Guidance for Control of Targeted Multi-Drug Resistant Organisms (MDROs)

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

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**Acknowledgement:** MDPH would like to thank the Oregon Health Authority. The original version of this document was adapted from the Bureau of Infectious Disease and Laboratory Sciences, 2016 Oregon CRE Toolkit.
Toolkit Overview

The Massachusetts MDRO Toolkit is designed to aid healthcare providers involved in the prevention, detection, and containment of targeted multi-drug resistant organisms across the continuum of healthcare. This group includes infectious disease physicians, epidemiologists, infection preventionists, directors of nursing in skilled nursing facilities, nurses, pharmacists, and microbiologists.

This guidance is intended to address these targeted MDROs in Massachusetts:

- Carbapenem-resistant *Acinetobacter baumannii* (CRAB)
- Carbapenem-resistant Enterobacteriaceae (CRE)
- Carbapenem-resistant *Pseudomonas aeruginosa* (CRPA)
- Carbapenemase-producing organisms (CPOs)
- *Candida auris*

MDROs are emerging threats to global health. The potential for rapid spread and the difficulties confronted when 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 affect others because of patient and resident transfers and shared healthcare providers. (1)

Routine hand hygiene and ongoing monitoring of staff adherence to hand hygiene remains the single most important aspect of preventing transmission of MDROs. However, additional practices, including appropriate antibiotic use, timely inter-facility communication, and infection control precautions are needed.

The 2020 Massachusetts MDRO Toolkit is 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/hai/pdfs/cre/CRE-guidance-508.pdf) (2).

*The creation of this toolkit was supported by funding from the Centers for Disease Control and Prevention (CDC) Epidemiology and Laboratory Capacity (ELC) Grant.*
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.

**Candida auris**: 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 Acinetobacter baumannii (CRAB)**: *Acinetobacter baumannii* 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 Enterobacteriaceae (CRE)**: Enterobacteriaceae are a family of Gram-negative bacteria, such as *Escherichia coli*. CRE are Enterobacteriaceae that are resistant to carbapenem antibiotics, such as meropenem or imipenem.

**Carbapenem-resistant Pseudomonas aeruginosa (CRPA)**: *Pseudomonas aeruginosa* 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)**: Any organism that produces enzymes called carbapenemases that inactivate carbapenems and other β-lactam antibiotics, including penicillins and cephalosporins. CPOs include carbapenemase-producing CRE (CP-CRE), carbapenemase-producing *Pseudomonas aeruginosa* (CP-CRPA), and carbapenemase-producing *Acinetobacter baumannii* (CP-CRAB). The 5 most commonly identified carbapenemases in the U.S. are:

- *Klebsiella pneumoniae* 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).
**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. Multi-drug resistant *Candida auris*, CRE, CRAB, CRPA, and CPOs are all MDROs.

*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 are task-based precautions that are implemented for all patients, regardless of their infection/colonization status. Enhanced-barrier precautions require gowning and gloving only for “high-contact resident care activities”, such as bathing or device care. CDC currently recommends enhanced barrier precautions *only* for skilled nursing facilities (7).
Surveillance

MDPH CRE Reporting Requirements

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

- *Enterobacter cloacae*
- *Escherichia coli*
- *Klebsiella aerogenes***
- *Klebsiella oxytoca*
- *Klebsiella pneumoniae*

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

- Imipenem (MIC >=4 µg/ml)
- Meropenem (MIC >=4 µg/ml)
- Doripenem (MIC >=4 µg/ml)
- Ertapenem (MIC >=2 µg/ml)

**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.


** Formerly *Enterobacter aerogenes*
Laboratory Testing

MA SPHL MDRO isolate submission guidance

The 105 CMR 300.000 Reportable Diseases, Surveillance, and Isolation and Quarantine Requirements (http://www.mass.gov/eohhs/docs/dph/cdc/reporting/rprtbdiseases-labs.pdf) were updated in January 2017 to include a requirement that select CRE isolates be forwarded to the Massachusetts State Public Health Laboratory (MA SPHL) for additional characterization.

All isolates with the following profile are to be sent to the MA SPHL:

- Enterobacter cloacae; Escherichia coli; Klebsiella aerogenes; Klebsiella oxytoca and Klebsiella pneumoniae (isolated from any source) with resistance to one or more of the following carbapenems: imipenem; meropenem; and/or doripenem (at MIC >=4 mcg/ml). Note: ertapenem resistance alone is not a criterion for isolate submission.

- OR, any organism demonstrating carbapenemase production, by phenotypic testing using the mCIM- Modified Carbapenem Inactivation Method; or Carba-NP; or by mechanism-specific testing by PCR detection of the following gene targets: KPC; NDM; OXA; VIM; and IMP.

As of January 1, 2020, the MA SPHL also requests submission of:

- 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 Candida auris, contact the MDPH Division of Epidemiology at 617-683-6800 to facilitate confirmatory testing at MDPH’s regional public health laboratory.

Isolates should be submitted to the MA SPHL Clinical Microbiology Lab using the general requisition form found here: https://www.mass.gov/lists/state-public-health-laboratory-specimen-submission-forms#human-specimen-submission-forms-. Please include a copy of all susceptibility results generated at your lab. Please send only one isolate per patient per admission.

