

# **Toolkit for Response to Antimicrobial- Resistant Organisms in Healthcare Facilities**

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**pennsylvania**

DEPARTMENT OF HEALTH  
BUREAU OF EPIDEMIOLOGY

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*Please note that page numbers are not included throughout the toolkit because individual documents are designed to be distributed or used together or as stand-alone resources. Please use your pdf viewing software to find documents by page number.*

# Introduction

This toolkit provides a comprehensive set of materials for public health professionals responding to outbreaks, clusters or single cases of novel or high concern antimicrobial-resistant organisms in healthcare facilities.

The toolkit contains materials developed by the Pennsylvania Department of Health, Bureau of Epidemiology Healthcare-associated Infection Prevention/Antimicrobial Stewardship (HAIP/AS) program based on established best practices, conversations with the Centers for Disease Control and Prevention (CDC) and other state and local health departments, and two key publications on containment of novel and high-concern organisms:

**Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms (MDROs)** (January 2019)

Available at: <https://www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf>

**Facility Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE) – November 2015 Update CRE Toolkit.** Available at:

<https://www.cdc.gov/hai/pdfs/cre/CRE-guidance-508.pdf>

Other supporting materials for investigation of novel and high concern organisms can be found on the HAIP/AS website. These include:

**CDC Frequently Asked Questions (FAQs) and Example Verbal Scripts to Request Assent for Multidrug-Resistant Organism (MDRO) Screening.**

Available at: <https://www.cdc.gov/hai/downloads/Screening-FAQs-verbal-consent-example.docx>

**PA DOH Educational Presentations, “Carbapenem-resistant Enterobacteriaceae (CRE) Investigations”, Parts 1 and 2** (2018). Available at:

<https://www.health.pa.gov/topics/programs/HAIP-AS/Pages/Public-Health.aspx>

Public health response to novel and high concern organisms is a rapidly changing field, and the Toolkit will be updated frequently to reflect changing priorities and strategies. Please refer to the CDC website (<https://www.cdc.gov/hai/containment/guidelines.html>) and the HAIP/AS program website (<https://www.health.pa.gov/topics/programs/HAIP-AS/Pages/HAIP-AS.aspx>) for the most updated information.

# Materials for Public Health Professionals

The following materials are written for a public health audience and are designed to guide investigation and response. They are not designed to be shared with healthcare facilities or the public.

For Tier 3 organisms in long-term care facilities, the sample letter for a facility with one case is available on the HAIP/AS website in Word version. It is designed to be edited and signed for each individual investigation. It is included in this toolkit as a reference.

## Public health response to novel or targeted HAI organisms in PA: Current guidance for determination of response ‘Tier’

The guidelines below were developed by the Department of Health, Bureau of Epidemiology (BOE) based on assessment of the current available data on multidrug-resistant organisms in Pennsylvania. They are subject to change and should not be used to guide response outside the commonwealth.

Please refer to the CDC guidance entitled, “Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms (MDROs)” to determine the appropriate public health response to novel or targeted organisms, based on the Tier designation suggested below. This guidance is available at:

<https://www.cdc.gov/hai/pdfs/containment/Health-Response-Contain-MDRO-H.pdf>

Bacterial species or organism type	Resistance mechanism	Response Tier
Enterobacteriaceae, any	KPC NDM Eastern & Central PA	Tier 3
Enterobacteriaceae, any	NDM Western PA IMP OXA-48 VIM Any mcr gene	Tier 2*
<i>Pseudomonas</i> spp., carbapenemase-producing	Any	Tier 2*
<i>Acinetobacter</i> spp., carbapenemase-producing	OXA-23, OXA-24, OXA-40	Tier 3
<i>Acinetobacter</i> spp., carbapenemase-producing	Any other than those listed above	Tier 2*

Bacterial species or organism type	Resistance mechanism	Response Tier
<i>Candida auris</i>	n/a	Tier 2 <sup>b</sup>
Pan-drug resistant organism (PDRO), defined as non-susceptible to all available antibiotics. Determination <u>must</u> be made by public health laboratories.	Any	Tier 1*
VRSA	n/a	Tier 2*
Novel mechanism of resistance	Any	Tier 1*

\*Tier 1 and Tier 2 organisms should be reported *immediately* to the local health jurisdiction and the PA Department of Health Bureau of Epidemiology by calling 717-787-3350.

<sup>b</sup>Any *Candida* spp. that may represent misidentification of *C. auris*, such as *Candida haemulonii* (see <https://www.cdc.gov/fungal/candida-auris/recommendations.html>) should also have preliminary investigation steps completed while awaiting confirmation. Please consult with BOE.

Please contact the Healthcare-associated Infection Prevention/Antimicrobial Stewardship (HAIP/AS) team with questions by calling 717-787-3350 or emailing [RA-DHHAI@pa.gov](mailto:RA-DHHAI@pa.gov).

More information can be found at: <https://www.health.pa.gov/topics/programs/HAIP-AS/Pages/HAIP-AS.aspx>

# Containment Checklist for Public Health

For use by public health staff during the investigation of suspected or confirmed carbapenemase-producing organisms (CPO), including carbapenem-resistant Enterobacteriaceae (CRE) or carbapenemase-producing carbapenem-resistant Enterobacteriaceae (CP-CRE).

