

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, Division of Healthcare-associated Infection Prevention (HAIP) 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) (December 2022)

Available at: [Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms \(MDROs\): Updated December 2022 \(cdc.gov\)](https://www.cdc.gov/hai/organisms/mdro/interim-guidance-for-a-public-health-response-to-contain-novel-or-targeted-multidrug-resistant-organisms-(mdros)-updated-december-2022)

Healthcare Facility Guidance and Resources for Control of Carbapenem-resistant Enterobacteriaceae (CRE). Available at:

<https://www.cdc.gov/hai/organisms/cre/cre-facilities.html>

Other supporting materials for investigation of novel and high concern organisms can be found on the HAIP 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 Division 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 intended to be shared with healthcare facilities or the public. Refer to the Materials for Healthcare Facilities and the Public section.

For Tier 3 organisms in long-term care facilities, the [sample letter for a facility with one case](#) is available on the HAIP 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: [Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms \(MDROs\): Updated December 2022 \(cdc.gov\)](https://www.cdc.gov/interim-guidance/2022/04/interim-guidance-for-a-public-health-response-to-contain-novel-or-targeted-multidrug-resistant-organisms-mdros/)

Bacterial species or organism type	Resistance mechanism	Response Tier
Organisms or resistance mechanisms never or very rarely identified in the United States.	Any	Tier 1*
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 2*
<i>Candida auris</i>	n/a	Tier 2* ^b
<i>Pseudomonas</i> spp., carbapenemase-producing	Any	Tier 2*
Enterobacterales, any	NDM Western PA IMP OXA-48 VIM	Tier 2*
Enterobacterales, any	KPC NDM Eastern & Central PA	Tier 3
<i>Acinetobacter</i> spp., carbapenemase-producing	Any other than those listed below	Tier 2*
<i>Acinetobacter</i> spp., carbapenemase-producing	OXA-23, OXA-24/40, OXA-58	Tier 3

*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.

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

Please contact the Healthcare-associated Infection Prevention (HAIP) team with questions by calling 717-787-3350 or emailing 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).

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 or shared a bathroom during any recent inpatient healthcare stay
 - It is critical to gather roommate and shared bathroom 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 or shared a bathroom with another resident(s), screening of identified residents may be required. Obtain the dates (start date to end date) of when the roommate was present, or bathroom was shared.
 - 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 (HAIP) 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
- Confirm that the patient's charts have been flagged to guarantee that the patient's status is communicated effectively.

Containment and Prevention

- The patient should be placed on Contact Precautions or Enhanced Barrier Precautions (depending on healthcare facility type) 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 outlined in the Facility Level Recommendation Checklist (pages 15 & 16). Additional resources for facilities are also available from CDC [here](#).

Surveillance

- For all healthcare facilities where the patient received overnight care in the 30 days prior to the positive culture:
 - Conduct a retrospective review of microbiology records for additional carbapenem-resistant organisms in the last 3 months using the positive culture date as the end point for look back.
 - Conduct prospective surveillance for 3 months from the date of the positive culture looking for additional carbapenem-resistant organisms among all recent healthcare facilities.

Monitoring and Tracking

- Enter information in PA-NEDSS as appropriate within 24 hours of notification.
- If part of your role at the Department of Health
 - Enter in REDCap
 - Create a folder on the N Drive for HAI Investigations to document notes, lab results, line lists, timelines, etc.

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Investigation Guide: CARBAPENEMASE-PRODUCING ORGANISMS (CPOs)

Note Changes: This investigation guide was previously called CARBAPENEMASE-PRODUCING CARBAPENEM-RESISTANT ENTEROBACTERIACEAE (CP-CRE).

In 2020, a taxonomy change was adopted to use “Enterobacterales” as the name of a new scientific order. “Enterobacteriaceae” are a family within the Enterobacterales order.

GENERAL INFORMATION AND COURSE OF DISEASE

Infectious Agent: Carbapenemase-producing organisms (CPOs) are typically Enterobacterales but can also be non-Enterobacterales. Enterobacterales are a large order of different types of bacteria that cause infections in healthcare settings. Examples of bacteria in the Enterobacterales order include *Klebsiella*, *Enterobacter*, and *Escherichia coli* (*E. coli*), among others. *Acinetobacter* and *Pseudomonas* are not in the Enterobacterales order; however, they are frequent causes of healthcare-associated infections and may also produce carbapenemases.