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

Table: CLSI breakpoints for Enterobacteriaceae, 2019 (8)

<table>
<thead>
<tr>
<th>Carbapenems</th>
<th>Current MIC breakpoints (µg/mL) and interpretation</th>
<th>Current disk diffusion zone diameters (mm) and interpretation</th>
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<tbody>
<tr>
<td></td>
<td>Susceptible</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Doripenem</td>
<td>≤1</td>
<td>2</td>
</tr>
<tr>
<td>Ertapenem</td>
<td>≤0.5</td>
<td>1</td>
</tr>
<tr>
<td>Imipenem</td>
<td>≤1</td>
<td>2</td>
</tr>
<tr>
<td>Meropenem</td>
<td>≤1</td>
<td>2</td>
</tr>
</tbody>
</table>

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

Table: CLSI breakpoints for Acinetobacter spp., 2019 (8)

<table>
<thead>
<tr>
<th>Carbapenems</th>
<th>Current MIC breakpoints (µg/mL) and interpretation</th>
<th>Current disk diffusion zone diameters (mm) and interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Susceptible</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Doripenem</td>
<td>≤2</td>
<td>4</td>
</tr>
<tr>
<td>Imipenem</td>
<td>≤2</td>
<td>4</td>
</tr>
<tr>
<td>Meropenem</td>
<td>≤2</td>
<td>4</td>
</tr>
</tbody>
</table>
### Table: CLSI breakpoints for *Pseudomonas spp.*, 2019 (8)

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Current MIC breakpoints (µg/mL) and interpretation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Susceptible</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Doripenem</td>
<td>≤ 2</td>
<td>4</td>
</tr>
<tr>
<td>Imipenem</td>
<td>≤ 2</td>
<td>4</td>
</tr>
<tr>
<td>Meropenem</td>
<td>≤ 2</td>
<td>4</td>
</tr>
<tr>
<td>Cefepime</td>
<td>≤ 8</td>
<td>16</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>≤ 8</td>
<td>16</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Antibiotics</th>
<th>Current disk diffusion zone diameters (mm) and interpretation</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Susceptible</td>
<td>Intermediate</td>
</tr>
<tr>
<td>Doripenem</td>
<td>≥ 19</td>
<td>16–18</td>
</tr>
<tr>
<td>Imipenem</td>
<td>≥ 19</td>
<td>16–18</td>
</tr>
<tr>
<td>Meropenem</td>
<td>≥ 19</td>
<td>16–18</td>
</tr>
<tr>
<td>Cefepime</td>
<td>≥ 18</td>
<td>15–17</td>
</tr>
<tr>
<td>Ceftazidime</td>
<td>≥ 18</td>
<td>15–17</td>
</tr>
</tbody>
</table>

*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 requirements) and will perform carbapenemase and gene-specific PCR testing on isolates that meet requirements.

**Carbapenemase-producing CRE (CP-CRE) and other CPOs**

The potential for rapid spread, treatment difficulties, and poor outcomes make it critically important to maintain aggressive infection control measures. 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-β-lactamase (NDM), Verona integron encoded metallo-β-lactamase (VIM), imipenemase metallo-β-lactamase (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 β-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 a 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 commonly 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)
Infection Prevention and Control in:

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 of clinical and infection prevention and control 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-C) and additional educational materials can be requested from MDPH.

3. **Review infection prevention and control procedures,** including policies regarding hand hygiene, environmental cleaning, device reprocessing, and personal protective equipment (14). Perform regular audits of staff, including housekeeping and nursing (see appendix D). 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/infectioncontrol/pdf/icar/hospital.pdf.

*Surveillance*

4. **Consider implementing active surveillance cultures** for patients who are at high-risk for MDRO colonization upon hospital admission. One suggested approach is 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 (before carbapenemase testing)

Communication

1. Labs 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 MDRO is identified.

3. Upon patient transfer to another healthcare facility, notify the receiving facility that the patient has a MDRO in a readily available written manner, in addition to verbal communication. An example transfer form is provided in Appendix E. Be sure the individual(s) directly caring for the patient and those responsible for infection prevention at the receiving facility are aware of the patient’s MDRO status.

Infection Control Precautions

4. Place patients infected or colonized with a 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 MDRO-positive patient so they can be identified and placed on contact precautions immediately if re-admitted.

5. Place patients infected or colonized with a MDRO in private rooms. If the number of single patient rooms is limited, prioritize single rooms for MDRO-positive patients with higher transmission risk such as a draining wound or stool incontinence. Cohort MDRO-positive patients if private rooms are unavailable.
Surveillance

6. **Review microbiology laboratory records** for the prior 12 months to identify any previously unrecognized 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 periodic audits, observations, and competency-based education.** Monitor adherence to core MDRO prevention measures (hand hygiene, contact precautions, inter-facility communication, 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 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/core-elements/hospital.html](https://www.cdc.gov/antibiotic-use/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 testing

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, and other CPOs), implement the following additional measures:

**Communication**

1. **Notify MDPH, in addition to 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 MDRO spread needs to be an institutional priority, which requires leadership and resource support.

**Surveillance**

3. **Review microbiology records** to identify any other 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 MDROs should also be conducted for at least 3 months after the index patient (or the last case, if transmission occurred) was identified (15).

