

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



Updated December 2022



**Centers for Disease  
Control and Prevention**  
National Center for Emerging and  
Zoonotic Infectious Diseases

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

This document is intended for use by state, local, territorial, and tribal health departments and healthcare facilities. It was developed with input from state and local health departments and serves as general guidance for the initial response following the identification of novel or targeted multidrug-resistant organisms (MDROs) or resistance mechanisms. Response recommendations are for MDROs that are in pre-endemic stages of spread, for which a public health response to identified cases is an important strategy to limit transmission. Recommendations are not inclusive of all the actions that might be required for control of an outbreak (e.g., sustained transmission within a facility or region).

Please refer to the complementary document, **Public Health Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs)**, for information about the development, implementation, and coordination of activities designed to prevent transmission of targeted MDROs at all epidemiologic stages (from pre-introduction through endemicity) across healthcare facilities within a jurisdiction. Combining prevention and response strategies has the potential to be more effective than either strategy alone.

## Updates to the 2019 interim guidance:

- **Updated definitions for organism/mechanism tiers**
  - **Tier 1 is now limited to novel organisms and/or resistance mechanisms** that have never (or very rarely) been identified in the United States and for which experience is extremely limited, thus requiring a more extensive evaluation. Isolates that are not susceptible to any available antimicrobials, but whose transmission dynamics are well-known, are now classified as Tier 2. Note that this classification change does not change overall recommended response activities when a pan-not susceptible isolate is identified.
  - **Added Endemic (Tier 4) to reflect jurisdictions where organisms are endemic**
- Expanded the “Response Recommendations by Tier” to include additional details
- Revised Tier 3 approaches to include steps to transition from response to prevention strategies
- Added a section to describe actions that should be taken following the identification of a targeted MDRO in a region where that organism (or mechanism) is endemic
- The section “Containment Strategies for Healthcare Facilities at High Risk for Transmission of MDROs” has been superseded by the Interim Guidance for Public Health Measures to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs)

## Goals of initial response include:

1. Identify affected patients.
2. Ensure appropriate control measures are promptly implemented to limit further spread.
3. Determine if transmission within a healthcare facility and dissemination to other facilities are occurring (Tiers 1-2).
4. Characterize novel organisms and mechanisms to guide further response actions, patient management, and future responses.
5. Coordinate response with ongoing prevention activities (e.g., MDRO education, infection prevention and control improvement initiatives, routine colonization screening, and improved interfacility communication) in the region.

In addition to this general guidance, further pathogen-specific guidance for some MDROs can be found here:

- [Vancomycin-resistant \*Staphylococcus aureus\* \(VRSA\)](#)
- [Carbapenem-resistant Enterobacterales \(CRE\)](#)
- [Candida auris](#)

## General recommendations

Healthcare facilities and laboratories should contact state or local public health authorities promptly when targeted resistant organisms (e.g., pan-not susceptible organism) or mechanisms are identified (e.g., New Delhi Metallo- $\beta$ -lactamase [NDM]-producing Enterobacterales).

Health departments should use the expanded capacity for antimicrobial resistance-related laboratory testing offered through the [Antimicrobial Resistance Laboratory Network](#) (e.g., mechanism testing for carbapenem-resistant Enterobacterales, *Pseudomonas aeruginosa*, and *Acinetobacter baumannii* clinical isolates, *Candida* species identification, carbapenemase-producing organism and *Candida auris* colonization screening) and should understand the availability of specific testing and processes to coordinate specimen submission to local, state, and regional public health laboratories.

All testing of clinical and surveillance specimens collected for novel and targeted MDRO prevention and response should be performed under applicable regulations for the collection, testing, and reporting of results to patients and healthcare providers.

Health departments conducting these investigations are encouraged to consult with CDC by contacting the healthcare-associated infections (HAI) outbreak duty officer at [haioutbreak@cdc.gov](mailto:haioutbreak@cdc.gov).

## Definitions

### Healthcare Facility:

For this guidance, 'healthcare facility' refers to all acute care hospitals and post-acute care facilities that care for patients or residents who remain overnight and require medical care, skilled nursing care, or rehabilitation services.

### Residential Care Settings:

Facilities with staff that provide non-skilled personal care (i.e., assistance with activities of daily living like bathing, dressing, and cooking) to people with disabilities or older adults, similar to that provided by family members in the home. This includes settings like group homes, assisted living, and personal care homes. On-site healthcare services in residential care settings are often provided by visiting or shared healthcare personnel (e.g., physical therapy, wound care, intravenous injections, or catheter care provided by home health agency nurses).