Antibiotic resistance occurs when the bacteria no longer respond to the antibiotics designed to kill them. Carbapenems are a class of powerful antibiotics and are often used as the last line of treatment. They include imipenem, doripenem, ertapenem, and meropenem. When bacteria develop resistance to this group of antibiotics, they are called carbapenem-resistant organisms (CROs) which can refer to any organism, Enterobacterales or non-Enterobacterales.

There are several mechanisms by which these organisms can become resistant to carbapenems. One such mechanism is through the production of a carbapenemase. Carbapenemases are enzymes that can break down carbapenem antibiotics. Certain bacteria have genetic material that produce the carbapenemase enzyme, making them resistant to carbapenem antibiotics. These CPOs have great public health significance because the genetic material is located on a plasmid, which is a mobile genetic element. This allows resistance to spread rapidly from organism to organism and easily from person to person on this mobile plasmid.

There are many known types of carbapenemases. The most commonly identified include *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo- β -lactamase-type 1 (NDM-1), Verona integron-encoded metallo- β -lactamase (VIM), imipenemase metallo- β -lactamase (IMP), oxacillinase-48 (OXA-48), and other types of oxacillinase. Currently, KPC is the most widespread carbapenemase in the United States, followed by NDM.

Mode of Transmission: Transmission of a CPO can occur whether a person is infected or colonized with a CPO, therefore the containment strategy should be applied when either is identified. CPOs are transmitted via direct contact with an affected person or by contact with body fluids, especially those from wound drainage or stool. Transmission can also occur through contact with contaminated materials or equipment and spread by healthcare worker hands.

Incubation Period: The incubation period is not well defined. It is unknown how soon after exposure a person can be colonized or infected with a CPO, but the timeframe is potentially short depending on dose and route of exposure.

Symptoms: CPOs 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 a CPO is likely to persist indefinitely; therefore, prevention measures should be immediate and in place indefinitely any time a person with a CPO is admitted to an inpatient healthcare facility.

Communicability: CPOs have the potential to be transmitted as long as the organisms are present in a person's bodily tissues or fluids, or on their skin. Colonization with these bacteria does not require treatment, though the same infection control precautions apply as with infected persons. Colonized patients are at risk for invasive infection from their own endogenous colonization. CPO infections occur most frequently among persons with prolonged hospitalizations or healthcare stays, those who are chronically or critically ill, or those exposed to invasive devices such as ventilators, urinary catheters, or central venous catheters.

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

Complications: Infections caused by CPOs are more difficult to treat and are associated with increased morbidity and mortality, healthcare costs, and increased lengths of stay in healthcare facilities.

Prevention: Patients with a CRO or CPO should be placed on Contact Precautions or Enhanced Barrier Precautions depending on the healthcare setting. Patients should also be placed in a private room if possible, to reduce the risk of spreading antimicrobial resistant bacteria. Additional prevention measures are addressed in the [CDC Containment Strategy](#) and the [CDC Prevention Strategy](#) which may include enhanced surveillance, colonization screening, infection control assessment, etc. It is critical that each report is 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 CROs and CPOs.

CASE DEFINITION

Carbapenemase-Producing Organisms (CPO) (CSTE-2023) (see: [CPO | 2023 Case Definition](#))

Clinical criteria:

CPOs can cause bloodstream infections, ventilator-associated pneumonia, wound infections and intra-abdominal abscesses, or urinary tract infections. However, patients can also be

colonized. Each lab report should be stratified by whether the cultures were clinical (i.e., collected for the purpose of diagnosing or treating disease in the course of medical care) versus for screening (i.e., collected for the detection of colonization and not for the purpose of diagnosing or treating disease). Because it can be difficult to differentiate screening cultures from clinical cultures based on microbiology records, screening tests should generally be limited to rectal, peri-rectal or stool cultures. The reason for testing should be confirmed with the provider if unknown.

Laboratory Criteria for Diagnosis

Confirmatory laboratory evidence:

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

- Positive phenotypic test for carbapenemase production in a specimen (e.g., metallo- β -lactamase test, modified Hodge test, Carba NP, carbapenem inactivation method [CIM], *EDTA-modified carbapenem inactivation method (eCIM)*, or *immunochromatography tests (ICT)*).
- OR-
- Positive molecular test detecting a carbapenemase gene (e.g., KPC, NDM, VIM, IMP, OXA-48) demonstrated by a recognized test (e.g., Cepheid Xpert Carba-R, *Nanosphere VERIGENE*, *Streck ARM-D*, *validated laboratory-developed NAAT*) with or without organism identification.
- OR-
- Detection of carbapenemase gene (e.g., KPC, NDM, VIM, IMP, OXA-48) by next generation sequencing (NGS)

