



Guidance for Control of
Multi-drug Resistant Organisms (MDROs)
in Massachusetts

**Toolkit for Acute Care, Long-term Acute Care,
Skilled Nursing, Ambulatory Care,
Community-Based, and Homecare Settings**

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TOOLKIT OVERVIEW

The Massachusetts multi-drug-resistant organism (MDRO) toolkit is designed to aid healthcare providers involved in the prevention, detection, and containment of MDROs across the continuum of healthcare. This group includes physicians, epidemiologists, infection preventionists, directors of nursing in skilled nursing facilities, nurses, pharmacists, and microbiologists.

This guidance is intended to address these MDROs in Massachusetts:

Targeted MDROs:

- Pan-resistant Organisms
- Carbapenem-resistant *Acinetobacter baumannii* (CRAB)
- Carbapenem-resistant Enterobacterales (CRE)
- Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)
- Carbapenemase-producing Organisms (CPO)
- *Candida auris*

Epidemiologically Important MDROs including but not limited to:

- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- ESBL-producing Enterobacterales
- Vancomycin resistant Enterococci (VRE)
- Multi-drug resistant *Pseudomonas aeruginosa*
- Drug-resistant *Streptococcus pneumoniae*

MDROs are emerging threats to global health. The potential for rapid spread and the difficulties treating these infections make it critically important for public health to promote aggressive infection control measures.

As highlighted in the Centers for Disease Control and Prevention's (CDC) 2019 *Antibiotic Resistance Threats in the United States*, more than 2.8 million antibiotic-resistant infections occur in the U.S. each year, and more than 35,000 people die from them. According to the CDC, a coordinated, regional approach to prevent the spread of MDROs is critical to reduce the impact on all of Massachusetts' healthcare facilities. Inappropriate antibiotic use and lack of infection prevention safeguards in one facility affects others because of patient and resident transfers and shared healthcare providers. (1)

Routine hand hygiene and ongoing monitoring of staff adherence to hand hygiene remain the single most important aspects of preventing transmission of MDROs. However, additional practices, including appropriate antibiotic use, timely inter-facility communication, and infection control precautions are needed. This toolkit contains information and links to resources for all of these important practices.

The Massachusetts MDRO Toolkit was originally adapted from the 2016 Oregon CRE Toolkit with Massachusetts-specific definitions and protocols, and is modeled after CDC's 2015 CRE toolkit, which is available on the CDC website (<https://www.cdc.gov/infection-control/media/pdfs/Guidelines-CRE-Guidance-508.pdf>) (2).

The creation of this toolkit was supported by the Centers for Disease Control and Prevention (CDC) Epidemiology and Laboratory Capacity for Prevention and Control of Emerging Infectious Diseases (ELC) Cooperative Agreement.

GLOSSARY OF TERMS

Antimicrobial resistance	Refers to bacteria, fungi, and other microorganisms developing resistance to the antibiotics, antifungals, and other antimicrobials designed to kill them.
Antimicrobial stewardship	Healthcare-based programs that focus on promoting appropriate antimicrobial use and preventing healthcare-associated infections, with the overall goal of reducing antimicrobial resistance and improving patient outcomes.
<i>Candida auris</i>	<i>C. auris</i> is an emerging fungus in the U.S. that is often multi-drug resistant, can cause outbreaks of healthcare associated infections, and persists in the environment.
Carbapenem-resistant <i>Acinetobacter baumannii</i> (CRAB)	CRAB are gram-negative bacteria that can cause infection or colonization in patients in healthcare settings and are resistant to carbapenem antibiotics, such as meropenem or imipenem.
Carbapenem-resistant Enterobacterales (CRE)	Enterobacterales (formerly Enterobacteriaceae) are an order of gram-negative bacteria. CRE are Enterobacterales that are resistant to carbapenem antibiotics, such as meropenem or imipenem.
Carbapenem-resistant <i>Pseudomonas aeruginosa</i> (CRPA)	CRPA are gram-negative bacteria that commonly cause healthcare-associated infections and are resistant to carbapenem antibiotics, such as meropenem or imipenem.
Carbapenemase-producing organism (CPO)	<p>Any organism that produces enzymes called carbapenemases that inactivate carbapenems and other beta-lactam antibiotics, including penicillins and cephalosporins. CPOs include carbapenemase-producing CRE (CP-CRE), carbapenemase-producing <i>Pseudomonas aeruginosa</i> (CP-CRPA), and carbapenemase-producing <i>Acinetobacter baumannii</i> (CP-CRAB). The 5 most identified carbapenemases in the U.S. are:</p> <ul style="list-style-type: none"> • <i>Klebsiella pneumoniae</i> carbapenemase (KPC), • New Delhi metallo-beta-lactamase (NDM), • Verona integron-encoded metallo-beta-lactamase (VIM), • Imipenemase (IMP), and • Oxacillinase-48-like (OXA-48-like) (3).
ESBL-producing Enterobacterales	Enterobacterales that produce extended spectrum beta-lactamases, enzymes that break down and destroy some commonly used antibiotics, including penicillins and cephalosporins.
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	MRSA are gram-positive bacteria that commonly cause healthcare-associated infections and are resistant to commonly used antibiotics, such as beta-lactams.

Multi-drug resistant organism (MDRO)	An umbrella term for bacteria and other microorganisms that are resistant to antibiotics and other drugs designed to kill them. Examples include multi-drug resistant <i>C. auris</i> , CRE, CRAB, CRPA, MRSA and CPOs.
Pan-resistant organism	Any organism that is non-susceptible to all agents in all antimicrobial drug categories, i.e., non-susceptible to any clinically available drug.
Vancomycin-resistant Enterococcus (VRE)	Gram-positive bacteria normally found in the gut or genital tract that have become resistant to vancomycin and can cause healthcare-associated infections.

Colonization vs. Infection

Colonization	Means that an organism is found in or on the body, but it is not causing any symptoms or disease.
Infection	Means that an organism is found in the body and is causing symptoms or disease, such as fever, inflammation, etc. (4)

Precautions

Standard precautions	Infection prevention practices that apply to all patients in all settings of care to prevent the spread of healthcare-associated infections. Standard precautions include practicing proper hand hygiene, using personal protective equipment (PPE), respiratory cough etiquette, needlestick and sharps injury prevention, environmental cleaning and disinfection, waste disposal, and safe injection practices (5).
Contact precautions	A form of transmission-based precautions that are used (depending on the healthcare setting) in addition to standard precautions for patients with known or suspected infection or colonization. Contact precautions are implemented for organisms that are spread via direct contact (with a patient or contaminated environment) such as CRE and CPOs. Contact precautions include gowning and gloving prior to room entry and using disposable or dedicated equipment for infected or colonized patients (6).
Enhanced barrier precautions	Unlike transmission-based precautions, which are implemented based on a patient's infection or colonization status, enhanced-barrier precautions (EBP) are task-based precautions that are implemented for all patients at higher risk of acquisition of an MDRO in long-term, non-acute care settings, regardless of their infection/colonization status, as well as those colonized or infected with any MDRO, in cases where contact precautions do not apply. EBP requires gowning and gloving for residents with a wound or any indwelling device during specific high-contact resident care activities that are associated with increased risk for MDRO transmission or acquisition, such as bathing or device care. CDC currently recommends enhanced barrier precautions only for skilled nursing facilities (7), however there may be other unique care settings where EBP might be considered (e.g., inpatient psychiatric settings).

SURVEILLANCE

Massachusetts Department of Public Health (MDPH) reporting requirements

Reporting certain MDROs to MDPH is important to monitor their impact, facilitate containment, and ultimately prevent further spread.

Report any of the following Enterobacterales (isolated from any source)*:

<i>Citrobacter</i>	<i>Morganella</i>
<i>Escherichia coli</i>	<i>Proteus</i>
<i>Enterobacter</i>	<i>Providencia</i>
<i>Klebsiella</i>	<i>Serratia</i>

a. With resistance to **one or more** of the following carbapenems:

Imipenem (MIC ≥ 4 $\mu\text{g/ml}$)
Meropenem (MIC ≥ 4 $\mu\text{g/ml}$)

Doripenem (MIC ≥ 4 $\mu\text{g/ml}$)
Ertapenem (MIC ≥ 2 $\mu\text{g/ml}$)

b. OR that demonstrate carbapenemase production (CP-CRE).
Specifically, an isolate that is either:

Positive for carbapenemase production via phenotypic test (i.e., CarbaNP, mCIM)

OR

Positive for a carbapenemase resistance mechanism (KPC, NDM, OXA, VIM, or IMP)
via molecular test (i.e., PCR)

Ideally, reporting should be done automatically through electronic laboratory reporting to MDPH. Questions about reporting should be directed to 617-983-6801.

*105 CMR 300.000 Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements. (Updated May 2022): <https://www.mass.gov/lists/infectious-disease-reporting-and-regulations-for-health-care-providers-and-laboratories#diseases-reportable-to-the-massachusetts-department-of-public-health-and-local-boards-of-health>

LABORATORY TESTING

Massachusetts State Public Health Laboratory (MA SPHL) MDRO isolate submission requirements

Effective May 27, 2022, in accordance with 105 CMR 300.000 Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements [Infectious Disease Reporting and Regulations for Health Care Providers and Laboratories](#) | [Mass.gov](#), the Massachusetts State Public Health Laboratory is requesting submission of:

- Carbapenem-resistant Enterobacterales (CRE) isolated from any source, with resistance to one or more of the following carbapenems: imipenem, meropenem, doripenem (at MIC ≥ 4 mcg/ml), or ertapenem (at MIC ≥ 2 mcg/ml); EXCEPTION: ertapenem resistance alone is not a criterion for isolate submission.
 - » Requested organisms include but are not limited to isolates of *Citrobacter*, *E. coli*, *Enterobacter*, *Klebsiella*, *Morganella*, *Proteus*, *Providencia*, and *Serratia* species.
 - » Some Enterobacterales (e.g., *Proteus* spp., *Morganella* spp., *Providencia* spp.) have intrinsic elevated minimum inhibitory concentrations (MICs) to imipenem and therefore results for meropenem, doripenem, and ertapenem should be used for these organisms to determine if they meet the CRE definition.
- Any organism demonstrating carbapenemase production, by phenotypic testing using the mCIM-Modified Carbapenem Inactivation Method; or Carba-NP; or detection of any of the following gene targets: KPC; NDM; OXA; VIM; and IMP by mechanism-specific testing by PCR.
- All Carbapenem-resistant *Acinetobacter baumannii* (CRAB) isolates.
- All Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA) isolates that are also non-susceptible to cefepime and/or ceftazidime.

For any suspected *Candida auris* isolates, contact the MDPH Division of Epidemiology at 617-683-6800 to facilitate confirmatory testing.

Isolates are to be submitted to the MA SPHL Clinical Microbiology Lab using the general requisition form [State Public Health Laboratory specimen submission forms](#) | [Mass.gov](#). Please include a copy of all susceptibility results generated at your lab.

Please submit one isolate per patient per year. If a repeat isolate is identified with a significantly different resistance profile less than a year after the first, please submit.

Clinicians, hospital laboratories, and public health labs can request expanded antimicrobial susceptibility testing from CDC's Antibiotic Resistance Lab Network to find new, effective treatment options for their patients' most resistant infections (see Appendix O).

Clinical and Laboratory Standards Institute (CLSI) breakpoints for antibiotic susceptibility testing (AST)

Table: CLSI breakpoints for Enterobacterales, 2023 (8)

	Current MIC breakpoints (µg/mL) and interpretation		
Carbapenems	Susceptible	Intermediate	Resistant
Doripenem	≤1	2	≥4
Ertapenem	≤0.5	1	≥2
Imipenem	≤1	2	≥4
Meropenem	≤1	2	≥4
	Current disk diffusion zone diameters (mm) and interpretation		
Carbapenems	Susceptible	Intermediate	Resistant
Doripenem	≥23	20-22	≤19
Ertapenem	≥22	19-21	≤18
Imipenem	≥23	20-22	≤19
Meropenem	≥23	20-22	≤19

Note: Most ertapenem mono-resistant Enterobacterales do not actually rule-in as CRE.

Table: CLSI breakpoints for *Acinetobacter* spp., 2023 (8)

	Current MIC breakpoints (µg/mL) and interpretation		
Carbapenems	Susceptible	Intermediate	Resistant
Doripenem	≤ 2	4	≥ 8
Imipenem	≤ 2	4	≥ 8
Meropenem	≤ 2	4	≥ 8
	Current disk diffusion zone diameters (mm) and interpretation		
Carbapenems	Susceptible	Intermediate	Resistant
Doripenem	≥ 18	15–17	≤ 14
Imipenem	≥ 22	19–21	≤ 18
Meropenem	≥ 18	15–17	≤ 14

Table: CLSI breakpoints for *Pseudomonas* spp., 2023 (8)

	Current MIC breakpoints (µg/mL) and interpretation		
Antibiotics	Susceptible	Intermediate	Resistant
Doripenem	≤ 2	4	≥ 8
Imipenem	≤ 2	4	≥ 8
Meropenem	≤ 2	4	≥ 8
Cefepime	≤ 8	16	≥ 32
Ceftazidime	≤ 8	16	≥ 32
	Current disk diffusion zone diameters (mm) and interpretation		
Antibiotics	Susceptible	Intermediate	Resistant
Doripenem	≥ 19	16–18	≤ 15
Imipenem	≥ 19	16–18	≤ 15
Meropenem	≥ 19	16–18	≤ 15
Cefepime	≥ 18	15–17	≤ 14
Ceftazidime	≥ 18	15–17	≤ 14

Note: Ertapenem has limited activity against *Pseudomonas* spp. and *Acinetobacter* spp. and therefore is not included in the breakpoints above.

Carbapenemase testing

CPO resistance mechanism(s) should guide the prevention and control response for the reasons cited below. Microbiology laboratory susceptibility testing does not reliably differentiate between resistance mechanisms. As a result, the MA SPHL utilizes a rapid method for testing carbapenem-resistant isolates (see above: MA SPHL MDRO isolate submission guidance) and will perform carbapenemase and gene-specific PCR testing on isolates that meet requirements.

CP-CRE and other CPOs

Resistance among CP-CRE and other CPOs is conferred by enzymes (carbapenemases) that directly break apart the carbapenem ring, inactivating the antibiotic.

