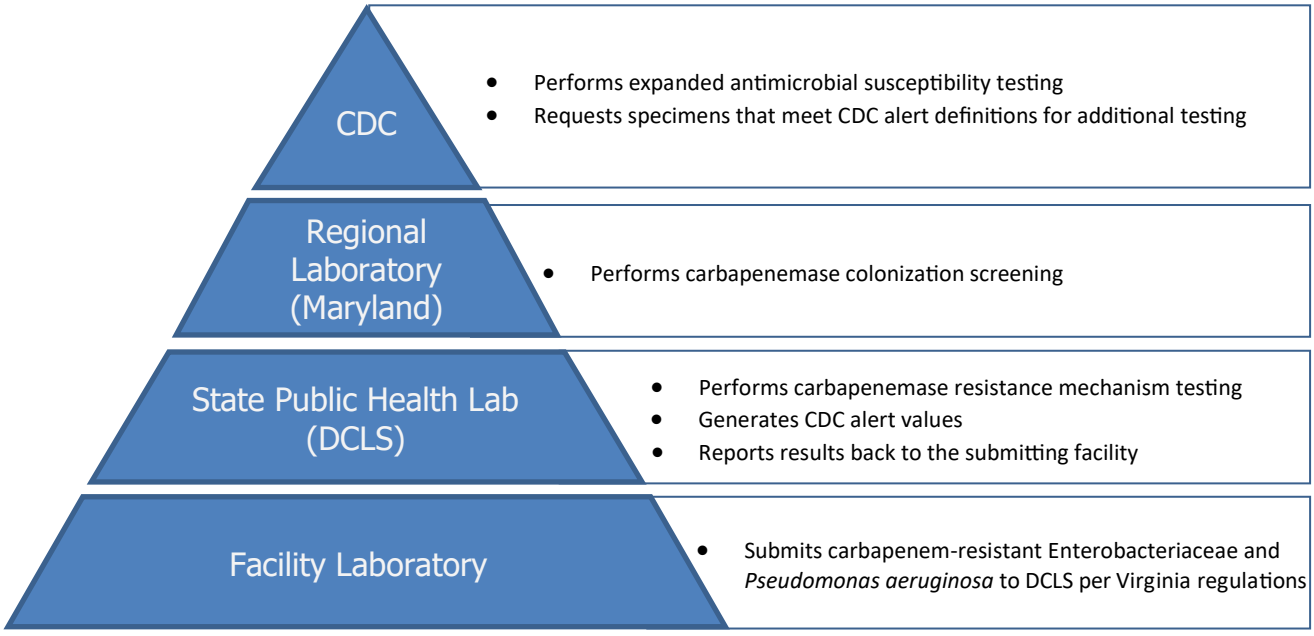


1. Rapid Identification

The CDC established the Antibiotic Resistance (AR) Lab Network, in 2016 to:

- Rapidly detect antibiotic resistance in healthcare and the community
- Provide comprehensive lab capacity and infrastructure for AR pathogens
- Prevent spread of future AR threats

The AR Lab Network includes labs in 50 states, five large cities, Puerto Rico, seven regional labs, and CDC.



See the DCLS CRE CRPA Testing Instructions for more guidance on DCLS Testing.

2. Infection Prevention Assessments

Infection Prevention is an important strategy to stop the transmission of CPOs. Facility infection prevention policies should include the following:

Infection Prevention	Acute Care Facility		Long-Term Care Setting	
	Infected	Colonized	Infected	Colonized
Standard Precautions	Yes	Yes	Yes	Yes
Contact Precautions	Yes	Yes	Yes	Yes, if high risk for transmission*
Private Room	Yes	Yes	Yes	Yes, if feasible
Door signage	Yes	Yes	Yes	Yes
Designated or disposable equipment	Yes	Yes	Yes	Yes
Visitor Recommendations				
Perform hand hygiene often, and always after leaving resident's room	Yes	Yes	Yes	Yes
Wear gown/gloves if contact with body fluids is anticipated	Yes	Yes	Yes	Yes
Wear gown/gloves if no contact with body fluids is anticipated	No	No	No	No

*Unable to perform hand hygiene, ventilator-dependent, incontinent of stool or urine, dependent on staff for activities of daily living (ADLs), draining wounds

Infection Prevention assessments should be completed by the facility on a regular basis to help identify and correct any gaps.

When a **Tier 1 or Tier 2 Organism is Identified** the CDC recommends:	Health departments or other experts **should** conduct on-site visits to facilities and use a standardized assessment tool to evaluate infection control practices at facilities that have cared for the index patient.
When a **Tier 3 Organism is identified and transmission is occurring** the CDC recommends:	Health departments or other experts **should consider** conducting on-site visits to facilities and use a standardized assessment tool to evaluate infection control practices at facilities that have cared for the index patient.

VDH uses the CDC Infection Prevention Assessment Tools when conducting on-site visits.

3. Colonization Screenings

The purpose of screening is to identify asymptomatic carriers so that additional control measures (e.g., contact precautions) can be put into place. The rationale for this testing is that clinical testing might only identify a small proportion of patients who are colonized. Screening typically involves collecting and testing rectal swabs.

Screening can involve: screening contacts; conducting a point prevalence survey; or conducting admission screening.

Admission Screening

1. Recommended for patients coming from high risk facilities. (e.g., ventilated skilled nursing facilities, and long-term acute care hospitals)
2. Recommended for patients admitted overnight to healthcare facilities in countries outside the United States in the last 12 months.

Contact Investigation Screening

When CPOs are identified in a facility, **the facility should work with the local health department** to identify patients who should be screened. This is available through the AR Lab Network at no charge to the patient or facility.