## Epi Details – Clinical and Travel History

- Obtain details about the patient's clinical needs
  - Is the patient bed bound?
  - Does the patient require respiratory care?
  - Does the patient require wound care?
  - Does the patient require any indwelling devices?
  - Any bowel or bladder incontinence? Any catheter? If yes, what type?
  - How dependent is the patient on healthcare personnel for bathing, toileting, etc.?
- Determine the recent healthcare exposures and travel history of the patient (within 6 months)
  - Is the patient currently hospitalized? Was the patient transferred from a nursing home? It is critical to gather any healthcare exposures 30 days prior to the positive culture to the time of identification.
  - Has the patient travelled or received medical care abroad in the last 6 months? If yes, obtain dates and description.
- Verify if patient had a roommate during any recent inpatient healthcare
  - It is critical to gather roommate information in the 30 days prior to the positive culture until the present to assist in screening decisions.
  - If the suspected or confirmed CPO case had a roommate, screening of the roommate may be required. Obtain the dates (start date to end date) of when the roommate was present.
  - In some cases, patients have been found to have had more than one roommate. In that case, information on all roommates, the dates they were roomed together, and the current whereabouts of the roommates will be helpful to determine if screening should occur and if it will be feasible.
  - Work with the Healthcare-associated Infection Prevention/Antimicrobial Stewardship (HAIP/AS) team to determine if screening is appropriate and to coordinate screening through a public health laboratory that can conduct mechanism testing. Note that this screening will use specific swabs provided by BOL and will be conducted at no cost to the facility.

## Communication

- Facilities that are transferring patients colonized or infected with a CPO must notify the receiving facility of the patient's status to ensure that appropriate infection prevention measures can be promptly implemented upon the patient's arrival
  - Use of an Inter-Facility Transfer Form will aid in this effort. Examples are provided by CDC: [https://www.cdc.gov/hai/prevent/prevention\\_tools.html](https://www.cdc.gov/hai/prevent/prevention_tools.html)
- Confirm that the patient's charts have been flagged to guarantee that the patient's status is communicated effectively

## Surveillance

- A retro micro review for additional CRE/CP-CRE should be conducted among all recent healthcare facilities where the patient received overnight health care in the 30 days prior to the positive culture  
Note: The review should look back over the last 3 months.
- Prospective surveillance should be ongoing for 3 months from the date of the positive culture to look for additional CRE/CP-CRE among all recent healthcare facilities where the patient received overnight care in the 30 days prior to the positive culture until the patient's organism and/or gene is contained (i.e., patient is placed on contact precautions in a private room)

## Containment and Prevention

- The patient should be placed on contact precautions in a private room, if available
  - If a private room is not available, the suspected or confirmed CPO case may be placed with another patient that requires minimal support from healthcare personnel. Clinically-dependent patients should not be paired with a suspected or confirmed CPO case.
- Inpatient health care settings managing a suspected or confirmed CPO should implement the guidance in the CDC CRE Toolkit about the following facility-level strategies:
  - Hand Hygiene
  - Contact Precautions
  - Healthcare Personnel Education
  - Minimize Device Use
  - Timely Laboratory Notification
  - Inter-facility Communication
  - Antimicrobial Stewardship
  - Environmental Cleaning
  - Patient and Staff Cohorting
  - Screening Contacts of CRE Patients (in consultation with HAIP/AS)
  - Active Surveillance Testing (as appropriate)
  - Chlorhexidine Bathing (as appropriate)

## Monitoring and Tracking

- Enter in REDCap in real-time on the date of notification (if this is part of your role)
  - Complete the initial case report form. The additional case report forms may be completed as more information becomes available.
- Create a folder on the N Drive for HAI Investigations to document notes, lab results, line lists, timelines, etc.
- Enter in PA-NEDSS as appropriate

## **QUICK GUIDE: CARBAPENEMASE-PRODUCING CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CP-CRE)**

### **GENERAL INFORMATION AND COURSE OF DISEASE**

**Infectious Agent:** Enterobacteriaceae are a family of bacteria that include *Klebsiella*, *Enterobacter*, and *Escherichia* species, among others. Carbapenems are a class of antibiotics that are powerful and often used as the last line of treatment. They include imipenem, doripenem, ertapenem, and meropenem. CRE stands for Carbapenem-resistant Enterobacteriaceae and refers to any organism in the Enterobacteriaceae family that also demonstrates laboratory evidence of resistance to one or more carbapenem antibiotic.

There are several mechanisms by which these organisms can become resistant to carbapenems. One such mechanism is through the production of carbapenemases. Carbapenemases are enzymes that can break down carbapenem antibiotics. Certain bacteria have genetic material that produces the carbapenemase enzyme, making them resistant to carbapenem antibiotics. These carbapenemase-producing carbapenem-resistant Enterobacteriaceae (CP-CRE) have great public health significance because the genetic element on the plasmid allows resistance to spread very rapidly from organism to organism and easily from person-to-person. There are several known types of carbapenemases including *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo- $\beta$ -lactamase-type 1 (NDM-1), Verona integron encoded metallo- $\beta$ -lactamase (VIM), imipenemase metallo- $\beta$ -lactamase (IMP), and oxacillinase-48 (OXA-48). Currently, KPC is the most widespread carbapenemase in the United States.

NOTE: *Acinetobacter* and *Pseudomonas* spp. are not in the Enterobacteriaceae family and therefore are not specifically addressed in this Quick Guide. However, they are frequent causes of healthcare-associated infections, and may also produce carbapenemases. Most of the public health response(s) to carbapenem-producing *Acinetobacter* or *Pseudomonas* spp. are the same as for CP-CRE.