When the genes that encode for carbapenemase enzymes are located on plasmids, this can facilitate transmission within and among bacterial species and contribute to rapid dissemination. Plasmid-mediated carbapenemases are one reason for the rapid worldwide spread of CP-CRE (9, 10). Carbapenemases of global importance include *Klebsiella pneumoniae* carbapenemase (KPC), New Delhi metallo-beta-lactamase (NDM), Verona integron encoded metallo-beta-lactamase (VIM), imipenemase (IMP), and oxacillinase (OXA-like). **KPC is the most widespread carbapenemase in the United States (11).**

Detection methods for carbapenemase production

- Carba NP Test: A rapid, accurate technique for carbapenemase detection (12). The test identifies the hydrolysis of the beta-lactam ring of a carbapenem. A buffered suspension of the organism is combined with a solution of imipenem and phenol red; a positive test is defined as a color change from red to yellow along with a change in pH.
- Modified Carbapenem Inactivation Method (mCIM): A test in which a paper disk with a particular concentration of meropenem is exposed to a suspension of the organism for a definite period of time, and then used to test a standard, meropenem-susceptible organism for meropenem susceptibility. If there is no zone of inhibition, then the meropenem has been inactivated.
- Nucleic acid amplification testing (NAAT): NAAT is typically performed on pure colonies of bacteria obtained by culture, which involves growing, isolating, and identifying an organism from clinical samples. NAAT testing for resistance markers directly from positive blood culture bottles is also possible. Examples of NAAT include PCR and transcription-mediated amplification (TMA).
 - » **NAAT: Isolated colonies.** Testing isolates for the presence of a carbapenemase gene is the most accurate way to detect CP-CRE and other CPOs. While PCR testing of bacterial isolates for carbapenemase gene targets is currently not performed by most clinical labs, the MA SPHL has the capacity to perform PCR testing for the most encountered global carbapenemases including KPC, NDM, VIM, IMP and OXA-48-like.
 - » **NAAT: Positive blood cultures.** Several molecular platforms are FDA-cleared for identifying organisms and detecting antibiotic resistance markers, including carbapenemases, directly from positive blood culture bottles. Example platforms include the FilmArray® Blood Culture Identification (BCID) Panel (BioFire, Salt Lake City, UT) and the Verigene® Gram-Negative Blood Culture Test (Nanosphere, Northbrook, IL) (13).

Acute care hospitals (ACHs) and long-term acute care hospitals (LTACHs)

PART 1:

General MDRO prevention measures for ACHs and LTACHs

MDRO prevention and response is a multifaceted approach that involves:

Communication

1. Ensure adequate processes to facilitate rapid notification to clinical and infection prevention and control (IPC) staff when MDROs are identified in the microbiology laboratory.

Education

2. Educate staff about MDROs. Provide in-service to staff about MDROs. Fact sheets are attached as appendices (see Appendices A-D) and additional educational materials can be requested from MDPH.
3. Review infection prevention and control procedures, including policies regarding hand hygiene, environmental cleaning, cleaning and disinfection of any reusable medical equipment that is not dedicated to a single patient, device reprocessing, and personal protective equipment (14). Perform regular audits of staff, including housekeeping and nursing (see Appendix E and G). A complete list of these policies with detailed descriptions can be found at CDC's Infection Prevention and Control Assessment Tool for Acute Care Hospitals here: <https://www.cdc.gov/healthcare-associated-infections/php/toolkit/icar.html>.

Surveillance

4. Consider implementing active surveillance cultures for patients who are at high-risk for MDRO colonization (including screening for both CPO and *C. auris* colonization) upon hospital admission. It is recommended to screen newly admitted patients who have either been hospitalized overnight internationally within the past six months or are admitted from another facility with documented transmission or an ongoing outbreak. For assistance on determining surveillance criteria, contact MDPH at 617-983-6800.



PART 2:

What to do when a targeted MDRO is identified at your ACH or LTACH

Initial recommendations for all targeted MDROs and before carbapenemase gene testing is conducted (in the case of a carbapenem-resistant organism)

Communication

- 1. Laboratories are required to notify MDPH** within one business day of identification of a patient isolate meeting the case definition (listed on page 6 of this toolkit). This includes any new cases or known cases transferred from out-of-state. Coordinate with your lab to ensure they are aware of the reporting requirements and are accurately reporting.
- 2. Notify the patient, staff, and caregivers of the patient's MDRO status.** Healthcare facilities should promptly notify the patient, their family or primary caregiver, and all appropriate healthcare staff within the facility when a targeted MDRO is identified.
- 3. Upon patient transfer to another healthcare facility, notify the receiving facility verbally and in writing that the patient has an MDRO.** An example transfer form is provided in Appendix F. Be sure the individual(s) directly caring for the patient and those responsible for infection prevention at the receiving facility as well as EMS/transport staff are aware of the patient's MDRO status.

Infection Control Precautions

- 4. Place patients infected or colonized with a targeted MDRO on contact precautions. Empower staff to monitor and enforce contact precautions.**
 - Continue contact precautions for the duration of hospitalization.
 - “Flag” the chart/EMR of a targeted MDRO-positive patient so they can be identified and placed on contact precautions immediately if readmitted.
- 5. Place patients infected or colonized with a targeted MDRO in private rooms.** If the number of single patient rooms is limited, prioritize single rooms for targeted MDRO-positive patients with higher transmission risk such as a draining wound or stool incontinence. Cohort targeted MDRO-positive patients (only if colonized/infected with the same MDRO) if private rooms are unavailable.

Surveillance

- 6. Review microbiology laboratory records** for the prior 12 months to identify any previously unrecognized targeted MDRO cases in consultation with laboratory personnel. Report any new cases discovered to MDPH.

Education

- 7. Educate staff, affected patients and their visitors about MDROs.** Education helps to reduce the spread of MDROs.

8. Reinforce the importance of adherence to core infection prevention measures through routine audits, observations, and competency-based education.

Monitor adherence to core MDRO prevention measures (hand hygiene, contact precautions, inter-facility communication, wound care and environmental cleaning) and provide feedback to healthcare personnel.

9. Notify pertinent clinician groups (infectious diseases, critical care, pharmacy, antimicrobial stewardship program, etc.) of a targeted MDRO in the facility.

- Develop and implement an antimicrobial stewardship program if your facility does not have one already. See CDC's website:
<https://www.cdc.gov/antibiotic-use/hcp/core-elements/hospital.html>
- Directly interface with clinicians caring for the MDRO-positive patient. Encourage limiting antimicrobials and discontinue invasive medical devices as soon as no longer necessary.

Recommendations after obtaining results of carbapenemase gene testing (in the case of a carbapenem-resistant organism)

For non-carbapenemase-producing organisms, continue contact precautions. Per recent CDC guidance, no additional measures are required (2, 15).

For carbapenemase-producing organisms (CP-CRE, CP-CRAB, CP-CRPA), pan-resistant organisms and *C. auris*, implement the following additional measures:

Communication

- 1. Notify any sending or receiving facility, upon patient transfer.** Additionally, if the patient is a resident of a long-term care facility, also notify the facility immediately.
- 2. Notify hospital administration.** Prevention of targeted MDRO spread needs to be an institutional priority, which requires leadership and resource support.

Surveillance

- 3. Review microbiology records** to identify any other targeted MDRO cases at the facility within the past 12 months. Review of microbiology records can detect MDRO outbreaks, such as those reported in association with contaminated medical equipment. In consultation with MDPH, prospective surveillance for targeted MDROs should also be conducted for at least 3 months after the index patient was identified (or the last case, if transmission occurred) (15). In the case of *C. auris*, request that your microbiology laboratory speciate all *Candida* cultures even from non-invasive/non-sterile sites, from the same unit(s) the case was on for at least the next month.

Environmental Cleaning Education & Monitoring

4. **Alert housekeeping and monitor environmental cleaning.** Ensure frequent, thorough cleaning of high-touch surfaces, particularly those near the patient, and common areas outside the room. Evaluate daily and terminal cleaning using visual inspection plus quantitative strategies, such as UV fluorescence marker or an adenosine triphosphate (ATP) monitor before placing another patient in that room. If available, supplement manual cleaning with UV light, hydrogen peroxide vapor or another “no touch” modality. See the CDC environmental cleaning monitoring checklist in Appendix G. In the case of *C. auris*, ensure that disinfection products found on EPA List P are being used in impacted area(s) of the facility: List P: [Antimicrobial Products Registered with EPA for Claims Against *Candida auris* | US EPA](#).
5. **Verify and audit decontamination, disinfection, reprocessing, and sterilization (when needed) of reusable medical equipment used by MDRO-positive patients.** There have been several documented occurrences of outbreaks connected to reusable medical equipment, especially procedures involving a duodenoscope (16-18).

Hand Hygiene Education & Monitoring

6. **Educate staff, patients, and visitors about MDROs.** Encourage visitors and families to practice proper hand hygiene.
7. **Monitor adherence to hand hygiene and contact precautions for the room(s) of MDRO-positive patients.**
 - Strongly consider a hand-hygiene campaign on affected units and promote the use of alcohol-based hand rub.
 - Review with and evaluate staff (including nursing and housekeeping staff) on use of contact precautions.



- 8. In consultation with MDPH, obtain screening swabs of high-risk healthcare facility patient contacts.** Expand the screening pool if initial testing reveals additional cases. Considerations for contacts at highest risk include factors related to duration and intensity of exposure to the case patient, including:
- Proximity to case patient;
 - Shared healthcare providers;
 - The intensity of nursing care required;
 - Stool and urine incontinence;
 - Shared medical equipment or procedures; and
 - Length of stay.

For roommates and other high-risk contacts that have been discharged, healthcare facilities should “flag” charts to facilitate admission screening if those individuals are readmitted to the facility in the next six months. Other local factors may be considered, and admission screening or wider point prevalence surveys may be recommended. Each situation is unique, and the final approach will be based on discussions between MDPH and the hospital.

Pertinent contact screening details include:

- Specimens for screening may be obtained by anyone who is qualified.
 - The recommended screening sites are either rectal swabs for CPOs or combined axilla/groin or combined nares/axilla/groin swabs for *C. auris*.
 - Keep a record of screening results and flag any CPO- or *C. auris*-positive patients for appropriate infection control.
 - MDPH may recommend wider point prevalence surveys of units, depending on the results of epidemiological investigations.
 - See Appendices H-I for further information and screening protocol.
- 9. In the event of a cluster of cases, consider active surveillance screening.** Unlike screening of high-risk contacts, which is routinely recommended for CPO and *C. auris* cases, this approach is the systematic screening of a predefined patient population, such as all ICU admissions (19). Typically, surveillance screening is performed upon admission and periodically thereafter, for affected wards or areas. Surveillance screening is another strategy used successfully as part of an intervention bundle to control outbreaks (20).

Cohorting

- 1. Cohort nursing staff that care for targeted MDRO-positive patients as resources allow. This is most important and more feasible in the situation of ≥ 2 targeted MDRO-positive patients.**
- 2. In the event >1 case is detected, cohort patients to one hospital ward when technically feasible.** Private rooms for each patient are still recommended.

Skilled Nursing Facilities (SNFs) and Rehabilitation Facilities

PART 1:

General MDRO prevention measures for SNFs

MDRO prevention and response is a multifaceted approach that involves:

Communication

- 1. Ensure adequate processes are in place for rapid notification to pertinent staff** when MDROs are identified at facility transfer or by the microbiology laboratory. This should include requesting that the laboratory call and notify the facility when any MDRO is identified.

Hand Hygiene Education & Monitoring

- 2. Ensure routine adherence to hand hygiene:**
 - Immediately before touching a resident, even if gloves will be worn;
 - Always upon room entry and exit;
 - Between caring for roommates;
 - Before exiting the resident's care area after touching the resident or the resident's immediate environment;
 - After contact with blood, body fluids or excretions, wound dressings, or contaminated surfaces;
 - Before performing an aseptic task such as capillary blood glucose testing or handling invasive medical devices;
 - If hands move from contaminated body sites to clean body sites during resident care; and
 - Immediately before donning gloves and after glove removal.

Infection Control Precautions

- 3. Ensure sufficient and appropriate PPE (gloves and gowns) is available and readily accessible.** Ensure all staff are trained and understand when and how to use PPE. Refer to the section labeled "When and how to apply precautions for MDRO-positive residents" on page 22 for further guidance.

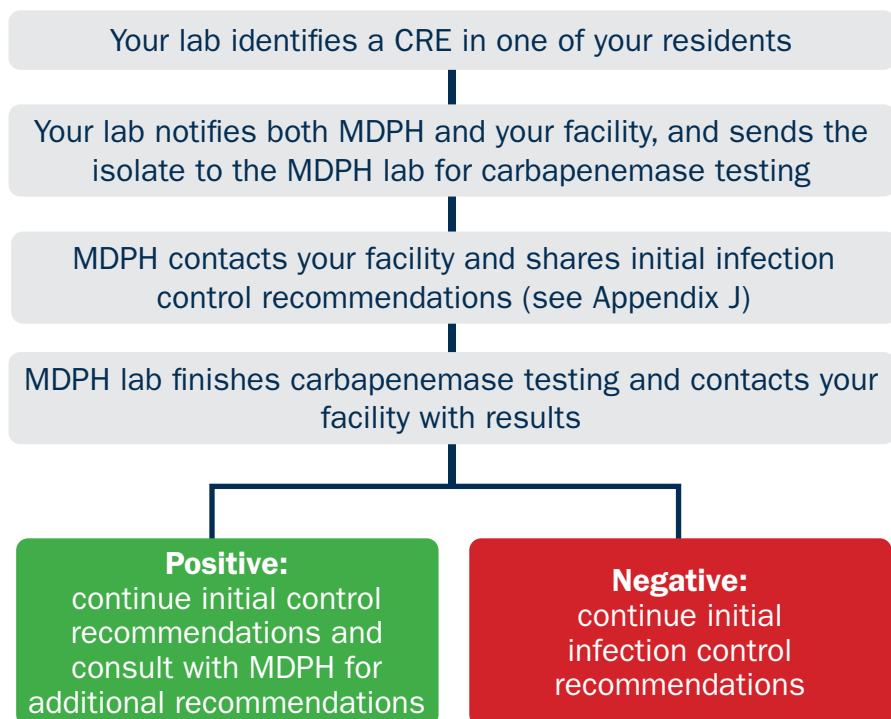
Education

- 4. Educate staff about MDROs.** Provide an in-service for staff about MDROs. Sample fact sheets are attached as appendices (see Appendices A-D) and additional educational materials can be requested from MDPH. As needed, MDPH can provide assistance with MDRO education at facilities.