**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 F.

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.
Contact Screening

8. **In consultation with MDPH, obtain screening swabs of high-risk health care facility 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 nurses, physicians, and other health care providers;
- The intensity of nursing 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 consider flagging 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 or perirectal swabs. The cost-benefit ratio of screening additional sites is uncertain and therefore not routinely recommended.
- Generally, screening specimen collection should not be billed to the patient; discuss billing with the microbiology laboratory and facility leadership.
- Keep a record of screening results and “flag” any MDRO-positive patients for appropriate infection control.
- MDPH may recommend wider point prevalence surveys of units, depending on the results of epidemiological investigations.
• See appendices G & H for further information and screening protocol.

9. **In the event of a cluster of cases, consider active surveillance screening.** Unlike screening for high-risk contacts, which is routinely recommended for MDRO 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*

10. **Cohort nursing staff that care for MDRO-positive patients as resources allow.** This is most important and more feasible in the situation of ≥2 MDRO-positive patients.

11. **In the event >1 case is detected, cohort patients to one hospital ward when technically feasible.** Private rooms for each patient are still recommended.
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 of 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 an 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 (CBG) 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 contact precaution PPE (gloves and gowns) is available and readily accessible, and that all staff understand and are trained on when and how to use it. Refer to the section labeled *When and how to apply contact precautions for MDRO-positive residents* on page 27 for further guidance.

Education

4. **Educate staff about MDROs.** Provide an in-service to staff about MDROs. Sample fact sheets are attached as appendices (see Appendices A-C) 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, linen reprocessing and environmental cleaning. For environmental cleaning, ensure housekeeping is properly using an EPA-registered disinfectant labeled for use in health care (21).

6. **Familiarize your staff with infection criteria and surveillance definitions in long term care settings (22).**
Part 2: MDRO identification & testing

Your lab identifies a MDRO in one of your residents

Your lab notifies both MDPH and your facility, and sends the isolate to the MDPH lab for carbapenemase testing

MDPH contacts your facility and shares initial infection control recommendations (see Appendix I)

MDPH lab finishes carbapenemase testing & contacts your facility with results

**Positive**: continue initial control recommendations & consult with MDPH for additional recommendations

**Negative**: continue initial infection control recommendations
Part 3: What to do when a targeted MDRO is identified at your SNF

These recommendations are also summarized in the table in Appendix I: Summary of Infection Control Recommendations for Targeted MDROs in SNFs (CRE, CRAB, CRPA, C. auris, & all CPOs).

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 D.

Communication

2. Labs 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 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 patient and caregivers of the patient’s MDRO status. Healthcare facilities should promptly notify the patient, their family or primary caregiver, and healthcare staff when a MDRO is identified.

5. Upon resident transfer to another health care facility, inform the receiving facility, both verbally and in writing, that the resident has a MDRO. An example transfer form is provided in Appendix E. Ensure that individuals directly caring for the patient and responsible for infection prevention are aware.

6. If a resident infected or colonized with a 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 a MDRO, and any at-risk residents on the same unit, on appropriate precautions.** See *When and how to apply precautions for MDRO-positive residents in SNFs* on page 27 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 patients. 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 those used by MDRO-colonized or 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 MDRO rooms and 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 J & K).

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 a MDRO in the facility.** Specific goals:
• Limit use of catheters, 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.

• Contact MDPH for information on antimicrobial stewardship programs in long-term care facilities.

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 testing:

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

If carbapenemase testing is POSITIVE (i.e. for a carbapenemase-producing-organism such as CP-CRE, CP-CRAB, or CP-CRPA) then additional infection control measures may be indicated, depending on the situation. Continue the recommendations summarized in Appendix I and consult with MDPH (617-983-6800) on further infection control measures, which may include:

• Surveillance

• Cohorting residents and staff

• 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 an MDRO, 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 MDRO-positive resident, including the following:

- Proximity to MDRO-positive resident;
- Shared health care providers;
- Intensity of nursing required;
- Stool or urine incontinence;
- Shared medical equipment or procedures; and
- Length of stay.

It is important to screen roommates, even if already discharged. For roommates and other high-risk contacts that have been discharged, consider flagging 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 H for the recommended screening protocol. MDPH is available for consultation and assistance throughout the process.

- Written consent is not required for MDRO 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 MDRO screening. Either verbal or written consent, depending on your facility’s policies and procedures, may be appropriate. See Appendix L 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 either rectal or perirectal 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 MDRO colonization, then infection control measures should be taken, including placing residents on the appropriate precautions.

- Additionally, 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* below 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 2019, CDC released 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 all residents at “higher-risk for transmission”, regardless of MDRO status, and all patients infected or colonized with a targeted MDRO (CRE, CRAB, CRPA, *Candida auris*, or any CPO) on a unit. For further guidance on enhanced barrier precautions, please see Appendix I or visit the CDC’s website at https://www.cdc.gov/hai/containment/PPE-Nursing-Homes.html (7).