### Colonization:

The presence of an organism, such as a novel or targeted MDRO, on or in the body of an individual without causing signs or symptoms of infection. Individuals who are colonized can be a source of spread to the environment and other patients and can develop infections with the colonizing organism.

### Colonization Screening:

The use of laboratory testing to identify colonized individuals by testing for the presence of novel or targeted MDROs on or in the body of an individual. When an emerging MDRO is identified, colonization screening is recommended by CDC as an essential component of the public health response. Colonization screening identifies unrecognized carriers so that infection prevention and control measures can be targeted to prevent the spread of antimicrobial resistance.

The colonization screening recommendations in this guidance apply to all healthcare facility types. Additionally, depending on the scope of the investigation and type of organism identified, colonization screening might be recommended for community settings. Recommendations about which individuals to screen are included in the 'Conduct a Contact Investigation' section for each response tier.

Body sites for colonization screening specimen collection will depend on the organism. For example, Staphylococci most commonly require samples from nares and sometimes other sites such as axillae, groin, or pharynx. Gram-negative organisms most commonly require samples from stool (including rectal swabs) and sometimes other

sites such as wounds, groin, or sputum. Confer with the testing laboratory to determine the anatomic site(s) that will be screened and best practices for specimen collection.

### **Response-driven Point Prevalence Survey (PPS):**

Colonization screening performed unit- or facility-wide following the identification of a patient or resident with a novel or targeted MDRO. The goal of these surveys is to identify colonized individuals and initiate transmission-based precautions; therefore, these serve as both an assessment tool (for possible transmission) and an intervention (facilitating identification of colonized individuals for implementation of appropriate precautions).

### **Epidemiologic Stages:**

The general pattern of MDRO emergence and spread throughout a geographic area, adapted from the work of Grundmann and colleagues.<sup>1</sup> For the purposes of this document and the companion document **Interim Guidance for Public Health Measures to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs)**, these stages are:

- No cases identified.
- Limited spread: Sporadic cases or sporadic clusters of epidemiologically linked cases in single facilities or in pairs of facilities that frequently share patients (e.g., acute care hospital (ACH) and long-term acute care hospital (LTACH) or LTACH and skilled nursing facility (SNF)).
- Moderate spread: Cluster or clusters of epidemiologically linked cases identified across multiple facilities that frequently share patients (i.e., cases are primarily limited to a single patient transfer network).
- Advanced spread: Clusters of cases identified across facilities in different patient transfer networks, suggesting transmission across networks.
- Endemicity: Cases are regularly identified in healthcare facilities across the region, including those in different transfer networks. Cases primarily occur in patients admitted from facilities in the region, suggesting that transmission is sustained without new importations from outside the area.

When assessing the epidemiologic stage of an organism or mechanism, consider the most recent, available information, such as the prior 6 months. The epidemiologic stage of an organism or mechanism may change due to rapid spread, or due to additional information gained from public health response or prevention activities.

### **Response Tiers:**

The following describes criteria for four different categories of organisms and resistance mechanisms (Tiers 1-4) and the recommended approach to each. Definitions of each tier are accompanied by examples. Tier 1 organisms and mechanisms are novel to the United States. Tier 2 and 3 organisms and mechanisms are targeted MDROs and health departments should use local epidemiology to guide the assignment of organisms to these tiers.

#### **Tier 1 organisms:**

This category encompasses organisms or resistance mechanisms that have never (or very rarely) been identified in the United States and for which experience is extremely limited. A more extensive evaluation is needed to define the risk for transmission and the extent of spread. Examples of Tier 1 organisms and mechanisms include the initial identifications of *Candida auris* and *mcr-1*-carrying Enterobacterales in the United States. After the risk for transmission and extent of spread are well-defined, these organisms are typically moved to lower tiers.

#### **Tier 2 organisms:**

Organisms in this group include (1) MDROs that are primarily associated with healthcare settings and are not commonly identified in the region and (2) organisms for which no current treatment options exist (pan-not susceptible) and that have the potential to spread more widely within a region (e.g., have plasmid-mediated resistance mechanisms). These organisms might be more common in other areas of the United States. Information is available about how transmission of these organisms occurs and the groups primarily at risk.