5. **Review general infection prevention and control policies and ensure that appropriate training, competencies, and audits are in place.** Examples of important basic issues are standard precautions, including hand hygiene, contact precautions, cleaning and disinfection of any reusable medical equipment that is not dedicated to a single patient, linen reprocessing and environmental cleaning. For environmental cleaning, ensure housekeeping is properly using an EPA-registered disinfectant labeled for use in healthcare (21) and in particular, if *C. auris* is identified, use of a disinfection product from EPA list P: [List P: Antimicrobial Products Registered with EPA for Claims Against *Candida auris* | US EPA](#) .



PART 2: CPO identification & testing



PART 3:

What to do when an MDRO is identified at your SNF

These recommendations are also summarized in the table in Appendix J: Summary of Infection Control Recommendations for MDROs in SNFs.

Hand Hygiene Education & Monitoring


- 1. Promote hand hygiene and monitor staff adherence to hand hygiene: this is the single most important aspect of preventing MDRO transmission!** Use the case as an opportunity to initiate a facility-wide hand hygiene campaign. CDC's long-term care facility hand hygiene and contact precautions observation tool can be found in Appendix E.

Communication

- 2. Laboratories are required to report to MDPH** within one business day of identification of a patient isolate meeting the case definition (listed on page 6 of this toolkit). Report any new cases or known cases transferred from out-of-state. Coordinate with your lab to ensure they are aware of the reporting requirements and are accurately reporting.
- 3. Consult public health about developing the appropriate infection prevention plan for the resident** based on the resident's clinical status and other medical and social needs.
- 4. Notify the resident and caregivers of the patient's MDRO status.** Healthcare facilities should promptly notify the resident, their family or primary caregiver, and healthcare staff when an MDRO is identified.
- 5. Upon resident transfer to another healthcare facility, inform the receiving facility, both verbally and in writing, that the resident has an MDRO.** An example transfer form is provided in Appendix F. Ensure that individuals directly caring for the resident and responsible for infection prevention are aware.
- 6. If a resident infected or colonized with an MDRO is discharged home, ensure the resident, immediate family and/or caregivers, and the primary care provider are aware of the diagnosis.** This will potentially help the individual during future medical treatment and assist public health in tracking MDROs on subsequent facility admissions.

Infection Control

- 7. Place residents infected or colonized with an MDRO, and any at-risk residents in the facility, on appropriate precautions.** See "When and how to apply precautions for MDRO-positive residents in SNFs" on page 22 for further guidance. Review and monitor PPE adherence with staff.

- 
8. **Dedicate equipment** (e.g., stethoscope, blood pressure cuff) or use disposable equipment for MDRO-positive resident. This will decrease the chance of transmission within the facility.
 9. **Verify and audit decontamination, disinfection, reprocessing, and sterilization** (when needed) of reusable medical equipment, especially that used by MDRO-colonized or MDRO-infected residents.

Environmental Cleaning Education & Monitoring

10. **Review the importance of meticulous environmental cleaning with housekeepers and audit housekeeping staff.** Determine and fix any gaps in the adequacy of room cleaning on discharge or transfer before placing another resident in the room. If available, use additional strategies to check cleaning adequacy, such as UV fluorescence markers or ATP monitors. Ensure that housekeeping staff is aware of rooms with MDRO-positive residents and is trained in the correct use of PPE. Routinely audit and document the quality of cleaning and disinfection procedures (23).
11. **Enhanced environmental cleaning:** This includes, at a minimum, daily room and bathroom cleaning and attention to “high-touch” surfaces, such as light switches, doorknobs and bathroom handrails. Two long-term care facility environmental cleaning checklists, one for resident rooms and one for common areas, can be found in the appendix (see Appendices K and L).

Education

12. **Educate staff, affected residents and their visitors about MDROs.** Encourage visitors and families to practice proper hand hygiene. Education helps to reduce the spread of MDROs.
13. **Notify appropriate clinicians and other staff (medical director, director of nursing, pharmacist, etc.) of an MDRO in the facility.** Specific goals:
 - Limit use of urinary catheters, vascular access catheters, enteral feeding tubes and other invasive devices in all residents.
 - Discontinue unnecessary antimicrobial use in all residents, especially those who are MDRO-positive.
 - » Review monthly antimicrobial use, culture orders, and susceptibility patterns to evaluate appropriate antimicrobial use and identify if unnecessary antimicrobials and cultures were ordered. MDPH recommends exploring resources available to enhance your facility’s antimicrobial stewardship program. One option is to participate in the Antibiotic Start Reporting Program: Long-Term Care Facility Antibiotic Stewardship - Infection Prevention and Control Resource Hub (<https://infectioncontrolma.org/index.php>)
 - Contact MDPH for information on antimicrobial stewardship programs in long-term care facilities at 617-983-6800.
14. **Notify facility administration.** Prevention of spread needs to be an institutional priority, which requires leadership and monetary support (24).

Additional recommendations based on the results of carbapenemase gene testing (in the case of a carbapenem-resistant organism):

If carbapenemase testing is NEGATIVE (i.e., for a non-carbapenemase-producing-CRE, CRAB, or CRPA) no additional measures are required. Continue the infection control recommendations summarized in Appendix J.

For carbapenemase-producing organisms (CP-CRE, CP-CRAB, and CP-CRPA), pan-resistant organisms and *C. auris*, additional infection control measures may be indicated, depending on the situation. Continue the recommendations summarized in Appendix J and consult with MDPH (617-983-6800) on further infection control measures, which may include:

- Surveillance
- Cohorting residents
- Contact screening

Contact screening


In consultation with MDPH (available 24/7 at 617-983-6800), your facility may need to obtain screening swabs from high-risk resident-contacts. This screening is performed at no cost to the facility. The purpose of contact screening is to determine if additional residents are colonized with a CPO or *C. auris*, and if transmission is occurring in a facility or on a unit. Expand the screening group if initial testing reveals additional cases. Considerations for contacts at highest risk include factors related to duration and intensity of exposure to the known CPO- or *C. auris*-positive resident, including the following:

- a. Proximity to CPO- or *C. auris*-positive resident;
- b. Shared healthcare providers;
- c. Intensity of nursing care required;
- d. Stool or urine incontinence;
- e. Shared medical equipment or procedures; and
- f. Length of stay.

It is important to screen roommates, even if already discharged. For roommates and other high-risk contacts that have been discharged, flag charts to facilitate admission screening if these individuals are readmitted to the facility in the next six months. Other local factors may be considered, and admission screening or wider point prevalence surveys may be recommended. Each situation is unique, and the final approach will be based on discussions between MDPH and the facility.

Pertinent screening details include:

- See Appendix I for the recommended screening protocols. MDPH is available for consultation and assistance throughout the process.
- Written consent is not required for CPO or *C. auris* colonization screening; however, your facility may choose to obtain consent. If MRSA, VRE or other



MDRO screening is performed in your facility, a similar consent process may be used for CPO and *C. auris* screening. Either verbal or written consent, depending on your facility's policies and procedures, may be appropriate. See Appendices M and N for Patient Screening FAQs and a sample consent form.

- Specimens for screening may be obtained by anyone who is qualified.
- The recommended screening specimens for CPOs are rectal swabs. The recommended screening specimens for *C. auris* are combined axilla/groin or combined nares/axilla/groin swabs. The cost-benefit ratio of screening additional sites is uncertain and therefore not routinely recommended. Screening should not be billed to the resident.
- Keep a record of screening results and “flag” any MDRO-positive residents for appropriate infection control.

Point prevalence surveys

MDPH may recommend point prevalence surveys, depending on the results of epidemiological investigations. Point prevalence surveys refer to expanding contact screening to an entire unit, floor, or facility.

- If any new residents screen positive for CPO or *C. auris* colonization, then infection control measures should be taken, including placing residents on the appropriate precautions.
- Positive surveys likely indicate that transmission is occurring in a facility or on a unit, and additional measures may need to be taken, including:
 - » Implement contact precautions for positive residents until transmission is no longer occurring (see “When and how to apply precautions for MDRO-positive residents in SNFs” on page 22 for further guidance).
 - » Conduct additional screening of residents until transmission is no longer occurring (i.e., two consecutive negative surveys at least two weeks apart). Note: patients known to be infected or colonized with an MDRO should not be rescreened.

In the event of an outbreak, consult with MDPH regarding the need for supplemental measures, including active surveillance screening.

When and how to apply precautions for MDRO-positive residents in SNFs

In 2022, CDC updated its guidance on the use of Enhanced Barrier Precautions (EBP) for long-term care facilities. Enhanced barrier precautions expand the use of PPE to all high contact resident care activities for residents with a wound or any indwelling device (regardless of MDRO status), and all residents infected or colonized with a targeted or epidemiologically important MDRO when contact precautions do not apply. For further guidance on enhanced barrier precautions, please see Appendix J or visit the CDC's website at <https://www.cdc.gov/long-term-care-facilities/hcp/prevent-mdro/ppe.html> (7).

Definition of “at-risk” residents based on CDC guidance (7):

- Ventilator-dependent;
- Indwelling medical devices (e.g., central line, urinary catheter, feeding tube, tracheostomy); or
- Wounds

Contact precautions, which involve using gown and gloves when entering the resident's room, are used for:

- Residents who are infected or colonized with an MDRO and have acute diarrhea, draining wounds, or other sites of secretions or excretions that are unable to be covered or contained; or
- Residents with an MDRO who reside on a unit or in a facility where ongoing transmission is documented or suspected.

Unlike EBP, contact precautions require room restriction, so they are generally intended to be time-limited and, when implemented, should include a plan for discontinuation or de-escalation. If contact precautions are being used due to ongoing transmission, they can be discontinued after a unit has two consecutive negative point prevalence surveys (i.e., two surveys where no new positives are found). Previously positive residents should not be rescreened.

For further guidance on when to use contact precautions or enhanced barrier precautions, please refer to Appendix J.

Important details:

- 1. Hand hygiene** is key to preventing transmission, and the appropriate use of transmission-based precautions for care provides an additional measure of protection. Staff should be reminded to perform hand hygiene before donning and after doffing gloves and gowns.
- 2. Standard precautions should be employed for all residents, regardless of MDRO status.** This includes hand hygiene and, depending on anticipated exposure with body fluid or potential splash/spray, the use of gowns and gloves, mouth and eye protection. Refer to the Standard precautions section in the Ambulatory care section on page 24 of this toolkit for additional information.

How to don and doff PPE:

How to Put On Personal Protective Equipment	
1	PERFORM HAND HYGIENE 
2	PUT ON GOWN 
3	PUT ON MASK OR N95 RESPIRATOR 
4	PUT ON EYE PROTECTION 
5	PUT ON GLOVES 

How to Remove Personal Protective Equipment	
1	REMOVE GLOVES 
2	REMOVE GOWN 
3	PERFORM HAND HYGIENE 
4	REMOVE EYE PROTECTION 
5	REMOVE MASK OR N95 RESPIRATOR 
6	PERFORM HAND HYGIENE 

When can precautions for residents with a targeted MDRO be discontinued?

MDPH does not recommend re-testing to determine whether precautions can be discontinued. MDPH should be consulted if a facility is considering discontinuing precautions for a resident with an MDRO. In rare circumstances, consecutive cultures might be used to discontinue precautions for a resident. However, there is currently not enough information to make a recommendation on when precautions can be discontinued for patients colonized or infected with MDROs. Patients may be colonized for long periods of time (months and even years) and can be intermittently positive when screened (24).

INFECTION PREVENTION AND CONTROL IN:

Ambulatory care, outpatient clinics, hemodialysis centers, ambulatory surgery centers, home health, hospice

Standard Precautions are used for all patient care.

Refer to the 2016 CDC booklet titled the Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Care, available here: <https://www.cdc.gov/healthcare-associated-infections/hcp/prevention-healthcare/outpatient-expectations.html>(25). The most pertinent infection prevention and control measures for preventing the transmission of CRE, other MDROs, norovirus and many other infections in ambulatory care settings are adherence to hand hygiene and proper use of personal protective equipment (PPE). Key recommendations for each item in the document are copied below.

Key recommendations for hand hygiene in ambulatory care settings:

- 1. Key situations where hand hygiene should be performed include:**
 - Immediately before touching a patient, even if gloves will be worn;
 - Before exiting the patient's care area after touching the patient or the patient's immediate environment;
 - After contact with blood, body fluids or excretions, or wound dressings;
 - Before performing an aseptic task such as placing an IV or preparing an injection;
 - If hands move from contaminated body sites to clean body sites in patient care; and
 - Before donning gloves and after glove removal.
- 2. The preferred method of hand decontamination is with an alcohol-based hand rub that contains at least 60% alcohol.**

Exception: Use soap and water when hands are visibly soiled or after using the restroom.

Key recommendations for the use of PPE in ambulatory care settings:

- 1. Facilities should ensure that sufficient and appropriate PPE is available and readily accessible.**
- 2. Educate all healthcare providers on proper selection and use of PPE.**
- 3. Remove and discard PPE before leaving the patient's room or area.**
- 4. Wear gloves for potential contact with blood, body fluids, mucous membranes, non-intact skin or contaminated equipment:**
 - Do not wear the same pair of gloves for the care of more than one patient;
 - Do not wash gloves for the purpose of reuse; and
 - Perform hand hygiene immediately after removing gloves.
- 5. Wear a gown to protect skin and clothing during procedures or activities where contact with blood or body fluids is anticipated.**
- 6. Do not wear the same gown for the care of more than one patient.**
- 7. Wear mouth, nose and eye protection during procedures that are likely to generate splashes or sprays of blood or other body fluids.**
- 8. Wear a surgical mask when placing a catheter into the spinal canal or subdural space and when injecting material into these spaces.**

We strongly recommend outpatient settings use the *Infection Prevention for Outpatient Settings* checklist included with the guide (and located here: <https://www.cdc.gov/infection-control/media/pdfs/outpatient-guide-508.pdf>) to review current policies and practices. Topics include transmission-based precautions, safe injection practices, and safe medication storage.

Infection Prevention tools and resources specific for dialysis facilities are available at the following link: <https://www.cdc.gov/dialysis-safety/about/>.

INFECTION PREVENTION AND CONTROL IN:

Community-based care settings including assisted living facilities, residential care facilities, adult foster homes, memory care

Standard precautions are recommended.

The most important infection prevention and control measures for MDROs in the community-based care setting are similar to those in outpatient and ambulatory care. Refer to the 2016 CDC booklet titled the *Guide to Infection Prevention for Outpatient Settings: Minimum Expectations for Safe Care*, available here: <https://www.cdc.gov/healthcare-associated-infections/hcp/prevention-healthcare/outpatient-expectations.html> (25). The most important infection prevention and control measures to prevent transmission of CRE, other MDROs, norovirus and many other infections in community-based care settings are **adherence to hand hygiene and proper use of personal protective equipment (PPE)**.