Criteria to Distinguish a New Case from an Existing Case

- A specific organism/carbapenemase combination in a person should be counted as a separate case from other organism/carbapenemase combinations in the same person. This includes when a person has two different mechanisms with the same organism. A specific organism/carbapenemase combination can include a carbapenemase gene(s) without an organism detected (e.g., NDM+ no organism vs. NDM+ *E. coli*).
- A person classified as a clinical case should not be counted as a screening case thereafter for the same carbapenemase.
- A person classified as a screening case can be later counted as a clinical case with the same organism/carbapenemase combination (e.g., patient with NDM+ *E. coli* peri-rectal screening swab who later develops NDM+ *E. coli* blood stream infection would be counted twice, once in each category). This is the only way that the same organism/carbapenemase combination can be counted twice for the same person.
- A case with a known carbapenemase but unknown organism should only be counted once for that carbapenemase. (e.g., an NDM+ screening case is later screened at a different facility and tests NDM+ and no organism is identified again).

PA-NEDSS Documentation:

The initial condition is carbapenemase-producing organism (CPO) and after investigation, a final condition will be classified as **CPO, Clinical** for clinical cases or **CPO, Screening** for screening cases. All cases should be closed as **Confirmed Case**. This classification will ensure the case is counted in the MMWR data sent to CDC. The data is pulled by the listed CDC Reporting County.

Organism identification and resistance mechanism is to be captured in PA-NEDSS and documented under the Test Page in the two drop downs. Investigators should complete these surveillance questions with all available information and update later if more information becomes available during the investigation process.

Relevant Laboratory Information

Testing for carbapenemases is not routinely conducted in most clinical laboratories. Many laboratories identify CROs, but only a few can do further testing for carbapenemase production. If a CRO is identified in a patient at high risk for carbapenemase acquisition (e.g., someone who lives in a skilled nursing facility and has high acuity medical needs like a ventilator or central lines), investigators should request approval for additional testing of the isolate. Approval for isolate confirmation and mechanism testing (i.e., identifying the carbapenemase) should be requested of the Bureau of Epidemiology's Division of Healthcare Associated Infection Prevention (HAIP), which will provide further instruction.

CASE INVESTIGATION

Priority for Investigations:	DISEASE/SITUATION	Start Investigation No Later Than:	Complete Investigation by:
	Carbapenamase Producing Organisms (CPOs)	One Day	Thirty Days

- Initiate investigation within one day of report. The containment strategy is the same for both infected and colonized patients.
- CPO investigations in PA-NEDSS will be assigned by jurisdiction of the ordering facility (not the patient's home address). The jurisdiction of the site where the test was conducted is the Responsible Jurisdiction in PA-NEDSS. The CDC Reporting Jurisdiction in PA-NEDSS reflects the patient's permanent address (private home, SNF or vSNF, not an LTACH or ACH). Jurisdiction for CPO investigations will initially be assigned by HAIP staff.
- If exposures to healthcare facilities outside of the assigned jurisdiction are identified during an investigation, notify HAIP divisional staff who will coordinate an any additional public health response that may be needed.
- Complete the PA-NEDSS questionnaire for CPO in real time as epidemiological information is gathered. There are critical epi 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. Follow the Checklist on page 6 of the [PA DOH Toolkit for Response to Antimicrobial-Resistant Organisms in Healthcare Facilities](#).
- You may find that a carbapenemase test was reported in PA-NEDSS but no bacterial species. Species information should be sought during investigation if the patient is classified as a CPO clinical case; this information will likely not be available for a CPO screening case since the goal is to detect additional cases of the resistance mechanism.
- If mechanism testing has not yet been conducted on a CRO, coordinate mechanism testing in consultation with the Division of HAIP, if the patient lives in a long-term care facility or is otherwise at high-risk for transmission to others.
- Use the [PA DOH Toolkit for Response to Antimicrobial-Resistant Organisms in Healthcare Facilities](#), section 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 Division of HAIP immediately by emailing RA-DHHAI@pa.gov or your HAIP point of contact. To determine what public health action is needed, refer to MDRO resources to develop an action plan.
- Follow guidance provided by the Division of HAIP as the response to each CPO case will be customized based on the circumstances that are identified through the case investigation. [CDC's Containment Strategy Guidance](#) should be used as a resource.