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

- Ventilator-dependent;
- Uncontained incontinence of stool;
- Uncontained incontinence of urine;
- 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 only used for:

- Residents who are infected or colonized with a targeted 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 a targeted 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 I.
Important details:

1. **Hand hygiene** is KEY to preventing transmission, and the appropriate use of contact precautions for in-room 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 the use of gowns and gloves for anticipated contact with body fluid or potential splashes, and when changing soiled bed linens. Refer to the *Standard precautions* section in the *Ambulatory care* section on page 30 of this toolkit for additional information.

How to don and doff PPE:

![Image showing steps to don and doff PPE]

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

*MDPH does not recommend screening to determine whether precautions can be discontinued.* MDPH should be consulted if a facility is considering discontinuing precautions for a resident with a targeted MDRO (CRE, CRAB, CRPA, *Candida auris*, or any CPO). In select circumstances, consecutive screening 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 targeted 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: http://www.cdc.gov/HAI/settings/outpatient/outpatient-care-guidelines.html (25). The most pertinent infection prevention and control measures for preventing the transmission of CRE, 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 caring for patients with known or suspected infectious diarrhea such as *Clostridium difficile* or norovirus, or after using the restroom.
Key recommendations for the use of PPE in ambulatory care settings:

1. Facilities should ensure sufficient and appropriate PPE is available and readily accessible.

2. Educate all health care providers on proper selection and use of PPE.

3. Remove and discard PPE before leaving the patient’s room or area; and

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/infectioncontrol/pdf/outpatient/guidechecklist.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/index.html
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/hai/settings/outpatient/outpatient-care-guidelines.html (25).

The most important infection prevention and control measures to prevent transmission of CRE, MDROs, norovirus and many other infections in community-based care settings are adherence to hand hygiene and proper use of personal protective equipment (PPE) when handling bodily fluids.

**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, 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 caring for residents with known or suspected infectious diarrhea such as
*Clostridium difficile* or norovirus, or after using the restroom.

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

1. Facilities should ensure sufficient and appropriate PPE is available and readily accessible.

2. Educate all health care 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 (and located here: [https://www.cdc.gov/infectioncontrol/pdf/outpatient/guidechecklist.pdf](https://www.cdc.gov/infectioncontrol/pdf/outpatient/guidechecklist.pdf)) to review current policies and practices. Topics include transmission-based precautions, safe injection practices, and safe medication storage.
Infection Prevention and Control for:

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 health care providers of their MDRO history.

Family members or health care employees 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, 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, after caring for persons with known or suspected infectious diarrhea such as *Clostridium difficile* or norovirus, or after using the restroom.
Key recommendations for use of PPE in home settings:

1. Home care agencies should ensure sufficient and appropriate PPE is available and readily accessible.

2. Educate all health care 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: http://consumers.site.apic.org/infection-prevention-in/your-home/
References


APPENDICES
Appendix A: CDC CRE Fact Sheet

General information about CRE
CRE stands for carbapenem-resistant Enterobacteriaceae. Enterobacteriaceae are a family of germs, specifically bacteria. Many different types of Enterobacteriaceae can develop resistance, including Klebsiella pneumoniae and Escherichia coli (E. coli). These bacteria can cause infections including pneumonia, bloodstream infections, urinary tract infections, wound infections, and meningitis.

CRE are a major concern for patients in healthcare settings because they are resistant to carbapenem antibiotics, which are considered the last line of defense to treat multidrug-resistant bacterial infections. Often, high levels of antibiotic resistance in CRE leave only treatment options that are more toxic and less effective.

How common are CRE infections?
In 2017, CRE caused an estimated 13,100 infections in hospitalized patients, and 1,100 estimated deaths in the United States [Source: 2019 AR Threats Report].

Who is most likely to get a CRE infection?
Healthy people usually do not get CRE infections—they are most common in patients in hospitals and long-term care facilities like skilled nursing facilities and long-term acute care hospitals. Patients whose care requires devices like ventilators (breathing machines), urinary (bladder) catheters, or intravenous (vein) catheters, patients who are taking long courses of certain antibiotics, and patients with weakened immune systems are among those at risk for CRE infections.
What is the difference between colonization and infection?
Some people have germs on or in their body, but those germs do not cause an infection. These people are said to be colonized.

People colonized with CRE can develop infections, but most will not. CRE can cause infections when the germs enter the body, often through medical devices like ventilators, intravenous catheters, urinary catheters, or wounds caused by injury or surgery.

How are CRE germs spread?
CRE are usually spread person to person through contact with infected or colonized people, particularly contact with wounds or stool (poop). This contact can occur via the hands of healthcare workers, or through medical equipment and devices that have not been correctly cleaned.

How can I protect myself from CRE?
As a patient, there are several ways you can protect yourself.

• Tell your healthcare provider if you have been hospitalized in another healthcare facility, including hospitals in other countries.
• Make sure all healthcare providers clean their hands before caring for you. If you don’t see your providers clean their hands, ask them to do so.
• Clean your own hands often, and ask anyone taking care of you to clean their hands:
  o Before preparing or eating food
  o Before touching your eyes, nose, or mouth
  o Before and after changing wound dressings or bandages
  o Before handling medical devices or touching tubes going into your body
  o After using the bathroom
  o After blowing nose, coughing, or sneezing
• If you are prescribed antibiotics, take them exactly as your healthcare provider recommends.
• Talk to your healthcare provider about your care and any concerns you have. Ask them what they are doing to protect you from getting an infection while receiving care.
• Avoid preventable infections by making sure you are up to date on all recommended vaccinations.