Key recommendations for hand hygiene in community-based care settings:

- 1. Key situations where hand hygiene should be performed include:**
 - Before touching the colonized or infected person, even if gloves will be worn;
 - Before exiting the care area after touching the colonized or infected person or their immediate environment;
 - After contact with blood, body fluids or excretions, or wound dressings;
 - Before performing an aseptic task such as placing an IV, blood glucose monitoring, or preparing an injection;
 - If hands move from contaminated body sites to clean body sites during care; and
 - Before donning gloves and after glove removal.
- 2. The preferred method of hand decontamination is with an alcohol-based hand rub that contains at least 60% alcohol.**

Exception: Use soap and water when hands are visibly soiled or after using the restroom.

Key recommendations for use of PPE in community-based care settings:

- 1. Facilities should ensure that sufficient and appropriate PPE is available and readily accessible.**
- 2. Educate all healthcare providers on proper selection and use of PPE.**
- 3. Remove and discard PPE before leaving the resident's room or area.**
- 4. Wear gloves for potential contact with blood, body fluids, mucous membranes, non-intact skin or contaminated equipment:**
 - Do not wear the same pair of gloves for the care of more than one resident;
 - Do not wash gloves for the purpose of reuse; and
 - Perform hand hygiene immediately after removing gloves.
- 5. Wear a gown to protect skin and clothing during procedures or activities where contact with blood or body fluids is anticipated:**
 - Do not wear the same gown for the care of more than one resident.
- 6. Wear mouth, nose and eye protection during procedures that are likely to generate splashes or sprays of blood or other body fluids.**

We strongly recommend outpatient settings use the *Infection Prevention for Outpatient Settings* checklist included with the guide (located here: <https://www.cdc.gov/infection-control/media/pdfs/outpatient-guide-checklist-508.pdf>) to review current policies and practices. Topics include transmission-based precautions, safe injection practices, and safe medication storage.

INFECTION PREVENTION AND CONTROL IN:

Individuals colonized or infected with MDROs and living at home

We recommend good hand hygiene and MDRO education.

The most important message for persons living at home who are colonized or infected with MDROs is adherence to good hand hygiene. MDRO education is also important; MDRO-positive persons should be informed that, if they are hospitalized, additional precautions will be taken when they receive care, and they should inform their healthcare providers of their MDRO history.

Family members or healthcare staff providing patient care in the home setting should use standard precautions and adhere to hand hygiene guidelines.

Key recommendations for hand hygiene in home settings:

- 1. Key situations where hand hygiene should be performed include:**
 - Before touching the colonized or infected person, even if gloves will be worn;
 - Before exiting the care area after touching the colonized or infected person or their immediate environment;
 - After contact with blood, body fluids or excretions, or wound dressings;
 - Before performing an aseptic task such as placing an IV, blood glucose monitoring, or preparing an injection;
 - If hands move from contaminated body sites to clean body sites during care; and
 - Before donning gloves and after glove removal.
- 2. The preferred method of hand decontamination is with an alcohol-based hand rub that contains at least 60% alcohol.**

Exception: Use soap and water when hands are visibly soiled or after using the restroom.

Key recommendations for use of PPE in home settings:

- 1. Home care agencies should ensure that sufficient and appropriate PPE is available and readily accessible.**
- 2. Educate all healthcare providers on proper selection and use of PPE.**
- 3. Remove and discard PPE before leaving the room or area.**
- 4. Wear gloves for potential contact with blood, body fluids, mucous membranes, non-intact skin or contaminated equipment:**
 - Do not wear the same pair of gloves for the care of more than one person;
 - Do not wash gloves for the purpose of reuse; and
 - Perform hand hygiene immediately after removing gloves.
- 5. Wear a gown to protect skin and clothing during procedures or activities where contact with blood or body fluids is anticipated.**
- 6. Wear mouth, nose and eye protection during procedures that are likely to generate splashes or sprays of blood or other body fluids.**

For additional information on infection prevention in your home, please refer to the Association for Professionals in Infection Control and Epidemiology (APIC) resources: [https://apic.org/Resource_/TinyMceFileManager/for_consumers/IPandYou Bulletin Infection prevention in the home.pdf](https://apic.org/Resource_/TinyMceFileManager/for_consumers/IPandYou_Bulletin_Infection_prevention_in_the_home.pdf)

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APPENDICES

CRE Carbapenem-resistant Enterobacterales

An Urgent Public Health Threat 

Information for Facilities

Carbapenem-Resistant Enterobacterales (CRE)

Enterobacterales is an order of gram-negative bacteria that includes some organisms commonly identified in clinical microbiology laboratories, like *Escherichia coli* and *Klebsiella pneumoniae*.

Carbapenems are last-line antibiotics used to treat serious multi-drug-resistant infections. In the United States, about 2-3% of Enterobacterales associated with healthcare-associated infections are resistant to carbapenems.

CRE infections **don't respond to common antibiotics** and invasive infections are associated with high mortality rates. Some CRE are resistant to all available antibiotics.

Carbapenemase-Producing CRE

A subset of CRE, called **carbapenemase-producing CRE, are primarily responsible for the rapid global spread of CRE**, including in U.S. healthcare settings. Carbapenemases are enzymes that inactivate carbapenems and other β -lactam antibiotics. Carbapenemase-producing CRE can share the genetic code for carbapenemases with other bacteria, rapidly spreading resistance.

COMMON ENTEROBACTEREALES SPECIES:

- *Escherichia coli*
- *Klebsiella pneumoniae*
- *Enterobacter cloacae*
- *Citrobacter freundii*
- *Serratia marcescens*

CARBAPENEMASES MOST COMMONLY IDENTIFIED U.S. CRE

- KPC
- NDM
- VIM
- OXA-48-type
- IMP



How is CRE Transmitted?

CRE spreads through direct or indirect contact with patients infected or colonized with CRE or contaminated environment and surfaces. In healthcare, transmission is usually person to person, and CRE is often carried on the hands of health care personnel or on contaminated shared medical equipment (e.g., portable X-ray machines). Some environmental sources, such as sink drains and toilets, can be important reservoirs contributing to CRE transmission.

How Does CRE Spread?

Hospital patients and long-term care facility residents, especially those who

- Receive complex medical care, including intensive care unit admission or having invasive devices
- Have taken certain antibiotics
- Need help with activities like toileting, bathing, and dressing

Anyone who had medical procedures or was admitted to a hospital outside the United States in the past 6 months.



INFECTIONS

COLONIZATION

Colonization

Colonization means that an organism is found in or on the body, but it is not causing any symptoms or disease. CRE primarily colonizes the digestive tract, but can also colonize other body sites. Patients may remain colonized with CRE for months to years.

Why is colonization important?

Infections represent only a fraction of the burden of CRE. Many more patients are colonized. Patients colonized with CRE can be a source of spread to other patients. They are also at higher risk of developing CRE infection than patients who are not colonized. Because patients colonized with CRE don't have signs or symptoms of illness, CRE colonization can go undetected and contribute to silent spread of resistant bacteria.

How can we identify colonized patients to stop spread?

Screening tests identify patients colonized with carbapenemase-producing CRE to prevent transmission to other patients through targeted interventions, like Transmission-Based Precautions. **Screening tests for patients and residents at risk of CRE colonization are available at no cost through CDC's Antimicrobial Resistance (AR) Lab Network.**

How Your Facility Can Prevent the Spread of CRE



Timely and Accurate Identification of Patients with CRE

- Ensure your clinical laboratory can identify CRE.
- Ask your health department about the availability of specialized testing through CDC's AR Lab Network to identify carbapenemase-producing CRE from clinical cultures and to screen for CRE colonization.
- Follow public health recommendations for CRE colonization screening.
- When transferring a patient colonized or infected with CRE, notify accepting facilities and units of the patient's CRE history.
- Work with your health department to understand local CRE epidemiology.



Perform Hand Hygiene

- Clean your hands immediately before touching a patient, before performing an aseptic task (e.g., placing an indwelling device), before handling invasive medical devices, and before moving from work on a soiled body site to a clean body site on the same patient.
- Clean your hands after touching a patient or the patient's immediate environment; after contact with blood, body fluids, or contaminated surfaces; and immediately after glove removal.

Did you know?

Alcohol-based hand sanitizers are the preferred method for cleaning your hands in most clinical situations.

Wash your hands with soap and water whenever they are visibly dirty, before eating, and after using the restroom.



Wear Gown & Gloves When Caring for Patients with CRE

CRE can contaminate your hands and clothes while you care for a patient with CRE or work in their environment. This puts the patients who you care for afterward at risk of getting CRE.

- Protect your patients by wearing a gown and gloves for patient care according to the guidelines for your setting (i.e., Contact Precautions in acute care, Enhanced Barrier Precautions in long-term care).
- Don and doff your personal protective equipment (PPE) in the right order and take care not to self-contaminate during doffing.
- Always change your PPE between patients or residents.



Clean and Disinfect the Patient Environment and Medical Equipment

- Follow your facility's cleaning and disinfection protocols.
- Ensure high-touch surfaces (e.g., bed rails, light switches, call buttons) are cleaned frequently.
- Dedicate non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs) to CRE patients whenever possible and always clean and disinfect between patients.
- Ensure shared medical equipment (e.g., portable X-ray machine) is cleaned and disinfected between each patient.



Prevent Transmission from Sinks, Toilets, and Other Wastewater Plumbing

CRE can contaminate wastewater plumbing, especially sink drains, toilets, and hoppers. Splashes from these sources are associated with outbreaks of carbapenemase-producing organisms.

- Clean and disinfect countertops, handles, faucets, and sink basins at least daily.
- Keep patient care items at least three feet away from sinks, toilets, and hoppers.
- Do not discard patient waste in sinks.
- Avoid discarding beverages or other sources of nutrients in sinks or toilets.

Resources

Learn more about CRE: <https://www.cdc.gov/cre/about/>

Contact your HAI Prevention Program: <https://www.cdc.gov/healthcare-associated-infections/programs/>

Preventing water-associated infections: <https://www.cdc.gov/healthcare-associated-infections/php/toolkit/water-management.html>

About CDC's AR Lab Network: <https://www.cdc.gov/antimicrobial-resistance-laboratory-networks/php/about/domestic.html>

Track carbapenemase-producing CRE: <https://arpsp.cdc.gov/profile/arln/cre>



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

CRPA

Carbapenem-resistant *Pseudomonas aeruginosa*

A Serious Public Health Threat 

Information for Facilities

Carbapenem-Resistant *Pseudomonas aeruginosa* (CRPA)

Pseudomonas aeruginosa bacteria are a common cause of infections in healthcare settings. They can **cause pneumonia, bloodstream infections, urinary tract infections, and surgical site infections**, and they are particularly dangerous for patients with chronic lung diseases. Carbapenems are last-line antibiotics used to treat serious multi-drug-resistant infections. Carbapenem-resistant *P. aeruginosa* (CRPA) infections are not susceptible to the effects of these antibiotics, and some are resistant to all available antibiotics.

Carbapenemase-Producing CRPA

A small subset of CRPA produce carbapenemases, enzymes that inactivate carbapenem and other beta-lactam antibiotics. These **carbapenemase-producing (CP) CRPA are typically resistant to most available antibiotics**. CP-CRPA can share the genetic code for carbapenemases with other bacteria, rapidly spreading resistance.

Currently, carbapenemase-producing CRPA are uncommon in the United States. By taking action to detect these multi-drug-resistant organisms and intervene to prevent transmission when they are identified, we can limit spread in the United States.

**CARBAPENEMASES
MOST IDENTIFIED IN
U.S. CRPA**

• VIM • KPC
• NDM • IMP • GES



How is CRPA Transmitted?

In healthcare settings, CRPA is transmitted from person to person, via the hands of healthcare personnel or contaminated medical equipment and devices. *Pseudomonas* thrives in the presence of water. Contaminated environmental sources, such as sink drains and toilets, have been increasingly recognized as reservoirs contributing to CRPA transmission.

Who is at risk?

Hospital patients and long-term care facility residents, especially those who

- Receive complex medical care, such as intensive care unit admission or having invasive devices
- Have severe or chronic wounds
- Have recent antibiotic exposure
- Were admitted to the same unit of a healthcare facility as a person with CRPA

Anyone who received inpatient medical care or underwent invasive medical procedures outside the U.S. in the past 6 months.



INFECTIONS

COLONIZATION

Colonization

Colonization means that the organism is found in or on the body, but it is not causing any symptoms or disease. CRPA can colonize many body sites, including the respiratory tract, wounds, and digestive tract. Patients may remain colonized for months to years.

Why is colonization important?

Infections represent only a fraction of the burden of CRPA; many more patients are colonized. Patients colonized with CRPA can be a source of spread to other patients and develop CRPA infections. Because patients colonized with CRPA do not have signs or symptoms of infection, they can go undetected and contribute to silent spread of resistant bacteria.

How can we identify patients colonized with CRPA to stop spread?

Screening tests identify patients colonized with carbapenemase-producing CRPA to prevent transmission to other patients through targeted interventions, like Transmission-Based Precautions. **Screening tests for patients and residents at risk of CRPA colonization are available at no cost through CDC's Antimicrobial Resistance Lab (AR) Network.**



How Your Facility Can Prevent the Spread of CRPA



Timely and Accurate Identification of Patients with CRPA

- Ensure your clinical laboratory can identify CRPA.
- Ask your health department about the availability of specialized testing through CDC's AR Lab Network to identify carbapenemase-producing CRPA from clinical cultures and to screen for CRPA colonization.
- Follow public health recommendations for CRPA colonization screening.
- When transferring a patient colonized or infected with CRPA, notify accepting facilities and units of the patient's CRPA history.
- Work with your health department to understand local CRPA epidemiology.



Perform Hand Hygiene

- Clean your hands immediately before touching a patient, before performing an aseptic task (e.g., placing an indwelling device), before handling invasive medical devices, and before moving from work on a soiled body site to a clean body site on the same patient.
- Perform hand hygiene after touching a patient or the patient's immediate environment; after contact with blood, body fluids, or contaminated surfaces; and immediately after glove removal.

Did you know?

Alcohol-based hand sanitizers are the preferred method for cleaning your hands in most clinical situations.

Wash your hands with soap and water whenever they are visibly dirty, before eating, and after using the restroom.



Wear Gown & Gloves When Caring for Patients with CRPA

CRPA can contaminate your hands and clothes while you care for a patient with CRPA or work in their environment. This puts the patients who you care for afterward at risk of acquiring CRPA.