- **Complete the dropdowns for organism and resistance mechanism** in the tests section of the PA-NEDSS questionnaire.
- Assign final condition and close within 30 days. Final condition will be classified as **CPO, Clinical** for clinical cases or **CPO, Screening** for screening cases.
- If part of an outbreak of 2 or more epidemiologically linked cases, create an outbreak in NEDSS and link cases.

OUTBREAK PREVENTION

Goals of prompt response and containment should include:

1. Ensuring appropriate control measures are promptly initiated 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 is occurring and determining if Pennsylvania health care facilities are prepared to respond to and contain CPO.

RESOURCES

- [PADOH HAIP Website](#): Resources for public health professionals
 - [PADOH Colonization Screening Toolkit for Antimicrobial-Resistant Organisms](#)
 - [PADOH Toolkit for Response to Antimicrobial-Resistant Organisms in Healthcare Facilities](#)
- [AHRQ CRE Control and Prevention Toolkit](#)
- [CDC's Containment Strategy](#)

[INSERT LOGO/LETTERHEAD HERE]

[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 a carbapenemase-producing organism (CPO) in a resident of your nursing home facility (hereafter referred to as index resident).

Containment of resistant organisms such as CPOs is a national problem and requires that health care facilities and public health agencies work together to prevent transmission. A CPO 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 a CPO 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 CPOs and other high-concern healthcare-associated organisms in the United States (2022). The Department supports this strategy for the safety of Pennsylvania patients and residents. The containment strategy guides public health and facility interventions by categorizing novel and targeted multidrug-resistant organisms (MDROs) and resistance mechanisms into four different Tiers. The specific mechanism of interest, or carbapenemase, that was identified in a resident of your facility is known as [type] carbapenemase ([acronym for the mechanism]) and is considered a Tier 3 organism in Pennsylvania. In the index resident, this carbapenemase was identified in [bacteria genus/species].

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 CPOs 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 CPOs, and colonization can persist for many years. Therefore, it is important to maintain infection prevention and control measures, including Enhanced Barrier Precautions (i.e., gown and gloves), for high contact resident care activities, for the duration of a resident's stay. There is no evidence that treatment will eradicate CPO 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,

Authorized Representative Name
Title/Position

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 CPO status. If possible, choose a CPO, MDRO, or other flag that indicates the resident should be on Enhanced Barrier Precautions while in the nursing home setting or contact precautions if transferred to an acute care facility.
- If the CPO 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 CPO status so that they may implement 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

2. Detection protocols

- Conduct a retrospective microbiology review to identify any carbapenem-resistant [*organism*]-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 [add date].
- Conduct prospective surveillance for three months from the date of the index resident's culture [add date]. Track and report *any* carbapenem-resistant [*organism*]-positive culture from a resident of the facility. Instruct the laboratory to save the 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, sexual partner, or shared a bathroom. Screening for CPO colonization in roommates, those who share a bathroom, 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 or Enhanced Barrier 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, if possible.
- Use Enhanced Barrier Precautions for the index resident while performing high contact resident care activities such as bathing, toileting, care of indwelling medical devices, etc. Contact Precautions should be used for the index resident if he or she is incontinent of stool that is difficult to contain or has draining secretions or draining wounds that cannot be controlled. Please refer to the document entitled "[Management of residents with Multidrug-Resistant Organisms \(MDROs\) including *Candida auris*](#)" for more information.
- Implement Enhanced Barrier Precautions for residents who are at risk of acquiring an MDRO such as those with indwelling devices or wounds.

- Provide formal re-education *to all staff* to include hand hygiene according to [CDC's Clean Hands Count for Healthcare Providers](#), as well as proper use of Personal Protective Equipment (PPE)/Enhanced Barrier 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 healthcare settings, including LTCF.
- Ensure adequate opportunities exist to conduct hand hygiene (i.e., clean sinks that are not used for wastewater 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 CPOs.
- 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 residents requiring Enhanced Barrier Precautions.
- 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 CDC has a library of organism-specific fact sheets for the healthcare facility audience (not patients and family members):

- [Carbapenem-resistant *Acinetobacter baumannii* \(CRAB\)](#)
- [Carbapenem-resistant *Pseudomonas aeruginosa* \(CRPA\)](#)
- [Carbapenem-resistant Enterobacterales \(CRE\)](#)

BACKGROUND

Enterobacterales are a large order of different bacteria that commonly cause infections in healthcare settings. *Enterobacteriaceae* are now a family of bacteria that are normally found in the human intestines within the order of Enterobacterales. *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 Enterobacterales have developed resistance to carbapenems. These bacteria are called carbapenem-resistant Enterobacterales (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 following CDC resources:

Clean Hands Count: <https://www.cdc.gov/handhygiene/providers/index.html> & Carbapenem-resistant Enterobacterales: <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.