**Mode of Transmission:** Transmission of CP-CRE can occur whether a person is infected or colonized with CP-CRE, therefore the containment strategy will be applied to both. CP-CRE are transmitted via direct contact with an affected person or by contact with body fluids, especially those from wound drainage or stool. Transmission can occur through contact with contaminated materials or equipment and spread by healthcare worker hands.

**Incubation Period:** The incubation period is not defined, particularly due to the ability of CP-CRE to colonize an individual for an extended time.

**Symptoms:** Enterobacteriaceae can cause a range of clinical infections and are a major cause of healthcare-associated infections as well as community-acquired infections, such as urinary tract infections (UTI), bloodstream infections (BSI), surgical site infections (SSI), and intra-abdominal infections. Colonization may also occur, if this happens a person will be asymptomatic.

**Duration:** Colonization with CP-CRE is likely to persist indefinitely; therefore, prevention measures should be immediate and consistent any time a person with CP-CRE is admitted to an inpatient healthcare facility.

**Communicability:** CP-CRE can potentially be transmitted as long as the organisms are present in a person's bodily tissues or fluids. Colonization with these bacteria does not require treatment, though similar infection control precautions apply to colonized persons. Colonized patients are at risk for invasive infection from their own endogenous colonization.

**Treatment:** CP-CRE are often resistant to antibiotics that would commonly be prescribed to treat Enterobacteriaceae infections. Therefore, laboratory tests (antibiotic susceptibility testing, also known as AST) should be done to determine which antibiotics will be effective in treating CP-CRE infections. Colonized persons who carry CP-CRE, but do not have symptoms of infection, should not receive treatment in most circumstances because currently there is no eradication protocol.

**Complications:** CP-CRE infections occur most frequently among persons with prolonged hospitalizations, those who are chronically or critically ill, or are exposed to invasive devices such as ventilators, urinary catheters, or central venous catheters. These infections are more difficult to treat and are associated with increased morbidity and mortality, healthcare costs and length of stay in healthcare facilities compared to infections caused by non-carbapenem-resistant Enterobacteriaceae.

**Prevention:** CRE and CP-CRE patients should be placed on contact precautions in a private room to reduce the risk of spreading antimicrobial resistant bacteria. Additional prevention measures are addressed in the CDC Containment Strategy which may include enhanced surveillance, colonization screening, infection control assessment, etc. It is critical that each response is individually assessed on a case-by-case basis to determine the appropriate prevention and control measures. Also, it should be noted that antimicrobial stewardship activities are critical to the prevention of CRE and CP-CRE.

## **CASE DEFINITION**

### **Carbapenemase Producing Carbapenem-Resistant Enterobacteriaceae (2018) (see: [CP-CRE | 2018 Case Definition](#) )**

**Clinical criteria:** Patients can be infected or colonized. In general, CP-CRE can cause bloodstream infections, ventilator-associated pneumonia, wound infections and intra-abdominal abscesses, or urinary tract infections.

**Laboratory criteria:** CRE are Enterobacteriaceae that are:

- Resistant to any carbapenem antimicrobial (i.e., based on 2010 Clinical and Laboratory Standards Institute (CLSI) revised breakpoints of minimum inhibitory concentrations of  $\geq 4$  mcg/ml for doripenem, meropenem, or imipenem OR  $\geq 2$  mcg/ml for ertapenem)

OR

- Documented to produce a carbapenemase

To document carbapenemase production, laboratories will need to conduct specialized testing which determines at least one of the following:

- Positive for known carbapenemase resistance mechanism (e.g., KPC, NDM, VIM, IMP, OXA-48) demonstrated by a recognized test (e.g., PCR, Xpert Carba-R);

**-OR-**

- Positive on a phenotypic test for carbapenemase production (e.g., metallo- $\beta$ -lactamase test, modified Hodge test, Carba NP, Carbapenem Inactivation Method [CIM], or modified CIM [mCIM]).

PA-NEDSS initial and final condition: The initial condition is Carbapenemase-producing organism (CPO) and after investigation, a final condition will be assigned that aligns with the reporting requirements for nationally notifiable diseases, following species identification. The final conditions include:

- CP- Enterobacter spp
- CP- Klebsiella spp
- CP- E Coli
- CP- Pseudomonas aeruginosa
- CP- Other organism

## **RELEVANT LABORATORY INFORMATION**

Testing for carbapenemases is not routinely conducted. Most laboratories are not able to test for carbapenemase production, therefore public health resources including the PA-Bureau of Laboratories (PA-BOL), and the Regional Antibiotic Resistance Laboratory Network (ARLN) Laboratory in Maryland will need to be utilized. Approval for isolate confirmation and mechanism testing (i.e. identifying the carbapenemase) should be coordinated via the Bureau of Epidemiology's Healthcare-associated Infection Prevention/Antimicrobial Stewardship (HAIP/AS) team.

## **CASE INVESTIGATION**

- Initiate investigation within one day of report. The containment strategy is the same for both infected and colonized patients.
- Print the PA-NEDSS template questionnaire for a carbapenemase-producing organism (if desired). There are critical epidemiological details including laboratory results, health care exposures (e.g., hospital, nursing home, rehab, personal care home) and travel history that should be obtained by the investigator to help drive public health action. You may find that a carbapenemase test was reported in PA-

NEDSS but no bacterial species. Species information should be sought during investigation.