- Protect your patients by wearing a gown and gloves for patient care according to the guidelines for your setting (i.e., Contact Precautions in acute care, Enhanced Barrier Precautions in long-term care).
- Don and doff your personal protective equipment (PPE) in the right order and take care not to self-contaminate during doffing.
- Always change your PPE between patients or residents.



Clean and Disinfect the Patient Environment and Medical Equipment

- Follow your facility's cleaning and disinfection protocols.
- Ensure high-touch surfaces (e.g., bed rails, light switches, call buttons) are cleaned frequently.
- Dedicate non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs) to CRPA patients whenever possible and always clean and disinfect between patients.
- Ensure shared medical equipment is cleaned and disinfected after each use.



Prevent Transmission from Sinks, Toilets, and Other Wastewater Plumbing

CRPA can contaminate wastewater plumbing, especially sink drains, toilets, and hoppers. Water splashes from these sources has been associated with outbreaks of carbapenemase-producing organisms.

- Clean and disinfect countertops, handles, faucets, and sink basins at least daily.
- Keep patient care items at least three feet away from sinks, toilets, and hoppers.
- Do not discard patient waste in sinks.
- Avoid discarding beverages or other sources of nutrients in sinks or toilets.

Resources

Contact your HAI Prevention Program: <https://www.cdc.gov/healthcare-associated-infections/programs/>

Learn more about CRPA: <https://www.cdc.gov/pseudomonas-aeruginosa/about/>

Preventing water-associated infections: <https://www.cdc.gov/healthcare-associated-infections/php/toolkit/water-management.html>

About CDC's AR Lab Network: <https://www.cdc.gov/antimicrobial-resistance-laboratory-networks/php/about/domestic.html>

Track carbapenemase-producing CRE: <https://arpsp.cdc.gov/profile/arln/crpa>

CRAB Carbapenem-resistant *Acinetobacter baumannii*

An Urgent Public Health Threat 

Information for Facilities

Acinetobacter baumannii is a species of bacteria that is an opportunistic pathogen. It can **cause a variety of different types of infections**. Infections caused by carbapenem-resistant *A. baumannii* (CRAB) **don't respond to common antibiotics** and some CRAB are resistant to all available antibiotics.

Large outbreaks of CRAB have been reported in U.S. hospitals and nursing homes.

In the United States, most CRAB produce carbapenemases, enzymes that inactivate carbapenem and other beta-lactam antibiotics. There are many different carbapenemases associated with CRAB. **Carbapenemase-producing CRAB has the potential to spread rapidly** and is frequently associated with outbreaks. CRAB is sometimes referred to by the type of carbapenemase genes it is carrying, e.g., OXA-23-producing CRAB or NDM-producing CRAB.

Carbapenemases identified in U.S. CRAB

More Common

- OXA-23-like
- OXA-24/40-like

Less Common

- KPC • NDM • VIM
- IMP • OXA-48-like
- OXA-58-like • OXA-235-like



How does CRAB spread?

CRAB spreads through direct and indirect contact with patients infected or colonized with CRAB or contaminated environmental surfaces and equipment. It is usually transmitted from person to person, often via the hands of healthcare personnel or on contaminated shared medical equipment, like IV poles and blood pressure machines. CRAB can cause large outbreaks in healthcare facilities. Without effective cleaning and disinfection, CRAB can persist in the environment and on medical equipment for days to weeks, even in dry conditions.

Who is at risk?

Hospital patients and long-term care facility residents, especially those who

- Receive complex medical care, including intensive care unit admission or having invasive devices
- Have severe or chronic wounds
- Have recently taken antibiotics
- Were admitted to the same room or unit as a person colonized or infected with CRAB

Anyone who received inpatient medical care or underwent invasive medical procedures outside the U.S. in the past 6 months.

INFECTIONS



COLONIZATION

Colonization

Colonization means that an organism is found in or on the body, but it is not causing any symptoms or disease. CRAB primarily colonizes the digestive tract, respiratory tract, skin, and/or wounds, but can colonize other body sites. Patients may remain colonized with CRAB indefinitely.

Why is colonization important?

Infections represent only a fraction of the burden of CRAB. Many more patients are colonized. Patients who are colonized with CRAB can be a source of spread to other patients. They are also at higher risk of developing CRAB infection than patients who are not colonized. And because patients colonized with CRAB don't have signs or symptoms, CRAB colonization can go undetected and contribute to silent spread of resistant bacteria.

How can we identify colonized patients to stop spread?

Identifying patients colonized with CRAB initiates targeted actions to prevent transmission to other patients. Colonization is detected by a screening test for patients and residents who are at risk of CRAB colonization or infection. **Screening tests are available at no cost through CDC's Antimicrobial Resistance (AR) Laboratory Network.**

How Your Facility Can Prevent the Spread of CRAB



Ensure Timely Identification of Patients Infected or Colonized with CRAB

- Ensure your clinical laboratory can identify CRAB.
- Ask about specialized testing to detect carbapenemase-producing CRAB in clinical cultures and through colonization screening via CDC's AR Lab Network.
- Follow public health recommendations for CRAB colonization screening.
- When transferring a patient colonized or infected with CRAB, notify accepting facilities and units of the patient's CRAB history.
- Work with your health department to understand local CRAB epidemiology.



Perform Hand Hygiene

- Clean your hands immediately before touching a patient, before performing an aseptic task (e.g., placing an indwelling device), before handling invasive medical devices, and before moving from work on a soiled body site to a clean body site on the same patient.
- Clean your hands after touching a patient or the patient's immediate environment; after contact with blood, body fluids, or contaminated surfaces; and immediately after glove removal.

Did you know?

Alcohol-based hand sanitizers are the preferred method for cleaning your hands in most clinical situations.

Wash your hands with soap and water whenever they are visibly dirty, before eating, and after using the restroom.



Wear Gown & Gloves When Caring for Patients with CRAB

CRAB can contaminate your hands and clothes while you care for a patient infected or colonized with CRAB or work in their environment. This puts the patients who you care for afterward at risk of getting CRAB.

- Protect your patients by wearing a gown and gloves for patient care according to the guidelines for your setting (i.e., Contact Precautions in acute care, Enhanced Barrier Precautions in long-term care).
- Don and doff your personal protective equipment (PPE) in the right order and take care not to self-contaminate during doffing.
- Always change your PPE between patients or residents.



Clean & Disinfect Medical Equipment

Medical equipment has been a source of spread in multiple healthcare facility CRAB outbreaks.

- Follow your facility's standardized cleaning/disinfection protocols for the medical equipment you use.
- Dedicate non-critical medical equipment (e.g., stethoscopes, blood pressure cuffs) to CRAB patients whenever possible.
- Ensure shared medical equipment (e.g., portable x-ray machine) is cleaned and disinfected between each patient.



Environmental Cleaning & Disinfection

CRAB can heavily contaminate the healthcare environment and live for weeks on wet and dry surfaces.

- Follow your facility's cleaning and disinfection protocols.
- Use EPA-registered one-step hospital-grade disinfectants and follow the label instructions for proper use of cleaning and disinfecting products (e.g., accurate dilution, sufficient wet contact time, appropriate material compatibility, storage, shelf-life, safe use, and disposal).
- Ensure high-touch surfaces (e.g., bed rails, light switches, call buttons) are cleaned at least daily.

Resources

Learn more about CRAB: <https://www.cdc.gov/acinetobacter/about/>

Contact your HAI Prevention Program: <https://www.cdc.gov/healthcare-associated-infections/programs/>

About CDC's AR Lab Network: <https://www.cdc.gov/antimicrobial-resistance-laboratory-networks/php/about/domestic.html>

Track carbapenemase-producing CRAB: <https://arpsp.cdc.gov/profile/arln/crab>



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

APPENDIX D: CDC *CANDIDA AURIS* FACT SHEET



Candida auris (also called *C. auris*) is a fungus that causes serious infections. Patients with *C. auris* infection, their family members and other close contacts, public health officials, laboratory staff, and healthcare personnel can all help stop it from spreading.



WHY IS *CANDIDA AURIS* A PROBLEM?

- It causes serious infections. *C. auris* can cause bloodstream infections and even death, particularly in hospital and nursing home patients with serious medical problems. More than 1 in 3 patients with invasive *C. auris* infection (for example, an infection that affects the blood, heart, or brain) die.
- It's often resistant to medicines. Antifungal medicines commonly used to treat *Candida* infections often don't work for *Candida auris*. Some *C. auris* infections have been resistant to all three types of antifungal medicines.
- It's becoming more common. Although *C. auris* was just discovered in 2009, it has spread quickly and caused infections in more than a dozen countries.
- It's difficult to identify. *C. auris* can be misidentified as other types of fungi unless specialized laboratory technology is used. This misidentification might lead to a patient getting the wrong treatment.
- It can spread in hospitals and nursing homes. *C. auris* has caused outbreaks in healthcare facilities and can spread through contact with affected patients and contaminated surfaces or equipment. Good hand hygiene and cleaning in healthcare facilities is important because *C. auris* can live on surfaces for several weeks.

HOW DO I KNOW IF I HAVE A *CANDIDA AURIS* INFECTION?

Most people who get serious *Candida* infections are already sick from other medical conditions.

C. auris is still rare in the United States. People who get invasive *Candida* infections are often already sick from other medical conditions, so it can be difficult to know if you have a *C. auris* infection. The most common symptoms of invasive *Candida* infection are fever and chills that don't improve after antibiotic treatment for a suspected bacterial infection. Only a laboratory test can diagnose *C. auris* infection. Talk to your healthcare provider if you believe you have a fungal or healthcare-associated infection.

STOPPING THE SPREAD OF *CANDIDA AURIS*

CDC is working with public health partners, healthcare personnel, and laboratories to stop the spread of *C. auris* in healthcare settings. Here's how CDC is asking everyone to help:

- Family members and other close contacts of patients with *C. auris*
 - » Clean your hands with hand sanitizer or soap and water before and after touching a patient with *C. auris* or equipment in his or her room.
 - » Remind healthcare personnel to clean their hands.

- Laboratory staff, healthcare personnel, and public health officials
 - » Know when to suspect *C. auris* and how to properly identify it.
 - » Report cases quickly to public health departments.
 - » For healthcare personnel, clean hands correctly and use precautions like wearing gowns and gloves to prevent spread.
 - » Clean patient rooms thoroughly with a disinfectant that works against *C. auris*.
 - » Investigate *C. auris* cases quickly and determine additional ways to prevent spread.
 - » See Recommendations for Identification, Treatment, and Infection Prevention and control of *Candida auris*.

SCIENTISTS ARE STILL LEARNING ABOUT CANDIDA AURIS

CDC and public health partners are working hard to better understand *C. auris* and answer the following questions so that we can continue to help protect people from this serious infection:

- Why is *C. auris* resistant to antifungal medicines?
- Why did *C. auris* start causing infections in recent years?
- Where did *C. auris* originally come from, and why has it appeared in many regions of the world at the same time?

APPENDIX E: HAND HYGIENE AND CONTACT PRECAUTIONS OBSERVATION TOOL

Hand Hygiene and Contact Precautions Observations				
Staff type*	Type of opportunity	HH performed?	Gown or glove indicated?	Gown/glove used?
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither
Click here to enter text.	<input type="radio"/> Room entry <input type="radio"/> Room exit <input type="radio"/> Before resident contact <input type="radio"/> After resident contact <input type="radio"/> Before glove <input type="radio"/> After glove <input type="radio"/> Other: Click here to enter text.	<input type="radio"/> Alcohol-rub <input type="radio"/> Hand Wash <input type="radio"/> No HH done	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> No	<input type="radio"/> Gown only <input type="radio"/> Glove only <input type="radio"/> Both <input type="radio"/> Neither

*Staff key: MD= Physician, PA= Physician assist., NP= Advanced practice nurse, RN=Registered nurse, LPN=Licensed practice nurse, CNA=Certified nurse aide or assist., REHAB= Rehabilitation staff (e.g. physical, occupational, speech), DIET=Dietary staff, EVS=Environmental services or housekeeping staff, SW = Social worker, UNK = Unknown/unable to determine

APPENDIX F: INTER-FACILITY INFECTION CONTROL TRANSFER INFORMATION TOOL

Sending Healthcare Facility:

Patient/Resident Last Name	First Name	Date of Birth	Medical Record Number

Name/Address of Sending Facility	Sending Unit	Sending Facility Phone

Sending Facility Contacts	Contact Name	Phone	E-mail
Transferring RN/Unit			
Transferring physician			
Case Manager/Admin/SW			
Infection Preventionist			

Does the person* currently have an infection, colonization OR a history of positive culture of a multi-drug-resistant organism (MDRO) or other potentially transmissible infectious organism?	Colonization or history (Check if YES)	Active infection on Treatment (Check if YES)
Methicillin-resistant <i>Staphylococcus aureus</i> (MRSA)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Vancomycin-resistant <i>Enterococcus</i> (VRE)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Clostridioides difficile</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Acinetobacter</i> , multi-drug-resistant	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Enterobacterales (e.g., <i>E. coli</i> , <i>Klebsiella</i> , <i>Proteus</i>) producing-extended spectrum beta-lactamase (ESBL)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Carbapenem-resistant Enterobacterales (CRE)	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Pseudomonas aeruginosa</i> , multi-drug-resistant	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
<i>Candida auris</i>	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes
Other, specify (e.g., lice, scabies, norovirus, influenza):	<input type="checkbox"/> Yes	<input type="checkbox"/> Yes

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

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

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

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

☐ Other:

Reason for Precautions:

Is the person* currently on antibiotics? ☐ NO ☐ YES (current use)

Antibiotic, dose, route, freq.	Treatment for:	Start date	Anticipated stop date	Date/time last dose
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>
<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>

Vaccine	Date administered (If known)	Lot and Brand (If known)	Year administered (If exact date not known)	Does the person* self-report receiving vaccine?
Influenza (seasonal)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Yes <input type="checkbox"/> No
Pneumococcal (PPSV23)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Yes <input type="checkbox"/> No
Pneumococcal (PCV13)	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Yes <input type="checkbox"/> No
Other: <input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="text"/>	<input type="checkbox"/> Yes <input type="checkbox"/> No

*Refers to patient or resident depending on transferring facility

Name of staff completing form (print):

Signature: Date:

If information communicated prior to transfer:

Name of individual at receiving facility:

Phone of individual at receiving facility:

APPENDIX G: CDC ENVIRONMENTAL CHECKLIST FOR MONITORING TERMINAL CLEANING TOOL

Date:	
Unit:	
Room Number:	
Initials of ES staff (optional):¹	

High-touch Room Surfaces ²	Cleaned	Not Cleaned	Not Present in Room
Bed rails / controls			
Tray table			
IV pole (grab area)			
Call box / button			
Telephone			
Bedside table handle			
Chair			
Room sink			
Room light switch			
Room inner door knob			
Bathroom inner door knob / plate			
Bathroom light switch			
Bathroom handrails by toilet			
Bathroom sink			
Toilet seat			
Toilet flush handle			
Toilet bedpan cleaner			

High-touch Room Surfaces ²	Cleaned	Not Cleaned	Not Present in Room
IV pump control			
Multi-module monitor controls			
Multi-module monitor touch screen			
Multi-module monitor cables			
Ventilator control panel			

Mark the monitoring method used:

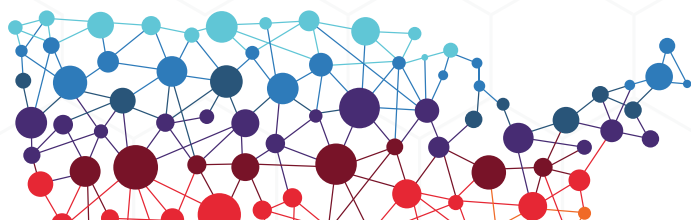
<input type="checkbox"/> Direct observation	<input type="checkbox"/> Fluorescent gel	
<input type="checkbox"/> Swab cultures	<input type="checkbox"/> ATP system	<input type="checkbox"/> Agar slide cultures

¹Hospitals may choose to include identifiers of individual environmental services staff for feedback purposes.