Algorithm for approach to contact investigation screening:

Source patient with target multidrug resistant organism on contact precautions for entire stay?

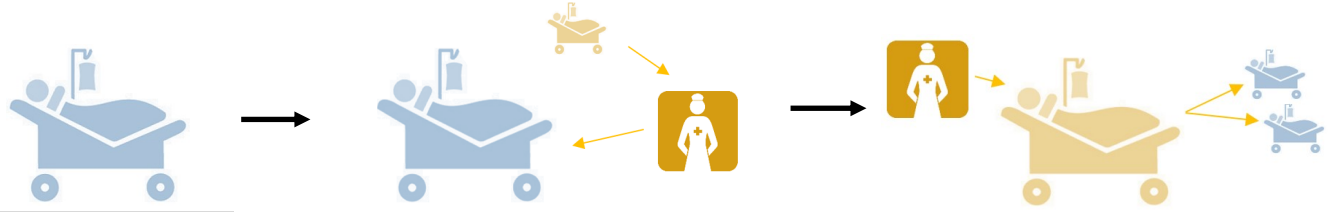
- Yes, on contact precautions for entire stay
  - If patient had adequate infection prevention and adherence to contact precautions verified through infection prevention assessment, then:
    - **Novel Resistance Mechanism**
      1. Screen Roommates and patients that shared a bathroom with index patient
      2. Broader contact screening is recommended*
    - **Pan Resistance or Non-KPC CP-CRE or CP-CRPA**
      1. Screen Roommates and patients that shared a bathroom with index patient
      2. Screening contacts is generally not recommend, but could be considered in specific instances*
  - If patient had inadequate infection prevention or adherence to contact precautions, then:
    - **KPC CP-CRE**
      1. Screen Roommates and patients that shared a bathroom with index patient
      2. Broader contact screening is not recommended
- No, not on contact precautions for entire stay
  - **Novel Resistance Mechanism, or Pan Resistance, or Non KPC-CP-CRE or CP-CRPA**
    1. Screen Roommates and patients that shared a bathroom with index patient
    2. Broader contact screening is recommended*
  - **KPC CP-CRE**
    1. Screen Roommates and patients that shared a bathroom with index patient
    2. Screening contacts is generally not recommend, but could be considered in specific instances*

Wider screenings are necessary if ongoing transmission is identified.
Please contact your local health department to coordinate screening healthcare contacts.

* see CDC Containment Strategy

4. Coordinated Response Between Facilities

CPOs can spread rapidly to other facilities. Infection prevention information should be transferred **with the patient at the time of transfer** to ensure the accepting facility is implementing the correct measures. The CDC Interfacility Infection Control Transfer Form can be used if no other form is currently being used at the facility. You can find the form here: https://www.cdc.gov/hai/pdfs/toolkits/InfectionControlTransferFormExample1.pdf



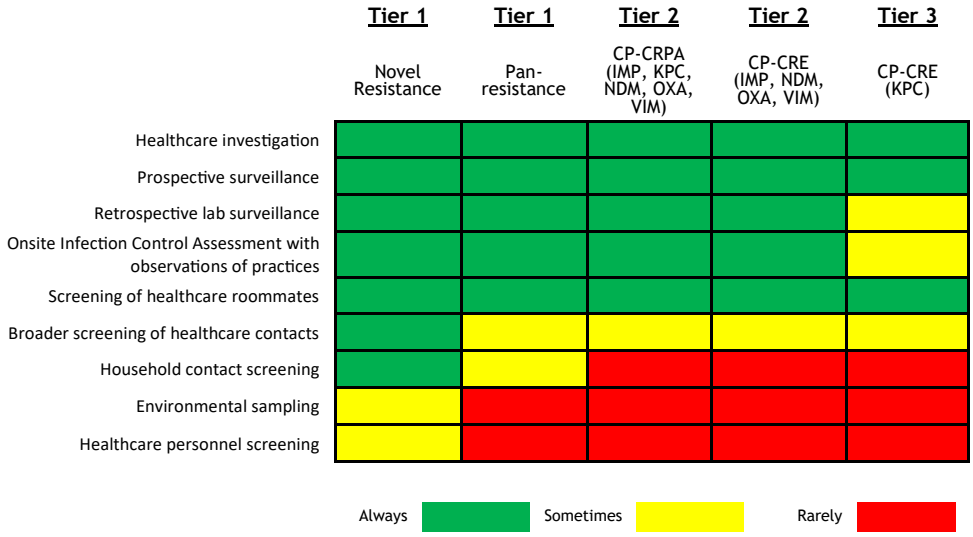
Patient is admitted to Hospital A. Patient is stable but needs long-term critical care.

Other patients at this facility have CRE. A nurse doesn't wash her hands, and CRE is spread to the patient. The patient develops a fever and is transferred to Hospital B.

The doctors at Hospital B are unaware patient has CRE so appropriate infection prevention measures are not followed. The patient spreads CRE to roommates.

5. Continued Assessments and Screenings

Once a CPO is detected in a facility, be on high alert for transmission. Remind the laboratory to continue to send CRE and CRPA isolates to DCLS for mechanism testing. Continue to work with your local health department on enhanced surveillance and response.



Summary

- Facilities are required to submit all their CRE and CRPA isolates to DCLS for testing and report CPO infection
- Facilities should communicate and collaborate with the health department when CPOs are identified
- A coordinated approach between healthcare providers/facilities and public health is necessary to help decrease antibiotic-resistant threats

More Detailed Guidance

CDC Containment Strategy

CDC CRE Toolkit

VDH CRO Page

Healthcare-Associated Infections (HAI) and Antimicrobial Resistance (AR) Program

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