- If mechanism testing has not yet been conducted on a carbapenem-resistant organism, coordinate mechanism testing in consultation with the HAIP/AS team.
- Use the DOH guidance entitled, “Public health response to novel or targeted HAI organisms in PA: Current guidance for determination of response ‘Tier’” to determine Tier. If Tier 1 or 2, notify the HAIP/AS team immediately by emailing [RA-DHHA1@pa.gov](mailto:RA-DHHA1@pa.gov) (external partners) or [DH-HA1alert@pa.gov](mailto:DH-HA1alert@pa.gov) (internal to PA DOH). Determine what public health action is needed; refer to MDRO resources to develop an action plan.
- Follow guidance provided by the HAIP/AS team as the response to each of these CRE/CP-CRE or CPO cases will be customized based on the circumstances that are identified through the case investigation.
- Assign case classification and submit for review.

### **OUTBREAK PREVENTION**

Goals of prompt response and containment should include:

1. Ensuring appropriate control measures are promptly initiated/implemented to contain potential spread
2. Characterizing the organism and/or gene of interest to guide further response actions, patient management, and future responses; and
3. Identifying if transmission/dissemination is occurring and determining if Pennsylvania health care facilities are prepared to respond to and contain carbapenemase-producing organisms

### **RESOURCES**

[CDC CRE Toolkit](#)

[Interim Guidance for a Public Health Response to Contain Novel and or Targeted Multidrug-Resistant Organisms](#)

[AHRQ CRE Control and Prevention Toolkit](#)

[CDC's Containment Strategy](#)



[DATE]

[Name, Title]  
[Name of Facility]  
[Address 1]  
[Address 2]

Dear [Addressee],

The Pennsylvania Department of Health (Department), Bureau of Epidemiology recently became aware of a report of carbapenemase-producing carbapenem-resistant Enterobacteriaceae (CP-CRE) in a resident of your nursing home facility (hereafter referred to as index resident).

**Containment of resistant organisms such as CP-CRE is a national problem and requires that health care facilities and public health agencies work together to prevent transmission. CP-CRE is particularly important to track, monitor and prevent due to its highly resistant nature, high mortality rates among infected persons, and increased likelihood of transmitting genetic material that confers antibiotic resistance to previously susceptible organisms. It is imperative to understand that identification of CP-CRE among a single resident requires public health action.**

The Centers for Disease Control and Prevention (CDC) has published a containment strategy specifically designed to reduce the transmission of CP-CRE in the United States (2019). The Department supports this strategy for the safety of Pennsylvania patients and residents. The containment strategy guides public health and facility interventions by categorizing CP-CRE into three different Tiers. The specific gene of interest, or carbapenemase producer, that was recently identified in a resident of your facility is known as *Klebsiella pneumoniae* carbapenemase (KPC) and is considered a Tier 3 organism in Pennsylvania.

The purpose of this letter is to provide you with recommended actions your facility should take in response to the identification of a resident with a Tier 3 organism. The Department recommendations emphasize the importance of infection control practices and other prevention activities to reduce the spread of CP-CRE in nursing homes. **Please see the attached facility-level recommendation checklist.** The purpose of the checklist is to assist facilities in the implementation of communication strategies, detection protocols, targeted screening practices and prevention activities.

**Both colonized and infected persons can spread CP-CRE, and colonization can persist for many years. Therefore, it is important to maintain infection prevention and control measures, including contact precautions (i.e. gown and gloves), for the duration of a resident's stay.** There is no evidence that treatment will eradicate CP-CRE colonization, and persons who are colonized should not receive treatment.

We appreciate your commitment to infection control and prevention and your dedication to the well-being of your residents and staff. If you have any questions regarding this information, please do not hesitate to contact [insert appropriate district staff names and contact info].

Thank you for your cooperation.

Sincerely,

Sharon Watkins, PhD  
State Epidemiologist  
Director, Bureau of Epidemiology

## Facility-Level Recommendation Checklist

### 1. Communication strategies

- Promptly notify the index resident's primary caregiver and other health care staff per facility policies/procedures. Inform the resident and family.
- Flag the medical chart with the resident's CP-CRE status. If possible, choose a CRE, MDRO, or other flag that indicates the resident should be on contact precautions.
- If the CP-CRE is suspected to have been present on admission, notify the transferring facility so that appropriate review can occur at that facility.
- When transferring the index resident to another facility, notify the receiving facility of the resident's CP-CRE status so that they may implement enhanced infection control measures. Use of an Inter-Facility Transfer Form will assist in this effort. Examples are provided by CDC: [https://www.cdc.gov/hai/prevent/prevention\\_tools.html](https://www.cdc.gov/hai/prevent/prevention_tools.html)

### 2. Detection protocols

- Conduct a retrospective microbiology review to identify any carbapenem-resistant Enterobacteriaceae (CRE)-positive culture from a resident of the facility. Retrospective microbiology review should extend from the date of the index resident's culture to at least three months prior.
- Conduct prospective surveillance for three months from the date of the index resident's culture. Track and report *any* CRE-positive culture from a resident of the facility. Instruct the laboratory to save any CRE isolates for potential advanced testing at the public health laboratory.

### 3. Targeted screening practices

- Determine if the index resident, at any time during their stay at your facility, had a roommate or sexual partner. Peri-rectal screening to look for CP-CRE colonization in roommates and sexual contacts is recommended. Screening specimens will be collected and sent to the public health laboratory, at no cost to the resident or facility. Screening will be facilitated by the Department.
- Determine if the index resident was on contact precautions during his or her stay at your facility. Report this information to the Department. Additional colonization screening may be indicated.