²Sites most frequently contaminated and touched by patients and/or healthcare workers

Antibiotic Resistance (AR) Solutions Initiative: AR Lab Network

CDC's AR Lab Network closes the gap between local capabilities and the data needed to combat AR in healthcare, food, and the community.



ARLABnetwork

CDC Laboratory Expertise & Coordination

7 Regional Labs

1 National Tuberculosis Molecular Surveillance Center

56 State & Local Labs, building on CDC's existing healthcare, food, and community programs.

Comprehensive lab capacity and infrastructure for AR pathogens

Cutting-edge technology, like DNA sequencing, in every state

Data to drive AR response and prevent infections

DETECT

Stronger detection of new resistance and better big-picture trend tracking to **create pathogen-specific solutions** and **support national public health strategies**.



AR Lab Network

RESPOND

When AR threats, like "nightmare bacteria" CRE, are reported, state and regional labs will work together to **identify how transmission is occurring** at the local level and **support outbreak response**.

Uncovering threats:

- *Acinetobacter* species
- *Candida* species
- *Clostridioides difficile*
- Carbapenem-resistant
- Enterobacterales (CRE)
- ESBLs to screen for colistin resistance

PREVENT

Better data **for stronger infection control** to prevent spread of future AR threats.

INNOVATE

Lab samples may be available through the **AR Isolate Bank**, which researchers can use in search of better diagnostics and treatment.

Gold-standard labs are the foundation of rapid detection to combat AR. The AR Lab Network establishes infrastructure to generate actionable data for stopping spread of resistance, and informing future prevention strategies.

www.cdc.gov/DrugResistance



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

Toolkit for Carbapenemase-producing Organism (CPO) and *Candida auris* Screening and Shipping



Division of Epidemiology
Massachusetts Department of Public Health
Phone: 617-983-6800
www.mass.gov/dph
December 4, 2023

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Colonization Screening Overview

This Toolkit is designed to aid healthcare providers with the collection and shipping of CPO and *Candida auris* screening swabs.

If a clinical or screening culture from a patient not previously known to be colonized grows an epidemiologically important multi-drug resistant organism (e.g., *Candida auris* or carbapenemase-producing Enterobacterales, *Pseudomonas aeruginosa*, or *Acinetobacter baumannii*), facilities may need to screen patient contacts to rule out transmission. Patients who are considered contacts may vary from setting to setting, however, at a minimum, should include any roommates of the index patient for the duration of their stay.

If colonization screening has been recommended by an epidemiologist, the information in this toolkit is intended to assist you with this process.

Specimens should only be submitted to our regional laboratory for colonization testing if an MDPH epidemiologist and the regional laboratory approve the testing request.

Screening Requests

Following identification of a CPO or *C. auris*, colonization screening may be recommended in consultation with MDPH. An epidemiologist will request screening supplies and shipping materials on behalf of your facility. You will be included in the email communication for the request sent to our regional AR Laboratory partner, the Wadsworth Center in New York.

The supplies should be shipped to your facility within one business day of the email request. You will receive an email notification when the shipment arrives at your facility. In your shipment, you will receive FedEx return labels, swab kits, transport bags, and shipping boxes depending on the number of swabs requested. If you require additional FedEx shipment labels, boxes, or swabs, you may request more by emailing the epidemiologist who is assisting you with the screening process.

Wadsworth Laboratory requires an IDR template (spreadsheet) with patient demographic information. The completed spreadsheet must be returned by email prior to shipping the specimens. Each column with an asterisk must be filled out for each specimen. Please enter the patient's MRN# in the column 'submitter patient ID.' For the column 'submitter specimen ID,' please enter the same identifier that you use to label your specimen (this could be #1, #2, #3, etc. or you could also use MRN#) and enter that in columns for both Patient ID and Specimen ID. Other important items to note are:

- 1) Please do **not** modify or change the formatting of the spreadsheet.
- 2) **Only include patients who were swabbed in the spreadsheet.**
- 3) Please label specimen with patient name, date of birth, and collection date.
- 4) Please do **not** encrypt the spreadsheet.

Once the spreadsheet has been completed and returned by email to Tammy Smith, our laboratory liaison, and the epidemiologist assisting you, a shipping manifest will be generated and emailed directly to you. You must include the shipping manifest in the box to be shipped. If specimens are shipped without the manifest, this may cause a delay with testing and reporting.

Example of completed IDR spreadsheet is included in Additional Resources.

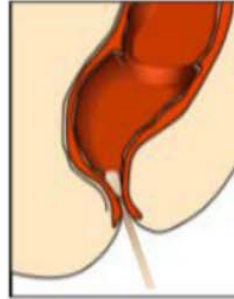
For CPO Colonization Sampling and Shipping Materials:

- 1) **Cepheid Rectal Swab Collection Device:** (Liquid Stuart Swabs 900-0370)
- 2) **Individual or Multi-Swab Transport bag:** Transport bag to contain swab during shipping
- 3) **Specimen Transport Bag:** Leakproof polybag (STP-711) with absorbent material
- 4) **Category B Shipping Box and Labels:** Shipping Box with Category B label for specimen transport
- 5) **FedEx Label:** Return FedEx label for shipping (included with shipping materials and provided by email to the designated contact at the screening facility)

CPO Rectal Swab Sampling Instructions



Use Cepheid device #900-0370 to collect the specimen



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



Place the swab pair back into the original transport tube.



Swabs that are not shipped the same day as collection, should be stored at 4C overnight for up to five days.

CPO Rectal Swab Sampling Instructions



Acceptable Swabs



Unacceptable Swabs

CPO Rectal Swab Sampling Instructions

1. Utilize the appropriate personal protective equipment when collecting specimens.
2. **Open the Cepheid collection device aseptically and remove both swabs from the packaging.**
3. Collect the specimen from the patient by carefully inserting both swab tips approximately 1cm beyond the anal sphincter and rotate gently.
4. Remove the sealed cap from the Cepheid collection device transport tube by rotating to break the seal, lift off and discard the cap. Place the swab pair into the transport tube and secure tightly.
5. Include patient information on the Cepheid collection device transport tube label or apply patient identification label (with at least two unique identifiers). This information must be clearly legible if handwritten.
6. **Ensure that two unique patient identifiers are listed on both the Cepheid collection device transport tube and the IDR template spreadsheet.**
7. **Include the collection date on both the Cepheid collection device transport tube and the IDR template spreadsheet.**
8. If not shipped on the day of collection, swabs should be stored (in transport tube) at 4°C. Swabs should be shipped at ambient temperature.
9. Testing must be performed within 5 days of collection.

CPO Rectal Swab Sampling Instructions

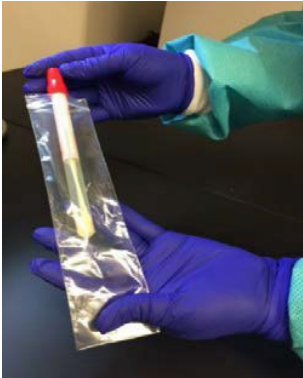
Rejection Criteria

1. Incorrect swab- Swabs must be made by Copan (**Cepheid Rectal Swab Collection Device, Liquid Stuart Swabs 900-0370**)
2. Specimen is unlabeled, insufficiently labeled, or illegible
3. Primary or secondary receptacle is leaking, cracked, or otherwise unsafe for handling
4. Failure to comply with shipping instructions
5. Unauthorized specimens that are sent without prior approval from the jurisdictional epidemiologist and the Wadsworth Center Regional Laboratory.

CPO Rectal Swab Sampling Instructions

A. Packaging and Shipping Instructions

1) Place one Cepheid collection device transport tube into an individual transport bag and seal. Multiple swabs can be placed in the perforated multi-swab transport bag (See Multi-swab packaging instructions in Section B). **Place one swab per single transport bag.**



2) Insert sealed plastic transport bag and absorbent material into leakproof Polybag (STP-711) with biohazard label.

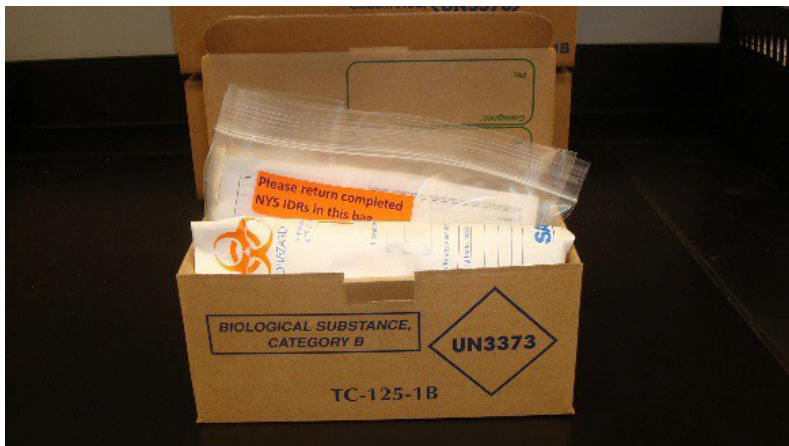


Maximum of 3 swabs
per leakproof
polybag (STP-711)

CPO Rectal Swab Sampling Instructions



3) Place the sealed specimen transport bag into the shipping box.

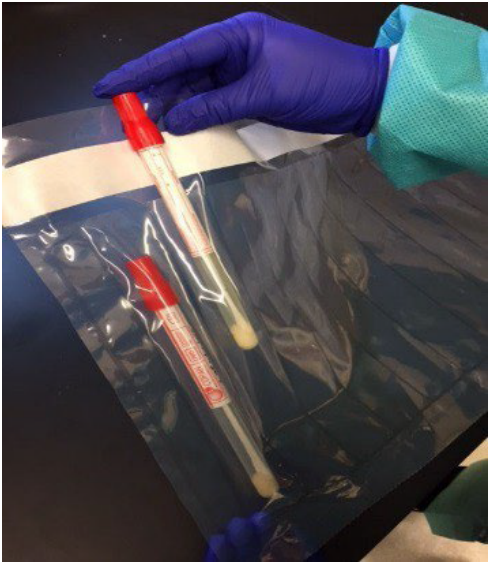




- 5) Close the fiberboard box (UN3373 Biological substance category B) facing outward and seal.
- 6) Place FedEx Label (provided) on appropriate area on shipping box.

B. Multi-Swab Packaging Instructions

- 1) Collect the rectal swab specimens following the sampling instructions.
- 2) Place the rectal swabs in the 15-slot transport bag, making sure there is only one swab per pocket.
- 3) Remove the white strip from the adhesive and fold to close. Press firmly to seal.
- 4) Insert the sealed 15-slot plastic transport bag and fold it to close absorbent material into the large leakproof polybag (STP-741) with the biohazard label.
- 5) Place the leakproof polybag (STP-741) with biohazard label into the shipping box. Seal the box and apply the FedEx return label.



Remove white adhesive and seal securely.

Candida auris Sampling and Shipping Instructions

Sampling and Shipping Materials Included

- 1) **BD ESwab Collection Kit:** Regular flocked swabs for sampling of patient
- 2) Sample Submission Form:
 - a. Remote Order Manifest – Submitting facility should include remote order manifest along with the sample shipment
 - b. Paper Requisition form:
 - i. DOH-4463 “Infectious Diseases Requisition” form for patient swabs
- 3) **Six Pocket Vial Sleeve with Bubble Wrap:** Six pocket vial sleeve with bubble wrap for BD ESwab tube holding during shipping
- 4) **Sealable Plastic Bag:** Primary specimen transport bag
- 5) **Specimen Transport Bag:** Secondary biohazard labeled specimen transport bag with absorbent material
- 6) **Category B Shipping Box:** Shipping Box labeled with Category B for specimen transport
- 7) **FedEx Label:** Return FedEx label for shipping (if not included in the package, please email the screening contact with facility name, facility address, contact name, and contact phone number for return labels to be emailed)