Generally, these have either not been previously identified in the region or have been limited to sporadic

<sup>1</sup> Grundmann H, Livermore DM, Giske CG, et al. Carbapenem-non-susceptible Enterobacteriaceae in Europe: conclusions from a meeting of national experts. Euro Surveill. Nov 18 2010;15(46)doi:10.2807/ese.15.46.19711-en

cases or small outbreaks (i.e., correspond to “not detected” or “limited to moderate spread” epidemiologic stages). However, these MDROs might be found more commonly in other areas of the United States or even in other regions or patient sharing networks within the same jurisdiction. In most of the U.S., carbapenem-resistant Enterobacterales (CRE) with OXA-48 or metallo-β-lactamase carbapenemases (e.g., New Delhi Metallo-β-lactamase (NDM), Verona-integron-mediated carbapenemase (VIM), and imipenemase (IMP)) and carbapenemase-producing *Pseudomonas spp.* meet the Tier 2 criteria. In some areas of the United States, carbapenem-resistant Enterobacterales producing *Klebsiella pneumoniae* carbapenemase (KPC-CRE) and *C. auris* also meet the Tier 2 criteria because they are not commonly identified.

**Tier 3 organisms:**

Organisms in this group include MDROs targeted by the facility or region for epidemiologic importance that have been identified frequently across a region, indicating advanced spread, but are not considered endemic. These organisms might be more common in other areas of the United States. Information is available about how transmission of these organisms occurs and the groups primarily at risk.

Examples include KPC-CRE and *Acinetobacter baumannii* with plasmid-mediated oxacillinases with carbapenemase activity (e.g., OXA-23-like, OXA-24/40-like) and *C. auris* in certain regions of the United States where these organisms are more regularly identified but are not endemic.

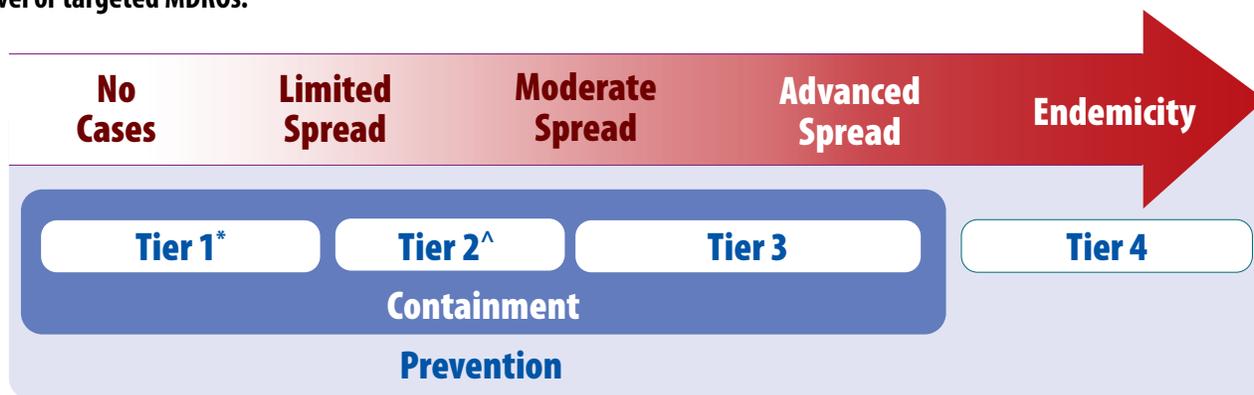
**Endemic (Tier 4) organisms:**

These MDROs are endemic in a region and have been targeted by public health for their clinical significance and potential to spread rapidly (e.g., to other regions where they are less common or from healthcare settings into the community).

## Relationship between prevention and response activities

MDRO prevention strategies described in Public Health Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs) should be considered at all epidemic stages. These encompass ongoing interventions across a group of facilities or geographic regions that are implemented based on the local epidemiology and healthcare facility characteristics. The response strategies described in this guidance are intended for pre-endemic stages of spread and are implemented following the identification of a targeted MDRO. They are time-limited and focused on facilities that have recently cared for patients or residents with targeted MDROs or are epidemiologically linked to facilities that cared for these patients or residents. Ideally, response activities should be layered on existing prevention interventions. *Combining these strategies has the potential to be more effective than either strategy implemented in isolation.*

**Figure 1. Relationship between epidemic stages, response tiers, containment response, and prevention activities for novel or targeted MDROs.**



Organism or resistant mechanism that have

\*Never (or very rarely) been identified **in the United States** and for which experience is extremely limited are Tier 1.

^Never (or very rarely) been identified **in a public health jurisdiction but are more common in other parts of the U.S.** are Tier 2.