### 4. Prevention activities

- Place index resident in private room.
- Use contact precautions at all times for the index resident if he or she is ventilator-dependent, incontinent of stool that is difficult to contain, or has draining secretions or draining wounds that cannot be controlled. If the index resident is less dependent on health care personnel, modified contact precautions may be utilized based on the type of care the healthcare worker is expecting to perform. Please refer to CDC CRE Toolkit and the Department handout entitled, "Management of residents with confirmed CP-CRE or other resistant organisms" for more information. Discuss any modified approaches with the Department, which will provide scientific-based feedback to assure the approach will be sufficient to protect other residents of the facility.
- Provide formal re-education *to all staff* to include hand hygiene according to the [World Health Organization's My 5 Moments for Hand Hygiene](#), as well as proper use of Personal Protective Equipment (PPE)/contact precautions and how to manage residents with Multidrug-resistant Organisms (MDROs) to reduce the likelihood of transmission. To aid in education effort, utilize the DOH Alcohol-Based Hand Rub (ABHR) memo to emphasize that

ABHR is the preferred method for routine hand hygiene in health care settings, including LTCF.

- Ensure adequate opportunities exist to conduct hand hygiene (i.e. clean sinks that are not used for waste water are available for hand washing and alcohol-based hand rubs) and adequate supplies (e.g. towels, soap, etc.). Regular inventory of supplies is critical.
- Perform monthly hand hygiene audits on each floor or unit. If possible, consider a “secret shopper” approach so that staff do not necessarily know they are being observed. Audits should occur during day, night and weekend shifts.
- Provide formal education to environmental health staff to emphasize their critical role in disinfecting the environment and preventing transmission of CP-CRE.
- Perform daily environmental cleaning with an EPA-registered disinfectant among all high-touch surface areas (e.g., bed rails, phone or call bell, bathroom) to decrease the burden of organisms. It is critical to follow the manufacturer’s instructions of each product and to observe the appropriate contact time for the product to work effectively.
- A cleaning schedule should be available to ensure that all environmental health staff are aware of which persons are responsible for which items or areas and with what frequency items and areas are to be cleaned and disinfected.
  - Waste containers may require more frequent disposal due to the amount of PPE that may be required during resident care with CP-CRE residents.
- Perform regular environmental cleaning audits on each floor or unit. Audits should occur during all shifts and include observation of routine and terminal cleaning. CDC has created an Environmental Cleaning Checklist to assist with the auditing process for terminal cleaning: <https://www.cdc.gov/HAI/toolkits/Environmental-Cleaning-Checklist-10-6-2010.pdf>.
- As adjuncts to having a direct observation audit program for the environmental services staff, supplemental tools may be utilized to ensure that thorough cleaning and disinfection was conducted and to identify any susceptible areas including:
  - Blacklight monitoring with the use of Ultraviolet (UV) markers; and
  - ATP Monitoring System, which allows for the detection of adenosine triphosphate (ATP), the universal unit of energy in all living cells.

# Materials for Healthcare Facilities & the Public

The following materials may assist public health professionals with education and communication efforts during investigation and response. Please share with healthcare providers, facilities, and the public as needed.

## BACKGROUND

Enterobacteriaceae are a family of bacteria that are normally found in the human intestines. *Klebsiella*, *Enterobacter* and *Escherichia coli* (*E. coli*) are three of the well-known types of Enterobacteriaceae. When these bacteria spread outside the intestines and get into other areas of the body, they can cause serious infections such as urinary tract (kidney or bladder) infections, bloodstream infections, wounds or surgical site infections, pneumonia and meningitis.

Carbapenem antibiotics (imipenem, meropenem, doripenem, and ertapenem) are broad spectrum antimicrobials that are usually reserved for severe, life-threatening infections. However, some types of Enterobacteriaceae have developed resistance to carbapenems. These bacteria are called carbapenem-resistant Enterobacteriaceae (CRE).

Some CRE possess an enzyme called a carbapenemase (carbapenemase-producing CRE or CP-CRE) that directly breaks down carbapenem antibiotics. CP-CRE are a special type of CRE.

## WHO DOES THE ISSUE IMPACT?

Healthy people usually don't get CRE infections. In hospitals and other health care settings, certain patients are at higher risk of developing CRE infection. These include patients whose care requires medical devices such as ventilators (breathing machines), intravenous catheters, or urinary catheters, and patients who are taking antibiotics for a long time.

## HOW IS IT TRANSMITTED?

CRE bacteria are mostly spread through direct person-to-person contact, particularly contact with wounds or stool. In healthcare settings, CRE can be spread by the hands of healthcare workers and through contact with contaminated objects such as medical equipment, bed rails, doorknobs, computer keyboards, cleaning supplies, and sink drains. The bacteria are not spread through the air.

## WHAT ARE THE COMPLICATIONS?

CRE are often resistant to multiple classes of antibiotics substantially limiting treatment options. Infections caused by these organisms, particularly bloodstream infections, are associated with high rates of death, up to 50 percent.

## HOW DO I KNOW IF I HAVE IT?

The only way to identify a CRE infection is to collect and test appropriate specimens in the laboratory. For example, a doctor might collect a blood sample for testing if he or she thinks a person has a blood infection. The laboratory can also test to determine which antibiotic will be the most effective to treat the illness. This is how they will know that the bacteria are resistant to carbapenems.

## HOW IS IT TREATED?

Infections caused by CRE are often difficult to treat. Laboratory testing can determine which antibiotics are

effective for treatment. If your provider prescribes you antibiotics, take them exactly as instructed and finish the full course, even if you feel better.