BD ESwab Sampling Instructions for Patients

Fig 1. **BD ESwab Collection Kit**

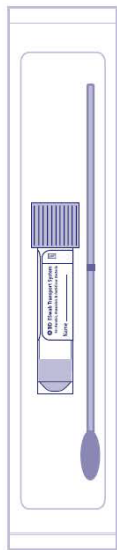
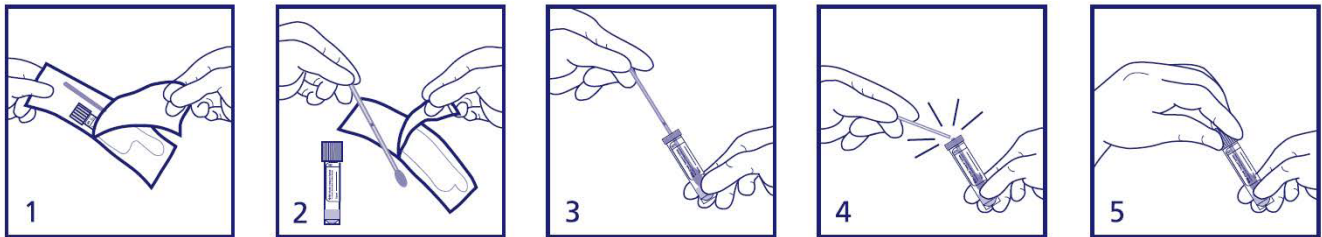
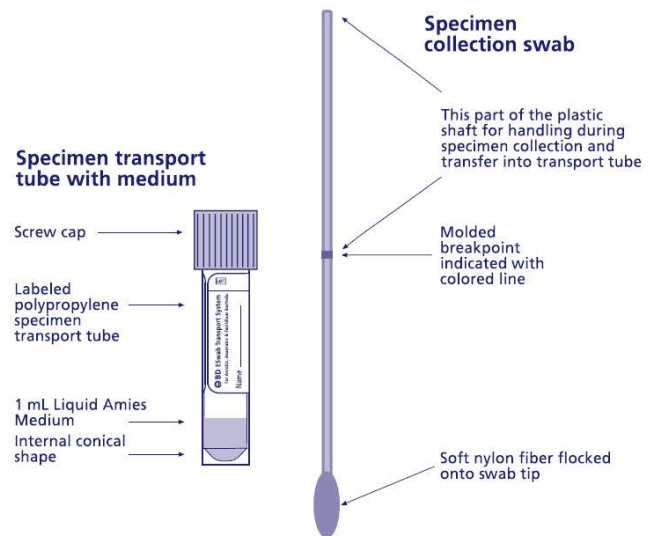
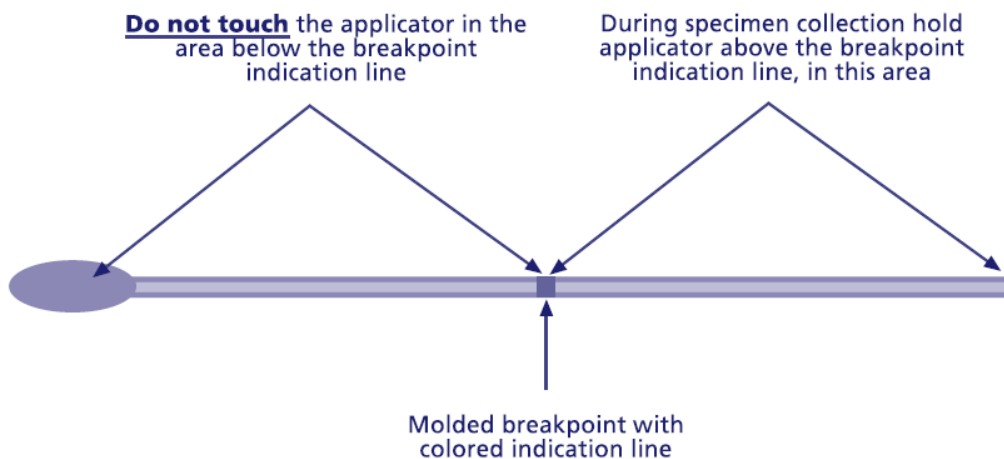
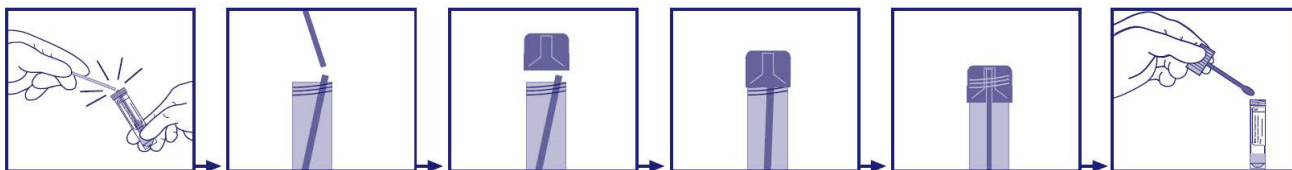


Fig 2. **BD ESwab Collection Kit Components**



To avoid contamination **DO NOT TOUCH** the applicator in the area below the breakpoint indication line. Hold applicator above the breakpoint indication line as shown in figure.

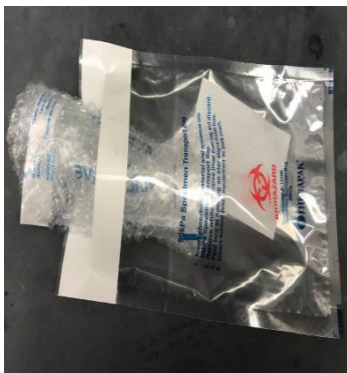




- 1) Open ESwab sample collection kit and remove the tube and the swab applicator.
- 2) Collect the specimen from the patient skin site(s) with options provided below:
 - a. Option 1: take one swab, consisting of bilateral swabbing of nares followed by bilateral swabbing of axilla and ending with bilateral swabbing of groin (**nares/axilla/groin swab**)
 - b. Option 2: take two swabs, one consisting of bilateral swabbing of axilla followed by bilateral swabbing of groin (**axilla/groin swab**) and another swab consisting of bilateral swabbing of nares (**nares swab**)
 - c. Option 3: take one swab, consisting of bilateral swabbing of axilla followed by bilateral swabbing of groin (**axilla/groin swab**)
- 3) Aseptically unscrew and remove the cap from the tube.
- 4) Insert the swab into the tube and bend the swab shaft at the breakpoint indicated by the colored line marked on the swab shaft against the tube to break the shaft. Discard the broken part of the swab shaft into an approved medical waste disposal container.
- 5) Replace cap on the tube and secure tightly.
- 6) Write patient information on the tube label along with body site(s) swab was collected from or apply patient identification label.
- 7) Please make sure unique identifiers are listed on both tube and manifest.

BD ESwab Packaging and Shipping Instructions

1. Place one ESwab tube into each vial sleeve pocket (six pockets per vial sleeve strip). Seal sleeve by removing white tape liner and fold at slit.
2. Roll up bubble wrap around vial sleeve.
3. Insert sealed samples into secondary specimen transport bag with biohazard label.
4. Remove tape adhesive backing from transport bag opening, fold bag at slit, and orient lines onto corresponding lines. Press hard from center working outward to seal and close. ***DO NOT PLACE PAPERWORK IN SAMPLE COMPARTMENT***
5. Fold and place completed requisition paperwork in the paperwork pouch located on the back of the specimen transport bag.
6. Place the sealed specimen transport bag with the completed requisition paperwork in the shipping box. **Note:** One specimen transport bag may be placed within each box.
7. Close the box and seal using tape strip. Place provided FedEx Label onto box for shipping.



To Ship Samples to Wadsworth

1. Swab kits do not need refrigeration until after specimen is obtained. However, once specimen is obtained, if not shipped the same day, the specimen should be kept at 4°C until ready to mail, then ship at room temperature.
2. Wadsworth will print return shipping labels and mail the labels with the outbound supplies. When ready to ship specimens, the facility will need to tape the return label to the box and arrange pickup:
 - a. Use your regularly scheduled Fed Ex pick-up (if you have one).
 - b. Drop off at a Fed Ex location.
 - c. Schedule a pickup via the web [fedex.com/return pickup](https://www.fedex.com/return-pickup) or by calling 1-800-463-3339.**Information on the return label is needed to schedule pickup so have label information readily available when scheduling pickup.**
3. Shipping of supplies to facilities and shipping of specimens back to Wadsworth is done via overnight FedEx courier.
4. Deliveries are accepted at the Wadsworth Center at all hours and any day of the week; however, testing is only conducted Monday-Friday. To get prompt lab results, please aim to ship samples to Wadsworth Center from Monday to Thursday whenever possible.
5. The shipping manifest (included in the box to be shipped) should include Accession ID, Specimen ID, Source, Patient Name, DOB, Sex, Collection Date, and Test Requested. **Please note that specimens submitted without the manifest may cause a delay in testing and reporting.**

FAQ

I do not have enough swab kits and/or shipping materials, what should I do?

If you need more swab kits for testing and/or shipping boxes or materials, please email your epidemiologist contact to request additional kits or materials for your facility.

I have completed the screening spreadsheet and have emailed it, but I have another patient to add to the screening, what do I do?

If you have already completed and emailed the screening spreadsheet and need to add a patient to the list, email the epidemiologist contact for screening with an updated spreadsheet with the added patient. An updated manifest will be generated for you. You can always add more patients to the spreadsheet before sending out the box of specimens. If you have already shipped the specimens to Wadsworth, you would then send the additional patient specimen in a separate shipment, using a separate spreadsheet and manifest.

On the spreadsheet template, for the specimen ID and Patient ID columns, what do I enter?

When completing the spreadsheet, you would want to complete all columns with an asterisk. For the column labelled 'submitter specimen ID,' this matches the numbering you use to label your tubes (i.e., #1, #2, #3) or alternatively you can use MRN# here. For the column 'submitter Patient ID,' this would be the MRN# used in your facility.

How long does it take until I receive the results?

PCR results are generally available within 48 hours of when Wadsworth receives the specimens if received between Monday-Friday. The final culture results are not available for 2-3 weeks after the PCR results.

What happens if I send a shipment and my samples will arrive at the lab more than 5 days after collection?

Even though the sample needs to be tested within 5 days of collection, if received after the 5-day window, Wadsworth will still test the samples, but there will be a disclaimer added to the report about the reliability of the results.

What do I do if it's a Friday and FedEx is closed?

You may store the specimens at 4°C until ready to mail, then ship at room temperature on Monday.

Why do we need to swab all the patients on the floor if the only patient who tested positive has been discharged?

Conducting a point-prevalence survey (PPS) can be beneficial to confirm that there is no ongoing transmission taking place on the unit. Even though there may be few remaining overlapping patients on the unit, it is important to rule out the possibility of ongoing transmission. If a positive patient were to be identified through screening, it would help to target mitigation measures and might suggest a need for screening of recently discharged patients (if discharged to another healthcare facility).

We have a resident who has an ileostomy. Should we collect the specimen from the ileostomy site (stoma) rather than the rectum?

We can accept specimen collection for an ileostomy or colostomy site (stoma) using the Copan dual swabs provided and you can generally follow the same instructions as those provided for collection of a rectal swab specimen.

Additional Resources

1) Sample completed IDR template spreadsheet

Test Name*	Specimen Source Type*	Submitter Specimen ID*	Submitter Patient ID*	Collection date*	Patient name, Last*	Patient name, First*	Patient ID*
TC_DISPLAY_TAG	SP_SOURCE_TYPE_DESC	SP_EXTERNAL_DB_ID	CA_SUBMITTER_SUBJECT_ID	CA_COLLECTION_DATE	CA_LAST_NAME	CA_FIRST_NAME	CA_DOB
Candida auris Surveillance Patient Testing	ctal swab	MRN041252	MRN041252	10/21/2022	Doe	Jane	CA_DOE

2) CDC MDRO Webinar Series found here: [Webinars | Infection Prevention and Control Resource Hub \(infectioncontrolma.org\)](https://www.infectioncontrolma.org/webinars)

APPENDIX J: SUMMARY OF CONTROL RECOMMENDATIONS FOR MDROS IN SNFS

Applies to:	All residents	Residents with a wound or any indwelling device*	Residents infected or colonized with an MDRO when Contact Precautions do not apply	Residents infected or colonized with an MDRO AND have acute diarrhea, draining wounds, or other sites of secretions or excretions that are unable to be covered or contained**
Precautions	Standard Precautions	Enhanced Barrier Precautions		Contact Precautions
PPE used for these situations:	Any potential exposure to: <ul style="list-style-type: none"> Blood Body fluids Mucous membranes Non-intact skin Potentially contaminated environmental surfaces or equipment 	During high-contact resident care activities: <ul style="list-style-type: none"> Dressing Bathing/showering Transferring Providing hygiene Changing linens Changing briefs or assisting with toileting Device care or use: central line, urinary catheter, feeding tube, tracheostomy/ventilator Wound care: any skin opening requiring a dressing 		Any room entry
Required PPE***	Depending on anticipated exposure: gloves, gown, face protection for splash/spray	Gloves and gown prior to the high-contact care activity (also face protection if performing activity with risk of splash or spray)		Gloves and gown (don before room entry, doff before room exit). Face protection for splash/spray
Hand hygiene education/auditing	YES	YES	YES	YES
Door signage	No	YES	YES	YES
Cleaning and disinfection review/auditing	YES	YES	YES	YES
Educate residents, staff, and visitors on MDROs	No	YES	YES	YES
Notify facility of MDRO status upon transfer	No	No	YES	YES
Designated or disposable equipment	No	No	YES	YES
Room restriction	None	None	None	YES, except for medically necessary care
Private room	No	No	No	YES, with private bathroom

* e.g., central line, urinary catheter, feeding tube, tracheostomy/ventilator

** Contact Precautions may also be indicated on units or in facilities where ongoing transmission is documented or suspected.

***ALWAYS change PPE before caring for another resident, regardless of precautions indicated.



ENHANCED BARRIER PRECAUTIONS EVERYONE MUST:



Clean their hands, including before entering and when leaving the room.

PROVIDERS AND STAFF MUST ALSO:



Wear gloves and a gown for the following High-Contact Resident Care Activities.

**Dressing
Bathing/Showering
Transferring**

Changing Linens

Providing Hygiene

Changing briefs or assisting with toileting

Device care or use:

**central line, urinary catheter, feeding tube,
tracheostomy**

Wound Care: any skin opening requiring a dressing



Do not wear the same gown and gloves for the care of more than one person.

CS19-306149-A



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



CONTACT PRECAUTIONS

EVERYONE MUST:



Clean their hands, including before entering and when leaving the room.