How are CRE infections treated?
Treatment decisions for patients with CRE infections are made on a case-by-case basis by a healthcare provider. For patients who are colonized with CRE but do not have an infection, treatment is often not required.
What if I have CRE?
Follow your healthcare provider’s instructions. If your provider prescribes antibiotics, take them exactly as instructed and finish the full course, even if you feel better. Clean your hands often, especially after you have contact with the infected area, after using the bathroom, and before preparing or eating food. Follow any other hygiene advice your provider gives you. Be alert to changes in your health (e.g., if you develop diarrhea), and contact your healthcare provider if changes occur.
**Pseudomonas** is a type of bacteria (germ) that is found commonly in the environment, like in soil and in water. Of the many different types of *Pseudomonas*, the one that most often causes infections in humans is called *Pseudomonas aeruginosa*, which can cause infections in the blood, lungs (pneumonia), or other parts of the body after surgery.

These bacteria are constantly finding new ways to avoid the effects of the antibiotics used to treat the infections they cause. *Antibiotic resistance* occurs when the germs no longer respond to the antibiotics designed to kill them. If they develop resistance to several types of antibiotics, these germs can become multidrug-resistant.

**How common are these infections?**

In 2017, multidrug-resistant *Pseudomonas aeruginosa* caused an estimated 32,600 infections among hospitalized patients and 2,700 estimated deaths in the United States [Source: 2019 AR Threats Report].

**Who is at risk?**

Those most at risk include patients in hospitals, especially those:
- on breathing machines (ventilators)
- with devices such as catheters
- with wounds from surgery or burns

**How is it spread?**

*Pseudomonas aeruginosa* lives in the environment and can be spread to people in healthcare settings when they are exposed to water or soil that is contaminated with these germs.
Resistant strains of the germ can also spread in healthcare settings from one person to another through contaminated hands, equipment, or surfaces.

How can you avoid getting an infection?
Patients and caregivers should:
- keep their hands clean to avoid getting sick and spreading germs that can cause infections
  - wash their hands with soap and water or use alcohol-based hand sanitizer, particularly before and after caring for wounds or touching a medical device
- remind healthcare providers and caregivers to clean their hands before touching the patient or handling medical devices
- allow healthcare staff to clean their room daily when in a healthcare setting

Healthcare providers should pay careful attention to recommended infection control practices, including hand hygiene and environmental cleaning (e.g., cleaning of patient rooms and shared equipment) to reduce the risk of spreading these germs to patients.

Healthcare facilities should have water management plans (see Reduce Risk from Water) that help ensure water quality and reduce the risk of exposure to potentially harmful germs like *Pseudomonas aeruginosa*.

How are these infections treated?
*Pseudomonas aeruginosa* infections are generally treated with antibiotics. Unfortunately, in people exposed to healthcare settings like hospitals or nursing homes, *Pseudomonas aeruginosa* infections are becoming more difficult to treat because of increasing antibiotic resistance.

To identify the best antibiotic to treat a specific infection, healthcare providers will send a specimen (often called a culture) to the laboratory and test any bacteria that grow against a set of antibiotics to determine which are active against the germ. The provider will then select an antibiotic based on the activity of the antibiotic and other factors, like potential side effects or interactions with other drugs. For some multidrug-resistant types of *Pseudomonas aeruginosa*, treatment options might be limited.
Acinetobacter is a group of bacteria (germs) commonly found in the environment, like in soil and water. While there are many types, the most common cause of infections is Acinetobacter baumannii, which accounts for most Acinetobacter infections in humans.

Acinetobacter baumannii can cause infections in the blood, urinary tract, and lungs (pneumonia), or in wounds in other parts of the body. It can also “colonize” or live in a patient without causing infections or symptoms, especially in respiratory secretions (sputum) or open wounds.

These bacteria are constantly finding new ways to avoid the effects of the antibiotics used to treat the infections they cause. Antibiotic resistance occurs when the germs no longer respond to the antibiotics designed to kill them. If they develop resistance to the group of antibiotics called carbapenems, they become carbapenem-resistant. When resistant to multiple antibiotics, they’re multidrug-resistant. Carbapenem-resistant Acinetobacter are usually multidrug-resistant.

How common are these infections?
In 2017, carbapenem-resistant Acinetobacter caused an estimated 8,500 infections in hospitalized patients and 700 estimated deaths in the United States.

Who is at risk?
Acinetobacter infections typically occur in people in healthcare settings. People most at risk include patients in hospitals, especially those who:

- are on breathing machines (ventilators)
- have devices such as catheters
- have open wounds from surgery
- are in intensive care units
- have prolonged hospital stays

In the United States, *Acinetobacter* infections rarely occur outside of healthcare settings. However, people who have weakened immune systems, chronic lung disease, or diabetes may be more susceptible.

**How is it spread?**

*Acinetobacter* can live for long periods of time on environmental surfaces and shared equipment if they are not properly cleaned. The germs can spread from one person to another through contact with these contaminated surfaces or equipment or through person to person spread, often via contaminated hands.