Persons who are colonized might carry the CRE in their body and may never develop serious infections from it; thus, colonized individuals may not require any treatment. Decisions on treatment of infections with CRE should be made on a case-by-case basis by a healthcare provider.

## WHAT CAN YOU DO?

The best way to prevent the spread of CRE, and all infections, is to clean your hands often. This includes washing hands with soap and water or using an alcohol-based hand rub. Health care workers should follow specific infection control precautions. These might include wearing gowns and gloves when entering a room of patients with CRE.

Patients and health care workers should clean their hands often, including:

- Before preparing or eating food;
- Before touching their eyes, nose or mouth;
- After using the restroom;
- After blowing their nose, coughing or sneezing;
- Before and after changing wound dressings or bandages;
- Before and after glove use; and
- After touching hospital surfaces such as bed rails, bedside tables, doorknobs, remote controls or the phone.

Research has shown that alcohol-based hand rub is the most effective method for hand hygiene in health care settings and that it is also the least drying and least likely to lead to skin breakdown in health care workers. Therefore, alcohol-based hand rub is the preferred method for routine hand hygiene in health care settings.

## DISEASE PATTERNS

Most CRE infections occur in a health care setting. They are associated with high rates of death and have the potential to spread from person to person.

## RESOURCES FOR MORE INFORMATION

More information can be found by reviewing the World Health Organization's (WHO) My 5 Moments for Hand Hygiene guidance: <http://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/>

Centers for Disease Control and Prevention:  
<https://www.cdc.gov/hai/organisms/cre/index.html>.

*This fact sheet provides general information. Please contact your physician for specific clinical information.*

**If you have any questions, contact us at [RA-DHHAI@pa.gov](mailto:RA-DHHAI@pa.gov).**

## BACKGROUND

This frequently asked questions (FAQs) document is designed for residents, families of residents and staff of long-term care facilities. It is a supplement to the background information about CRE that is provided in the department Fact Sheet: Carbapenem-resistant Enterobacteriaceae.

### Q. WHY IS IT IMPORTANT TO KNOW IF A RESIDENT HAS A CARBAPENEMASE-PRODUCING ORGANISM (CPO)?

A. Carbapenemase-producing organisms (CPOs) are bacteria that have an enzyme called a carbapenemase that directly breaks down strong antibiotics called carbapenems. This means that carbapenem antibiotics can't be used to treat these infections. An infection with a CPO may be difficult to treat.

Additionally, the presence of a carbapenemase means that this resistance is easily spread from person-to-person within a healthcare setting.

### Q. WHAT KIND OF PRECAUTIONS SHOULD BE TAKEN WITH A PATIENT WHO HAS A CPO?

A. In long-term care facilities, it is recommended that residents with a CPO be placed in a private room, ideally with their own bathroom. Health care workers should follow specific infection control precautions. These might include wearing gowns and gloves when entering a room of these residents. This is called contact precautions. Health care workers should practice hand hygiene frequently, especially before and after patient contact and before and after using gloves.

### Q. IF SOMEONE IS COLONIZED WITH A CPO, ARE THEY ABLE TO SPREAD IT TO OTHERS, EVEN IF THEY DON'T HAVE AN INFECTION?

A. For CPOs, the risk of spreading the organism from person-to-person or person-to-environment is the same whether a person has an infection or is colonized with the organism.

### Q. IS THERE A TREATMENT THAT CAN BE GIVEN TO GET RID OF A CPO?

A. An infection should be treated by a medical provider as clinically indicated based on the results of antibiotic susceptibility testing. There is no known effective way to treat colonization with a CPO. Attempting to treat CPO colonization with antibiotics may put the patient at unnecessary risk for antibiotic complications and may promote growth of other harmful organisms.

## Q. DO FAMILY MEMBERS AND VISITORS NEED TO TAKE ANY SPECIAL PRECAUTIONS WHEN VISITING OR CARING FOR A RESIDENT WITH A CPO?

A. Family members and visitors should follow the policies of the facility. However, it is generally not necessary for them to wear gowns or gloves in the patient room unless they also visit with other residents in the facility (e.g. two family members are in the same facility). If the visitor is going to take an active role in the care of the resident, for example to help with toileting, the visitor should consult with the facility staff to determine if any extra precautions should be taken.

## Q. HOW LONG DOES A PERSON STAY COLONIZED WITH A CPO?

A. We don't know how long a person will stay colonized with a CPO. However, there have been circumstances where people were tested for a CPO over long periods of time. Sometimes the CPO colonization shows up in a waxing-and-waning pattern; one test will be negative, and then another test a few months later will be positive for a CPO. It has also been found that persons remain colonized over several years.

This information indicates that there is no reason to continue to test a person who is known to have had a CPO. It is assumed they will have the CPO for the remainder of their lives.

## Q. IF A PERSON WITH A CPO INFECTION IS TREATED, DO THEY STILL HAVE THE CPO?

A. Successful treatment of an infection with a CPO means that the clinical signs and symptoms of infection are gone. However, it is likely that the person will still be colonized with the CPO. Once a person has been identified as having a CPO, they should be considered colonized for the remainder of their lives.

## Q. IF MY FAMILY MEMBER WITH A CPO IS GOING HOME, IS THERE ANYTHING SPECIAL THAT NEEDS TO BE DONE AT HOME BECAUSE OF THIS INFECTION?