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 Enterobacterales.

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 procedures, called "transmission-based precautions." These include wearing gowns and gloves when providing care during high contact resident care activities (i.e., bathing or basic hygiene, toileting, dressing, care of indwelling devices). This is called Enhanced Barrier 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

Management of Residents with Multidrug- Resistant Organisms (MDROs) including *Candida auris*

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 [CDC's Clean Hands Count for Healthcare Providers](#);
- 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).
- 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.

Enhanced Barrier Precautions

Use Enhanced Barrier Precautions for the management of residents colonized or infected with targeted or epidemiologically important MDROs and residents at risk of acquiring MDROs (e.g., wounds or indwelling devices present), where contact precautions do not apply, according to the Healthcare Infection Control Practices Advisory Committee (HICPAC) [Consideration for Use of Enhanced Barrier Precautions in Skilled Nursing Facilities](#) (2021).

Enhanced Barrier Precautions include:

- Use of gowns and gloves during high-risk activities including:
 - Dressing
 - Bathing
 - Transferring
 - Changing linens
 - Providing general hygiene assistance
 - Toileting or changing briefs
 - During care and use of indwelling medical devices (e.g., central lines, urinary catheters, feeding tubes, tracheostomy tubes)
 - During wound care

Gowns and gloves are necessary when there is potential for exposure to body fluids through a splash or spray, or there is a risk of the healthcare provider contaminating their clothing.

- Placing residents ideally in a private room. If a private room is not available, decisions on placement need to be balanced. Residents may room with another resident who is less dependent on healthcare personnel (i.e., has a lower risk for acquiring the resistant organism).
- Allowing movement of residents throughout the facility if their bodily fluids are controlled. These residents can participate in all therapies and activities without restriction.
- 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 for residents placed on contact precautions, verifying the proper disinfectant is used for the associated MDRO. Adhere to cleaning the resident environment and ensuring that high-touch surfaces are properly maintained is critical to reducing the spread of unusual resistance.

For complete details on these precautions and guidance on droplet and airborne precautions, view the following resources: [HICPAC Guidelines for Isolation Precautions](#) and [CDC website for PPE in Nursing Homes](#).

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 residents. 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 resident 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 resident care is needed.
- Use disposable or dedicated resident-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.
- Because contact precautions require room restriction, a strategy for discontinuation or de-escalation should be part of the resident care plan.

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 healthcare facilities. The memo represents a joint effort by the Deputate of Quality Assurance and the Bureau of Epidemiology.

USE AND EFFICACY:

Did you know that healthcare providers might need to clean their hands as many as 100 times per 12-hour shift? On average, healthcare providers clean their hands less than half of the times they should. Clean your hands in these key moments: [DOH Hand Hygiene Make Your Intention Prevention Poster](#). Read more about hand hygiene here: [CDC Hand Hygiene](#); [WHO World Hand Hygiene Campaign](#).

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

AVAILABILITY IN HEALTHCARE FACILITIES:

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 healthcare workers. In multi-patient rooms, consider placing dispensers in a location that can also be easily accessed between patients, 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 requires careful adherence to proper procedure (see question on next page); 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:** Facilities that receive Medicaid or Medicare reimbursement must follow the Life Safety Code regarding location and installation of ABHR dispensers. More information about fire safety and the Life Safety Code is available at [CDC Fire Safety](#). 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 Field Office ([DOH Life Safety Office Contacts](#)).
- **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 handrails.
- **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.
- **Refilling containers:** Refilling or "topping off" containers of ABHR is not recommended due to the risk of contamination, reduced effectiveness from the evaporation of alcohol, and irritant effects from mixing formulations. Only refill ABHR dispensers in accordance with manufacturer's guidance.

POLICY:

Review and update your infection control policies annually and as needed and perform monthly audits of hand hygiene to monitor compliance and provide feedback to staff. 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.

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 healthcare worker.

Q. How do we protect vulnerable patients 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 healthcare 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 patient 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.
- After caring for a person with known or suspected infectious diarrhea; and
- After known or suspected exposure to certain organisms (e.g., norovirus, *C. difficile* outbreaks).

For patients 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 [CDC Hand Hygiene Training](#).

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. Healthcare 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 healthcare 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.