**How can you avoid getting an infection?**

Patients and caregivers should:
- keep their hands clean to avoid getting sick and spreading germs that can cause infections
  - wash their hands with soap and water or use alcohol-based hand sanitizer, particularly before and after caring for wounds or touching a medical device
- remind healthcare providers and caregivers to clean their hands before touching the patient or handling medical devices
- allow healthcare staff to clean their room daily when in a healthcare setting

In addition to hand hygiene, healthcare providers should pay careful attention to recommended infection control practices, including rigorous environmental cleaning (e.g., cleaning of patient rooms and shared equipment), to reduce the risk of spreading these germs to patient.

**How are these infections treated?**

*Acinetobacter* infections are generally treated with antibiotics. To identify the best antibiotic to treat a specific infection, healthcare providers will send a specimen (often called a culture) to the laboratory and test any bacteria that grow against a set of antibiotics to determine which are active against the germ. The provider will then select an antibiotic based on the activity of the antibiotic and other factors, like potential side effects or interactions with other drugs. Unfortunately, many *Acinetobacter* germs are resistant to many antibiotics, including carbapenems, which makes them difficult to treat with available antibiotics.
### Hand Hygiene and Contact Precautions Observation Tool

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<tr>
<th>Staff type*</th>
<th>Type of opportunity</th>
<th>HH performed?</th>
<th>Gown or glove indicated?</th>
<th>Gown/glove used?</th>
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<td>○ Alcohol-rub ○ Hand Wash ○ No HH done</td>
<td>○ Gown only ○ Glove only ○ Both ○ No</td>
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<td>○ Room entry ○ Room exit ○ Before resident contact ○ After resident contact ○ Before glove ○ After glove ○ Other: Click here to enter text.</td>
<td>○ Alcohol-rub ○ Hand Wash ○ No HH done</td>
<td>○ Gown only ○ Glove only ○ Both ○ No</td>
<td>○ Gown used ○ Glove used ○ Both ○ Neither</td>
</tr>
<tr>
<td></td>
<td>○ Room entry ○ Room exit ○ Before resident contact ○ After resident contact ○ Before glove ○ After glove ○ Other: Click here to enter text.</td>
<td>○ Alcohol-rub ○ Hand Wash ○ No HH done</td>
<td>○ Gown only ○ Glove only ○ Both ○ No</td>
<td>○ Gown used ○ Glove used ○ Both ○ Neither</td>
</tr>
<tr>
<td></td>
<td>○ Room entry ○ Room exit ○ Before resident contact ○ After resident contact ○ Before glove ○ After glove ○ Other: Click here to enter text.</td>
<td>○ Alcohol-rub ○ Hand Wash ○ No HH done</td>
<td>○ Gown only ○ Glove only ○ Both ○ No</td>
<td>○ Gown used ○ Glove used ○ Both ○ Neither</td>
</tr>
<tr>
<td></td>
<td>○ Room entry ○ Room exit ○ Before resident contact ○ After resident contact ○ Before glove ○ After glove ○ Other: Click here to enter text.</td>
<td>○ Alcohol-rub ○ Hand Wash ○ No HH done</td>
<td>○ Gown only ○ Glove only ○ Both ○ No</td>
<td>○ Gown used ○ Glove used ○ Both ○ Neither</td>
</tr>
</tbody>
</table>

*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 E: Inter-facility Infection Control Transfer Form

This form must be filled out for transfer to accepting facility with information communicated prior to or with transfer. Please attach copies of latest culture reports with susceptibilities if available.

<table>
<thead>
<tr>
<th>Sending Healthcare Facility:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Patient/Resident Last Name</strong></td>
<td><strong>First Name</strong></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Name/Address of Sending Facility</th>
<th><strong>Sending Unit</strong></th>
<th><strong>Sending Facility Phone</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sending Facility Contacts</th>
<th><strong>Contact Name</strong></th>
<th><strong>Phone</strong></th>
<th><strong>E-mail</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Transferring RN/Unit</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transferring physician</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Case Manager/Admin/SW</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Infection Preventionist</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Does the person* currently have an infection, colonization OR a history of positive culture of a multidrug-resistant organism (MDRO) or other potentially transmissible infectious organism?</th>
<th><strong>Colonization or history (Check if YES)</strong></th>
<th><strong>Active infection on Treatment (Check if YES)</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Methicillin-resistant <em>Staphylococcus aureus</em> (MRSA)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Vancomycin-resistant <em>Enterococcus</em> (VRE)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Clostridoides difficile</em></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Acinetobacter, multidrug-resistant</em></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Enterobacteriaceae (e.g., <em>E. coli, Klebsiella, Proteus</em>) producing Extended Spectrum Beta-Lactamase (ESBL)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Carbapenem-resistant Enterobacteriaceae (CRE)</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Pseudomonas aeruginosa</em>, multidrug-resistant</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td><em>Candida auris</em></td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Other, specify (e.g., lice, scabies, norovirus, influenza):</td>
<td>Yes</td>
<td>Yes</td>
</tr>
</tbody>
</table>

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

- Cough or requires suctioning
- Diarrhea
- Vomiting
- Incontinent of urine or stool
- Open wounds or wounds requiring dressing change
- Drainage (source):
- Central line/PICC (Approx. date inserted)
- Hemodialysis catheter
- Urinary catheter (Approx. date inserted)
- Suprapubic catheter
- Percutaneous gastrostomy tube
- Tracheostomy
Is the person* currently in Transmission-Based Precautions?  □ NO  □ YES