A. The risk of spreading a CPO outside the healthcare environment is low, and no special precautions will need to be taken by friends or family members in a private residence. Home care nurses or other staff should be made aware of the person's history of a CPO and may take additional precautions according to agency policy.

More information can be found at: <https://www.health.pa.gov/topics/programs/HAIP-AS/Pages/HAIP-AS.aspx>

**If you have any questions, contact us at [RA-DHHAI@pa.gov](mailto:RA-DHHAI@pa.gov)**

# Management of residents with CP-CRE or other resistant organisms

Supplemental Guidance for Long Term Care Settings

## Standard Precautions – All Resident Care

Standard Precautions are used for all resident care. They are based on a risk assessment and use common-sense practices and personal protective equipment to protect healthcare providers from infection and prevent the spread of infection from resident to resident.

This includes:

- Performing hand hygiene according to [World Health Organization \(WHO\) 5 moments for hand hygiene](#);
- Using Personal Protective Equipment (PPE) whenever there is the potential for exposure to infectious material;
- Following respiratory hygiene/cough etiquette standards;
- Properly cleaning and disinfecting patient care equipment, devices, and instruments;
- Properly cleaning and disinfecting the patient environment (including laundry and textiles); and
- Following safe injection practices and ensuring healthcare worker safety.

## \*\*\*Transmission-Based Precautions\*\*\*

Transmission-based precautions are the second tier of basic infection control and should be used to prevent infection transmission in addition to standard precautions for residents who may be infected or colonized with certain infectious agents.

### Contact Precautions

Use contact precautions for residents with known or suspected infections that represent an increased risk for contact transmission according to the HICPAC Guidelines for Isolation Precautions (2007).

Contact precautions are as follows:

- In long-term and other residential settings, make room placement decisions balancing risks to other patients. Preferably, residents on contact precautions will be in a private room.
- Use personal protective equipment (PPE) appropriately when entering the room, including gloves and gown. Putting on PPE upon room entry and properly discarding before exiting the patient room will help contain pathogens.
- Consider limiting transport of residents outside of the room to medically-necessary purposes. When transport is necessary, cover or contain the infected or colonized areas of the resident's body. Remove and dispose of contaminated PPE and perform hand hygiene prior to transporting residents on contact precautions. Put on clean PPE upon arrival at the destination if patient care is needed.
- Use disposable or dedicated patient-care equipment (e.g. blood pressure cuffs). If use of shared equipment for multiple residents is unavoidable, clean and disinfect such equipment before use on another resident.

- Prioritize cleaning and disinfection of the rooms of residents on contact precautions (at least daily or prior to use by another resident), focusing on frequently-touched surfaces and equipment in the immediate vicinity of the resident.

### Modified Contact Precautions

The Centers for Disease Control and Prevention (CDC) support modified contact precautions as outlined in the CDC CRE Toolkit for the management of Carbapenem-resistant Enterobacteriaceae (CRE) and Carbapenemase-producing carbapenem-resistant Enterobacteriaceae (CP-CRE).

In long-term care settings, the use of contact precautions should be guided by the potential risk that residents will serve as a source of transmission, based on their clinical status and the type of care or activity that is being performed. Modifications to any form of transmission-based precautions should be reflected in the facility policies and procedures prior to being implemented into practice.

Modifications may include:

- Placing residents ideally in a private room. If a private room is not available, decisions on placement need to be balanced and reasons for decisions documented. Residents with the same carbapenemase or resistance mechanism may be cohorted (e.g. a KPC+ resident may be roomed with another KPC+ resident). If there is only one resident requiring management with no private room available, then the resident may room with a resident who is less dependent on healthcare personnel (i.e. has a lower risk for acquiring the resistant organism).
- Using gowns and gloves based on the type of care provided. This consists of using gowns and gloves when there is potential for exposure to body fluids or there is a risk of the healthcare provider contaminating their clothing. High risk activities include: bathing; toileting; changing residents' briefs or soiled bedding; changing a wound dressing; and manipulating devices (e.g., urinary catheter). Gowns and gloves might not be needed if there is minimal potential for cross-contamination such as delivering a meal tray or entering the room without touching the resident or their immediate environment.
- Not requiring residents to have restricted movement if their bodily fluids are controlled. These residents can participate in all therapies and activities without restriction. Management of patients with CRE and CP-CRE should not prevent participation in the therapeutic plan.
- Scheduling residents requiring use of equipment or certain therapies (e.g. physical therapy) for the last appointment of the day, when a terminal cleaning of the equipment can be done after the therapy is complete.
- Keeping the same cleaning and disinfection as outlined in non-modified contact precautions. Adhere to cleaning the patient environment and ensuring that high-touch surfaces are properly maintained is critical to reducing the spread of unusual resistance.
- **SPECIAL NOTE: Modified contact precautions are not recommended for the following: residents who are ventilator-dependent (even if not in a ventilator unit); are incontinent of stool that is difficult to contain; have draining secretions or draining wounds that cannot be controlled.**

For complete details on these precautions and guidance on droplet and airborne precautions, view the following resources: [HICPAC Guidelines for Isolation Precautions](#) and [CDC CRE Toolkit](#)

## Alcohol-based Hand Rub Memo

The purpose of this communication is to promote use of alcohol-based hand rubs (ABHR) by addressing misconceptions regarding the safety, use and efficacy of ABHR in long-term care facilities (LTCF). The memo represents a joint effort by the Bureau of Quality Assurance, Division of Nursing Care Facilities and Division of Safety Inspection, and the Bureau of Epidemiology.