PROVIDERS AND STAFF MUST ALSO:



**Put on gloves before room entry.
Discard gloves before room exit.**



**Put on gown before room entry.
Discard gown before room exit.**

**Do not wear the same gown and gloves
for the care of more than one person.**



**Use dedicated or disposable equipment.
Clean and disinfect reusable equipment
before use on another person.**



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

APPENDIX K: LONG-TERM CARE RESIDENT ROOM ENVIRONMENTAL CLEANING CHECKLIST

Date: _____

Unit or Ward: _____

Room: _____

Initials of environmental services staff (optional):¹

Evaluate the following priority sites for each resident room:			
High-touch Room Surfaces ²	Cleaned	Not Cleaned	Not Present in Room
Bed rails			
Tray table			
Call button			
Remote Controls			
Bedside table			
Bedside Chair			
Telephone			
Room light switch			
Room inner door knob/door pull			
Closet door knob/door pull			
Bathroom inner door knob/pull			
Bathroom light switch			
Bathroom handrails by toilet			
Bathroom sink/faucet handles			
Toilet seat			
Toilet flush handle			
Toilet bedpan cleaner			
Shower hand holds			
Evaluate the following additional sites if these equipment are present in the room:			
High-touch Room Surfaces ²	Cleaned	Not Cleaned	Not Present in Room
IV /tube feeding pump control panel			
Wound Vacuum Control panel			
Wheelchair-especially handles			
Walker /Cane handles			

¹ Facilities may choose to include identifiers of individual environmental services staff for feedback purposes

² Sites most frequently contaminated and touched by residents and/or healthcare workers

APPENDIX L: LONG-TERM CARE COMMON AREAS ENVIRONMENTAL CLEANING CHECKLIST

Date: _____

Unit or Ward: _____

Initials of environmental services staff (optional):¹

Evaluate the following priority sites for each resident room:			
High-touch Common Surfaces ²	Cleaned	Not Cleaned	Not Present in Room
Common Light Switch			
Common Call Button			
TV Remote Controls			
Common Chair			
Common Telephone			
Mechanical Lift			
Hall Hand Rails			
Door Pulls			
Common Closet Door Knobs/Pull			
Microwave Control Panel			
Refrigerator/Freezer Handles			
Bathroom inner door knob/pull			
Bathroom light switch			
Bathroom handrails by toilet			
Bathroom sink/faucet handles			
Bathroom toilet seat			
Toilet flush handle			
Common Tub Faucet Handles			
Common Shower hand holds			
Common Bench			
Evaluate the following additional sites if these equipment are present in the facility:			
High-touch Surfaces ²	Cleaned	Not Cleaned	Not Present in Room
Beauty Salon Chair			
PT/OT Support Bars			
Washer/Dryer Knobs			
Activity Room Tables			

REFERENCE: Guh, A., Carling, P., and the Environmental Evaluation Workgroup. (2010). [Options for Evaluating Environmental Cleaning](#). Centers for Disease Control and Prevention.

DISCLAIMER: All data and information provided by the Oregon Patient Safety Commission is for informational purposes only. The Oregon Patient Safety Commission makes no representations that the patient safety recommendations will protect you from litigation or regulatory action if the recommendations are followed. The Oregon Patient Safety Commission is not liable for any errors, omissions, losses, injuries, or damages arising from the use of these recommendations.

APPENDIX M: PATIENT CPO SCREENING FAQs AND SAMPLE CONSENT SCRIPT

Frequently Asked Questions about Screening Tests for Rare Antibiotic-Resistant Germs that Colonize the Gut, such as Carbapenem-Resistant Enterobacterales (CRE)

[Insert healthcare facility e.g., hospital or nursing home] has identified a person with a type of bacteria (a kind of germ) that is resistant to important antibiotics that are used to treat infections. When bacteria are resistant to an antibiotic, it means that the drug will not work to treat infections caused by those bacteria.

WHY HAVE I BEEN CONTACTED?

To make sure this type of resistant bacteria does not spread further, the healthcare facility or health department is contacting people who might have had contact with these bacteria. They are requesting that these people get a screening test to make sure they are not also carrying the bacteria.

WHY IS IT IMPORTANT FOR ME TO BE TESTED FOR THIS BACTERIA?

It is important for you to be tested for this germ so that the healthcare facility and health department can prevent it from spreading. Preventing the spread of these bacteria is very important so that these resistant bacteria don't become common in your community.

WHAT HAPPENS IF THESE BACTERIA ARE FOUND IN OR ON ME?

The results of the test will be kept confidential to the extent allowed by law. The results will be shared with you and your healthcare providers and might be shared with the health department.

The risk to you from this germ is low. Most people carry these bacteria and never get sick from them. If you receive medical care, your healthcare providers may take extra steps to protect you and make sure they do not spread the bacteria to other patients.

HOW CAN I BE TESTED FOR THIS GERM?

People carry this kind of germ in their gut or stool, so the best way to test for these bacteria is to swab your rectum. If you agree to be tested, a healthcare provider will gently insert just the tip of a soft swab that looks like a Q-tip into your rectum, gently rotate it, and then remove the swab. The procedure is not painful and there should be no side effects. The swab will be sent to a lab, and, within a few days, the lab will report the result to your healthcare provider.

DO I HAVE A CHOICE TO BE TESTED?

Yes, providing a swab is voluntary. You can choose to decline testing. However, if you decline testing and you receive medical care, your healthcare providers might take extra precautions, such as wearing a gown and gloves when caring for you, since they will not know if you have this germ.

I WANT TO BE TESTED, BUT I AM NOT COMFORTABLE HAVING A RECTAL SWAB COLLECTED. IS THERE AN ALTERNATIVE TEST?

We can give you the swab for you to swab a few times around your anus or you can provide a stool sample, but these alternative tests may decrease our ability to find these bacteria in your body if they are present.

IF MY TEST IS POSITIVE, WHAT WILL I NEED TO DO?

The risk of spreading this germ to your family and friends is very low, but family and visitors should wash their hands well after caring for you or visiting you to decrease the chance of getting the germ. You should also wash your hands frequently, especially after using the bathroom and before eating or preparing food.

If you receive medical care at a healthcare facility, such as a hospital or nursing home, be sure to let your healthcare providers know about the results so that they can take steps to prevent spreading the germ to others.

IF MY TEST IS POSITIVE, WILL I NEED TREATMENT?

If the test is positive, it means you are carrying the germs in your gut. Since they are not making you sick (causing infection), you will not need antibiotics. Many people stop carrying these bacteria over time, but this depends on many factors. Taking antibiotics can increase the time these germs are carried in your gut. So, in consultation with your doctor, antibiotics should be used appropriately and should be taken exactly as prescribed.

Your healthcare providers might recommend you get an additional test at a later time to see if the germ is gone. However, a follow-up test will not be recommended for everyone.

EXAMPLE VERBAL CONSENT FOR COLLECTION OF RECTAL SWAB TO ASSESS CRE COLONIZATION

Hi, my name is [insert name] and I work for [insert organization]. I'm here to talk to you about some screening the [insert healthcare facility e.g., hospital or nursing home] is doing to check for a rare germ. Recently, we identified this germ that is rare in the U.S. in a patient who was cared for at this facility. The germ is called carbapenem-resistant Enterobacterales, or "CRE" for short.

We are screening patients for this germ because some people can carry this germ in the gut without knowing it and they can spread the germ to others without knowing it.

The chance that you carry this germ is very low, and fortunately, most people who do carry it never get sick from it. But to make sure this germ has not spread, the health department would like us to screen patients to make sure they don't have it.

If you agree to be screened, the process is very simple and takes just a few seconds. We would need to swab inside your rectum. To do that, we would gently insert the tip of a soft swab, which looks like a Q-tip, into your rectum, gently rotate it, and then remove it. The process is not painful and there shouldn't be any side effects. If you're not comfortable with us doing this, you can use the swab yourself to gently wipe a few times around your anus. The downside to swabbing yourself is that it may decrease our ability to find the bacteria than if we collect it.

The swab will be sent to a lab to test for the bacteria, which will take a few days. If they find the germ, someone will contact you to discuss what to do. The results of the test will be kept confidential to the extent allowed by law.

Providing a swab is completely voluntary and you can choose not to be swabbed.

Do you have any questions? [pause for questions]

Is it OK if we collect the swab?

APPENDIX N: PATIENT *C. AURIS* FAQs

CDC CANDIDA AURIS INFORMATION FOR PATIENTS AND FAMILY MEMBERS

What are the symptoms of *C. auris* infection?

Symptoms may not be noticeable, because patients with *C. auris* infection are often already sick in the hospital with another serious illness or condition. Symptoms of *C. auris* infection depend on the part of the body affected. *C. auris* can cause many different types of infection, such as bloodstream infection, wound infection, and ear infection. Because symptoms can vary greatly, a laboratory test is needed to determine whether a patient has a *C. auris* infection.

Who is most likely to get *C. auris* infection?

C. auris mainly affects patients who already have many medical problems. It often affects people who have had frequent hospital stays or live in nursing homes. *C. auris* is more likely to affect patients who have weakened immune systems from conditions such as blood cancers or diabetes, receive lots of antibiotics, or have devices like tubes going into their body (for example, breathing tubes, feeding tubes, catheters in a vein, or bladder catheters). Healthy people usually don't get *C. auris* infections.

Are *C. auris* infections treatable?

Most *C. auris* infections are treatable with a class of antifungal medications called echinocandins. Some *C. auris* infections have been resistant to all three main classes of antifungal medications, making them difficult to treat. In this situation, multiple antifungal medications at high doses may be needed to treat the infection.

How serious can *C. auris* infection be?

Any invasive infection, which includes bloodstream infection with any *Candida* species, can be serious or even fatal. Many people who have died with *C. auris* had other serious illnesses that increased their risk of death.

Why does a patient with *C. auris* infection need special precautions during care?

C. auris can spread from one patient to another in healthcare settings, such as hospitals and nursing homes, even if *C. auris* is on the skin or other body sites and the patient does not have symptoms. Special precautions reduce the chance of spreading the fungus to other patients. These precautions may include placing the patient in a different room, having healthcare personnel or other caregivers wear gowns and gloves during patient care, cleaning the room with different products than usual, and having family members and healthcare personnel clean their hands thoroughly after visiting the patient. The patient may also be encouraged to wash their hands often.

How long does a patient with *C. auris* need to be under these special precautions?

Even after *C. auris* infection is treated, patients might continue to have *C. auris* on their skin or other body sites that doesn't cause infection or illness but can still spread to other patients. Special precautions should continue as long the patient has *C. auris* on the skin or other body sites. In most situations, precautions should be continued for the entire duration of the patient's stay in a healthcare facility. More about the duration of precautions can be found in CDC's infection control guidance.

Can a nursing home resident with *C. auris* participate in activities with others, such as meals or social gatherings, if they are on these special precautions?

In general, residents of nursing homes who have *C. auris* on their skin or other body sites or are sick with a *C. auris* infection can leave their rooms to attend meals and group functions if they can wash their hands thoroughly on a regular basis, if wounds are bandaged to prevent any fluids from seeping out and infecting others, if other types of secretions like phlegm are contained, and if items that residents touch often and shared equipment (for example, physical therapy equipment or recreational resources) are cleaned and disinfected after use.

Can family members get sick?

Family members who are healthy probably have a low chance of *C. auris* infection. *C. auris* is mainly a problem among people who are already sick with multiple medical problems and have spent a lot of time in healthcare settings. Family members and others caring for patients with *C. auris* should wash their hands thoroughly before and after touching the patient or touching medical devices. Handwashing is particularly important if the caregiver is caring for more than one ill person at home. Ask and remind healthcare personnel to wash their hands.

Should family members or other close contacts of patients be tested for *C. auris*?

In most instances, CDC does not recommend that family members or other close contacts of patients with *C. auris* infections be tested for *C. auris*. However, if someone who has frequent contact with a patient with *C. auris* is admitted to a healthcare facility, a healthcare provider might test them for *C. auris* to determine if special precautions should be used.

What should people who have tested positive for *C. auris* do after being discharged from healthcare facilities?

People who have tested positive for *C. auris* should inform healthcare providers that they have tested positive for *C. auris* when visiting healthcare offices and when being admitted to hospitals and nursing homes.

APPENDIX O: CDC EXPANDED ANTIMICROBIAL SUSCEPTIBILITY TESTING

Expanded Antimicrobial Susceptibility Testing for Hard-to-Treat Infections

Antimicrobial susceptibility testing for Enterobacterales producing a metallo-beta-lactamase (MBL)

Clinicians, hospital laboratories, and public health labs can request expanded antimicrobial susceptibility testing (ExAST) from CDC's Antibiotic Resistance Lab Network (AR Lab Network) to find new, effective treatment options for their patients' most resistant infections.

- Enterobacterales are resistant to new drugs for carbapenem-resistant Enterobacterales (CRE) treatment, specifically ceftazidime-avibactam and meropenem-vaborbactam. However, these bacteria may be susceptible to the combination therapy ceftazidime + avibactam + aztreonam*.
- Susceptibility testing is CLIA-compliant and results will be reported for ceftazidime + avibactam, aztreonam; and aztreonam + avibactam to help assess utility of combination therapy.
- CDC plans to expand testing as new antimicrobial treatment options become available for other hard-to-treat bacterial infections.
- There is no cost for this service.

*Ceftazidime + avibactam + aztreonam is a combination of drugs recommended by the 2018 Sanford Guide for treatment of serious infections caused by MBL-producing Enterobacteriaceae.

1

What isolates can I submit?

Hospital laboratories and clinicians are encouraged to submit Enterobacterales isolates that:

- Test non-susceptible to all beta-lactams, including either ceftazidime-avibactam or meropenem-vaborbactam. These isolates may be MBL-producing isolates with few effective treatment options.
- OR-
- Enterobacterales with NDM, VIM, or IMP genes confirmed by a molecular test and are highly resistant to all or the majority of antimicrobials already tested.

2

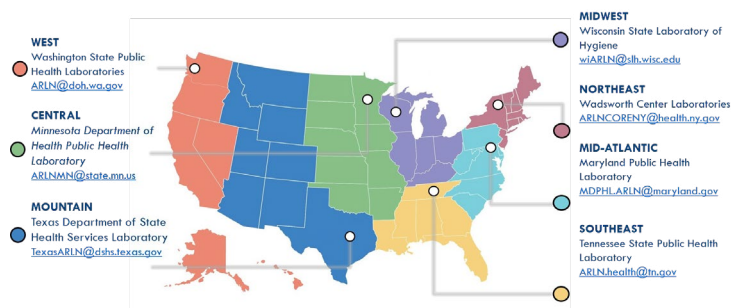
What is the testing process?

- AST turn-around time is 3 business days (once isolate received) for therapy decisions.
- Isolates will be tested to confirm carbapenem resistance, carbapenemase production, and to identify carbapenemase gene-coded resistance.
- Isolates that meet the inclusion criteria will be tested for susceptibility to ceftazidime + avibactam, aztreonam and avibactam + aztreonam.

3

How do I request the test and receive results?

- Healthcare providers, hospital laboratories, and public health labs should email their regional lab to request testing and instructions for submitting the bacterial isolate.
- Provide preliminary lab testing results and confirm that the facility's infection control department has been notified and/or infectious disease physician has been consulted.
- See regional lab map and contact information on the right.



AS PART OF THE AR LAB NETWORK, YOUR STATE & REGIONAL LAB WORK TO:

DETECT RESISTANT SPECIES & NEW THREATS | PERFORM SUSCEPTIBILITY TESTING TO TRACK RESISTANCE | HELP RESPOND TO OUTBREAKS

www.cdc.gov/antimicrobial-resistance-laboratory-networks/php/about/domestic.html



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