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

□ Other: ____________________________

Reason for Precautions: ____________________________

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

<table>
<thead>
<tr>
<th>Antibiotic, dose, route, freq.</th>
<th>Treatment for:</th>
<th>Start date</th>
<th>Anticipated stop date</th>
<th>Date/time last dose</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Vaccine</th>
<th>Date administered (If known)</th>
<th>Lot and Brand (If known)</th>
<th>Year administered (If exact date not known)</th>
<th>Does the person* self-report receiving vaccine?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Influenza (seasonal)</td>
<td></td>
<td></td>
<td></td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td>Pneumococcal (PPSV23)</td>
<td></td>
<td></td>
<td></td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td>Pneumococcal (PCV13)</td>
<td></td>
<td></td>
<td></td>
<td>□ Yes □ No</td>
</tr>
<tr>
<td>Other:</td>
<td></td>
<td></td>
<td></td>
<td>□ Yes □ No</td>
</tr>
</tbody>
</table>

*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 F: CDC Environmental Checklist for Monitoring Terminal Cleaning

**Date:**

**Unit:**

**Room Number:**

**Initials of ES staff (optional):**

Evaluate the following priority sites for each patient room:

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

Evaluate the following additional sites if these equipment are present in the room:

<table>
<thead>
<tr>
<th>High-touch Room Surfaces</th>
<th>Cleaned</th>
<th>Not Cleaned</th>
<th>Not Present in Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>IV pump control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-module monitor controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-module monitor touch screen</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Multi-module monitor cables</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Ventilator control panel</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Mark the monitoring method used:

- [ ] Direct observation
- [ ] Fluorescent gel
- [ ] Swab cultures
- [ ] ATP system
- [ ] Agar slide cultures

---

1. Selection of detergents and disinfectants should be according to institutional policies and procedures
2. Hospitals may choose to include identifiers of individual environmental services staff for feedback purposes.
3. Sites most frequently contaminated and touched by patients and/or healthcare workers
Appendix G: Antibiotic Resistance Laboratory 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.

**AR Lab Network**

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

Uncovering threats:
- *Acinetobacter* species
- *Candida* species
- *Clostridium difficile*
- Carbapenem-resistant Enterobacteriaceae (CRE)
- ESBLs to screen for colistin resistance
- *Mycobacterium tuberculosis*
- *Neisseria gonorrhoeae*
- *Salmonella*
- *Streptococcus pneumoniae*

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

**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.

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

CDC Laboratory Expertise & Coordination
- 7 Regional Labs
- 1 National Tuberculosis Molecular Surveillance Center
- 55 State & Local Labs, building on CDC’s existing healthcare, food, and community programs.

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
Appendix H: Rectal Screening Specimen Collection Protocol

Background:

Following isolation of a carbapenemase-producing organism (CPO), screening cultures may be recommended in consultation with MDPH. Other appendices provide additional information for obtaining patient consent as well as specimen processing.

Steps to Prepare for Specimen Collection:

1. Work with administration and infection prevention & control to clarify costs and payment for surveillance cultures.

2. Collaborate with your laboratory and MDPH regarding supplies:
   - MDPH recommends culture swabs prepackaged in neutralizing buffer (e.g., liquid Stuarts or phosphate buffered saline).

3. Inform and educate staff about CPOs. Train staff on rectal and perirectal screening specimen collection.

4. Inform and educate patients regarding CPOs and the reason for screening cultures. Obtain patient consent.

5. Collaborate with the laboratory regarding:
   - Timing of collection for optimal delivery and set-up (e.g., specimen collection on either Monday or Tuesday is typically preferred).
   - Appropriate test order entry (e.g., screening or surveillance test).

6. Collaborate with the laboratory and infection prevention & control to manage test results.
   - Include pertinent clinician groups (e.g., infectious diseases, critical care, pharmacy, etc.)
   - Determine manner of reporting in the patient’s chart or “flagging” of positive results.
**Specimen Collection Protocol:**

This protocol is written with culture swabs identified for rectal or perirectal sites, but it is applicable to using pre-moistened “sponge sticks” and other body sites, as well. If multiple sites are cultured, use one swab per site to allow better interpretation and prevent cross-contamination.

1. In consultation with MDPH, identify high-risk contacts to undergo surveillance cultures.

2. Premoisten the sterile swab in liquid transport media in the accompanying culturette tube.

3. Insert moistened tip of swab into the anal canal and turn 2-3 times.

   - Alternatively, sample stool for culture if visible on the perianal skin or in an ostomy bag.

4. Replace swab in culturette tube and secure top.

5. Label specimen with unique patient ID, date, site and collector’s initials. Place in sealed specimen bag.

6. Make sure to note type of culture as “screening.”

7. Send specimen to the laboratory. Ensure laboratory is aware of correct methodology to process specimen.

   - Note: ideally specimens should be plated within 4 hours of collection. If significant delay occurs before plating specimens, store swabs at 4°C for up to 3 days.