# Tier 1 Organisms



This category includes organisms or resistance mechanisms that have never (or very rarely) been identified in the United States and for which experience in the United States is extremely limited. The objective of Tier 1 organism investigations is to identify all cases and prevent further transmission. Because experience with a Tier 1 organism in U.S. healthcare settings is, by definition, limited, more extensive evaluation is needed to define the risk for transmission and the extent of spread.

Examples of Tier 1 organisms and mechanisms include the initial identifications of *Candida auris* and *mcr-1*-carrying Enterobacterales in the United States.

## Strategies:

**The response strategies described may occur concurrently or in a different sequence from the numbered strategies in the guidance. The order of the strategies does not reflect their relative importance.**

### (1) Initial response measures.

*Initial response measures are intended to facilitate prompt implementation of appropriate infection prevention and control (IPC) measures (e.g., Contact Precautions if not already in place for another indication) for the index patient, at the facility where they are currently admitted, to prevent transmission.*

- Upon identification of the organism or mechanism in a laboratory, the laboratory or healthcare facility should promptly notify the patient's primary healthcare provider, healthcare personnel caring for the patient, infection control department, and other healthcare staff per facility policies. Healthcare facilities (or clinical laboratories) should notify local and state public health departments promptly (within 24 hours), even if the organism/mechanism is not included in reporting mandates. State or local public health departments should notify federal public health authorities.
- If the index patient is currently admitted to a healthcare facility:
  - Implement Contact Precautions for the index patient until the health department and healthcare facility can assess the risk for transmission. Skilled nursing facilities considering use of Enhanced Barrier Precautions for a Tier 1 organism or mechanism should first consult with public health. Facilities should ensure adequate supplies are available to implement these measures and communicate any anticipated supply shortages to their public health authority.
  - Prioritize the facility where the index patient is currently admitted for a rapid infection control assessment to identify and address any potential gaps in IPC (see Strategy 5).
- Notify the patient about the results and infection control measures being implemented.
- If the MDRO was present on admission, notify the transferring facility so appropriate investigation can occur at that facility.
- Due to the limited information regarding transmissibility and duration of colonization for most Tier 1 organisms, consider periodic testing (e.g., monthly) of the index patient and/or others found to be colonized, in consultation with public health. The goal of this testing is to inform public health understanding of the organism/mechanism and ongoing risk for transmission.
  - As there is often a time lag between specimen collection and identification of a novel organism or mechanism, retesting of the index patient should be performed if more than a month has elapsed since collection of the specimen that yielded the Tier 1 organism.
  - Retesting of the site(s) that were positive initially from clinical cultures is usually indicated, particularly non-sterile sites such as a wound or urine.
  - Discontinuing Transmission-based Precautions is not routinely recommended for patients infected or colonized with Tier 1 organisms. Decisions about discontinuing Transmission-based Precautions should be made in consultation with public health authorities.

## (2) Conduct a healthcare investigation.

*These steps identify and prioritize healthcare settings based on the risk for novel MDRO transmission from the index patient to others. A healthcare investigation can provide more information about when and where the organism/mechanism might have been acquired.*

- Review the patient's healthcare exposures from at least 30 days prior to the initial positive specimen collection up to the present. Exposures of interest include overnight stays in healthcare settings (both domestic and international), outpatient visits, and home health visits to identify facilities where transmission could have occurred.
  - o Prioritize collecting information about the index patient's healthcare facility admissions, admission/discharge dates, care location(s) within a facility, presence and duration of roommates, types of care received (e.g., respiratory therapy, wound care, hemodialysis, invasive mechanical ventilation, functional status (e.g., bedbound, incontinent of stool), laboratory culture and screening results for the organism of interest, timing of healthcare facility implementation of transmission-based precautions (if any), and history of travel and/or healthcare outside the U.S. in the prior 12 months.
  - o Additional epidemiological case level data such as chronic medical conditions, recent antimicrobial exposure, and detailed information about medical procedures may be gathered after the initial healthcare investigation commences, to avoid delays in assessing for and preventing spread.
- If information is available about the time that the organism was most likely acquired (e.g., patient was hospitalized outside of the United States in a country where the organism and mechanism is known or believed to be common), then consider this period the risk period for transmission for investigation.
  - o If the suspected time of acquisition is longer than 30 days prior to identification of the Tier 1 organism, review all healthcare exposures since the time of suspected acquisition, with particular focus on settings with high acuity and long lengths of stay.