### USE AND EFFICACY:

Did you know that health care providers might need to clean their hands as many as 100 times per 12-hour shift? Fewer than half of health care providers properly implement World Health Organization's (WHO) My 5 Moments for Hand Hygiene guidance (<http://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/>).

Research has shown that ABHR is the most effective method for hand hygiene in health care settings and is also the least drying and least likely to lead to skin breakdown in health care workers. Therefore, ABHR is the preferred method for routine hand hygiene in health care settings, including LTCF.

### AVAILABILITY IN LTCFs:

It is important to ensure that the ABHR dispensers are widely available and easily accessible at the points of care. Make ABHR available to staff where and when they need it!

- Place ABHR dispensers at the entrance to each patient room. Ideally, dispensers should be in a place that is easily accessible to health care workers. In multi-resident rooms, consider placing dispensers in a location that can also be easily accessed when caring for multiple residents, as well as at the entrance to the rooms.
- In secured units, place ABHR dispensers near the nurses' station. Provide individual-sized containers of ABHR for staff to carry in an otherwise empty pocket or clipped onto their person. Using these is a skill; promote a culture of hand hygiene in your locked units. Train staff on how to properly use individual-sized containers and document demonstrated competency.

### SAFETY:

- **Fire hazard:** LTCFs must follow Life Safety Code regarding location and installation of ABHR dispensers (<https://www.federalregister.gov/documents/2016/05/04/2016-10043/medicare-and-medicaid-programs-fire-safety-requirements-for-certain-health-care-facilities>). If you are having difficulty determining where to install ABHR dispensers in your facility per the requirements of the Life Safety Code, you may contact your local Division of Safety Inspection Regional Office (<https://www.health.pa.gov/topics/facilities/safety/Pages/Contact.aspx>).
- **Slip and fall hazard:** ABHR dispensers should have a tray or other mechanism to stop excess product from going on the floor. Dispensers must be kept in good working order. Don't leave ABHR bottles on hand rails.
- **Ingestion hazard:** ABHR dispensers should only dispense the amount of product required for proper use and should not dispense more than once per activation. See "Commonly Asked Questions" for more information.

### POLICY:

Review and update your infection control policies annually and as needed. If the information provided in this memo is not congruent with current practice at your facility, we encourage you to take steps to improve infection control practices by updating policies and providing education to staff.

Perform monthly audits of hand hygiene to monitor compliance and provide feedback to staff.

For questions related to this information, please contact your local Department of Health field office.

## COMMONLY ASKED QUESTIONS ABOUT ABHR:

### Q. Will overuse of ABHRs cause resistance?

A. No. According to the World Health Organization, there is no reported resistance to ABHR in any microorganism. Appropriate use of ABHR can reduce the spread of antibiotic resistant bacteria.

### Q. How many times can staff use ABHRs?

A. There is no limit to the number of times in a row that ABHR can be used. If hands feel sticky or uncomfortable, hand washing may be used intermittently for comfort of the health care worker.

### Q. How do we protect vulnerable residents who might ingest ABHR?

A. Infections are hazardous too! A facility will need to determine which patients are at risk for harm from ABHR; however, keeping ABHR readily accessible to staff is important to prevent the spread of infection. In secured units, one option is for staff to carry small containers of ABHR in their pocket or clipped onto their person.

### Q. How can we assure that staff are using pocket or clip-on individual containers of ABHR properly?

A. ABHR kept in a pocket or clipped onto a health care worker will be contaminated. However, the product inside the container is still effective. Using the proper steps to access these types of ABHR containers is critical.

1. Pull pocket ABHR out of pocket and dispense adequate gel or foam into one hand.
2. Place bottle back in pocket with other hand before performing hand rub.
3. Perform hand rub, thoroughly coating all surfaces of both hands.
4. Go directly to resident without touching anything else – or re-entering hands into pockets.

Staff using these types of ABHR containers should be initially trained and observed doing the procedure to assure competency. Routine observations should occur monthly to assure staff are performing steps properly.

### Q. Are there certain situations in which hand washing should be used instead of ABHR?

A. Yes. Hand washing should be performed in the following situations:

- If hands are visibly soiled;
- Before eating or after using the restroom; and
- During an outbreak of *C. difficile* or norovirus. For residents with *C. difficile*, always wear gloves during care. Learn more about hand hygiene and *C. difficile* by watching and sharing this video with free continuing education available at <https://www.cdc.gov/handhygiene/providers/training/index.html>.

### Q. I have a staff member who reports he/she is allergic to ABHR, what can I do?

A. There are two types of skin reactions associated with hand hygiene: irritant contact dermatitis and allergic contact dermatitis. Allergic contact dermatitis attributable to ABHR is very rare. Health care workers with skin complaints related to ABHR should be referred for evaluation by occupational health or a medical provider.

In winter months, dry skin is common in health care workers and can lead to irritant contact dermatitis irrespective of ABHR use. In fact, ABHRs will result in less drying than hand washing. We suggest making lotion that is compatible with gloves and ABHR available so that staff will be less likely to have skin irritation and be more likely to comply with ABHR use. Staff should not be permitted to use their own lotion in the clinical setting. Other strategies for skin health will also improve winter irritation: using a heavy cream and cotton gloves while sleeping, wearing gloves when outside, and frequent use of lotion during waking hours.

**You can find more information about ABHR in the following resources:**

<https://www.cdc.gov/handhygiene/index.html>; <http://www.who.int/gpsc/5may/tools/9789241597906/en/>.