**References:**

- Prabaker K et al. Transfer from High-acuity long-term care facilities is associated with carriage of *Klebsiella pneumoniae* carbapenemase-producing *Enterobacteriaceae*: A multihospital study. ICHE 2012;33:1193–1198
### Appendix I: Summary of Control Recommendations for Targeted MDROs in SNFs (CRE, CRAB, CRPA, C. auris, & CPOs) & Door Signage

<table>
<thead>
<tr>
<th>Applies to:</th>
<th>All residents</th>
<th>“At-risk” residents* (regardless of MDRO status) who reside on a unit where a resident with a targeted MDRO resides</th>
<th>Residents infected or colonized with a targeted MDRO when Contact Precautions do not apply</th>
<th>Residents infected or colonized with a targeted MDRO AND acute diarrhea, draining wounds, or other sites of secretions or excretions that are unable to be covered or contained**</th>
</tr>
</thead>
<tbody>
<tr>
<td>Precautions</td>
<td><strong>Standard Precautions</strong></td>
<td><strong>Enhanced Barrier Precautions</strong></td>
<td><strong>Contact Precautions</strong></td>
<td></td>
</tr>
</tbody>
</table>
| PPE used for these situations: | Any potential exposure to:  
- Blood  
- Body fluids  
- Mucous membranes  
- Non-intact skin  
- Potentially contaminated environmental surfaces or equipment | During high-contact resident care activities:  
- 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 | 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 |
| Enhanced cleaning of environment | No | 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 |

* Definition of at-risk residents: Residents with wounds and/or indwelling medical devices (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.
CONTACT PRECAUTIONS

EVENONE 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.
Appendix J: Long-term Care Resident Room Environmental Cleaning Checklist

Date: ___________________________
Unit or Ward: ___________________
Room: ___________________________
Initials of environmental services staff (optional): 1

<table>
<thead>
<tr>
<th>Evaluate the following priority sites for each resident room:</th>
<th>Cleaned</th>
<th>Not Cleaned</th>
<th>Not Present in Room</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-touch Room Surfaces</strong> 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bed rails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Tray table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Call button</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remote Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedside table</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bedside Chair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Telephone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room light switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Room inner door knob/door pull</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Closet door knob/door pull</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom inner door knob/pull</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom light switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom handrails by toilet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom sink/faucet handles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet seat</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet flush handle</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Toilet bedpan cleaner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Shower hand holds</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Evaluate the following additional sites if these equipment are present in the room:</th>
<th>Cleaned</th>
<th>Not Cleaned</th>
<th>Not Present in Room</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>High-touch Room Surfaces</strong> 2</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IV /tube feeding pump control panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wound Vacuum Control panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wheelchair-especially handles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Walker /Cane handles</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## Appendix K: Long-term Care Common Areas Environmental Cleaning Checklist

**Date:** ____________________________

**Unit or Ward:** ________________

**Initials of environmental services staff (optional):**

<table>
<thead>
<tr>
<th>Evaluate the following priority sites for each resident room:</th>
<th>Cleaned</th>
<th>Not Cleaned</th>
<th>Not Present in Room</th>
</tr>
</thead>
<tbody>
<tr>
<td>High-touch Common Surfaces&lt;sup&gt;2&lt;/sup&gt;</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Light Switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Call Button</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TV Remote Controls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Chair</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Telephone</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mechanical Lift</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hall Hand Rails</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Door Pulls</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Closet Door Knobs/Pull</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Microwave Control Panel</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Refrigerator/Freezer Handles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom inner door knob/pull</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom light switch</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom handrails by toilet</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom sink/faucet handles</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Bathroom toilet seat</td>
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<td>Toilet flush handle</td>
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<td>Common Tub Faucet Handles</td>
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<td>Common Shower hand holds</td>
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<td>Common Bench</td>
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<th>Evaluate the following additional sites if these equipment are present in the facility:</th>
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<th>Not Cleaned</th>
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<td>Washer/Dryer Knobs</td>
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<td>Activity Room Tables</td>
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**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 L: Patient Screening FAQs & Sample Consent Script

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

Your [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 drugs 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 this 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 Enterobacteriaceae, 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 just 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.

Do you have any questions? [pause for questions]

Is it OK if we collect the swab?
Antimicrobial susceptibility testing for Enterobacteriaceae 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.

- Enterobacteriaceae are resistant to new drugs for carbapenem-resistant Enterobacteriaceae (CRE) treatment, specifically ceftazidime-avibactam and meropenem-vaborbactam. However, these bacteria may be susceptible to the combination therapy ceftazidime + avibactam + aztreonam*. 
  *Ceftazidime + avibactam + aztreonam is a combination of drugs recommended by the 2018 Sanford Guide for treatment of serious infections caused by MBL-producing Enterobacteriaceae. 

- 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.

1 What isolates can I submit?

Hospital laboratories and clinicians are encouraged to submit Enterobacteriaceae 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-

- Enterobacteriaceae with NDM, VIM, or IMP genes confirmed by a molecular test.

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.

As part of the AR Lab Network, your state and regional lab work to:
Detect resistant species & new threats | Perform susceptibility testing to track resistance | Help respond to outbreaks

AR Lab Network Testing & Resources
(https://www.cdc.gov/drugresistance/laboratories.html)