## (3) Conduct a contact investigation.

*These steps use colonization screening to assess for transmission at healthcare facilities where the index patient recently received care and among their close contacts and facilitate implementation of appropriate precautions.*

**In general, contact investigations should be initiated at all healthcare facilities (i.e., acute care hospitals and post-acute care facilities) identified as part of the healthcare investigation, prioritizing the facility where the index patient is currently located and settings with highest risk of transmission, as determined by the healthcare investigation. Depending on the type of exposure and organism, contact investigations may also include healthcare facilities where the patient received care but did not stay overnight (e.g., outpatient clinics) and community contacts. For most Tier 1 organisms, the frequency and modes of transmission will not be well understood, and therefore screening approaches are more expansive than for Tier 2 and 3 organisms. Collaborate with the AR Lab Network and CDC for appropriate methods to detect Tier 1 organisms.**

### **Patient screening to assess for transmission:**

- If the index patient had an overnight stay in a healthcare facility, screen epidemiologically linked patients regardless of whether the index patient was being managed with Contact Precautions or Enhanced Barrier Precautions.
  - o Screen patients who shared a room or bathroom with the index patient even if they have been discharged from the facility to another healthcare facility or a private residence.
  - o Screen the patient(s) *currently* admitted to rooms where the index patient stayed at least one night in healthcare facilities identified during the healthcare investigation, due to the risk of persistent environmental contamination for some organisms (e.g., carbapenem-resistant *Acinetobacter baumannii*; *Candida auris*) and transmission through the premise plumbing for others (e.g., carbapenemase-producing Enterobacterales and *Pseudomonas spp.*).

- o Screen patients who were on the same ward as the index patient and/or patients who shared healthcare personnel (HCP), including ancillary staff, if they are currently in a healthcare facility, even if it's a different facility from where they overlapped with the index case.
- o Perform point prevalence surveys (PPS) in units where the patient was admitted.
- o If screening resources are limited, prioritize screening for patients who overlapped with the index case on same unit for three or more days or with characteristics that increase their risk of MDRO acquisition (e.g., presence of invasive medical devices and lines, bedbound, etc.), and those currently in healthcare settings with high-acuity patients and longer lengths of stay.
  - ◇ Flag charts of any contacts not screened for preemptive Contact Precautions and admission screening if these individuals are readmitted to the facility in the following six months.

**Patient screening when transmission is suspected or ongoing:**

- Perform additional, wider point prevalence surveys if there is evidence or suspicion of ongoing transmission, such as clinical isolates from multiple patients or if screening identifies new cases.
  - o If contacts who have moved units or facilities are identified as cases, then contacts on the units where they have been admitted should also be screened to identify transmission.
  - o Follow up point prevalence surveys are indicated to better define the extent of transmission and the epidemiology of the organism in the facility and the region.
    - ◇ On units with suspected or confirmed transmission, periodic (e.g., every two weeks) point prevalence surveys are generally recommended until transmission is controlled. Control of transmission may be demonstrated with two consecutive point prevalence surveys with no new MDRO cases identified or, in facilities with high colonization pressure (i.e., >30%), substantially decreased transmission.
    - ◇ Conduct a point prevalence survey at facilities (or on units) that frequently receive patients from units with transmission to define the extent of spread.
  - o If transmission does not decrease across multiple point prevalence surveys, consider pausing or increasing the interval between point prevalence surveys (e.g., performed every 4-6 weeks) while reassessing and implementing measures to improve infection control. Resume more frequent point prevalence surveys (e.g., every 2 weeks) after improving infection control.
    - ◇ Implement measures to prevent outbreaks at facilities that receive patients from facilities with ongoing transmission. This could be discharge screening from the transferring facility or preemptive Contact Precautions and/or admission screening at receiving facilities.
  - o Once control is achieved, some healthcare facilities may still have relatively high colonization pressure (i.e., prevalence). Consider continuing point prevalence surveys at these facilities at increasing intervals (e.g., monthly and then quarterly) to ensure control is maintained.
  - o Implement broader measures to prevent further spread in the region (see Interim Guidance for Public Health Measures to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs)). Example measures include clinical alerts, education for clinical laboratories and healthcare facilities, prevention-driven infection control assessments and colonization screening, and improved interfacility communication.
- Screen outpatients who were seen in the same clinic as the index patient if contact between the patient and the clinic healthcare personnel or environment was extensive (e.g., wound care, invasive procedure) or if patients were exposed to common devices (e.g., whirlpools, endoscopes, etc.) and cleaning of the devices might not have been adequate.

**Healthcare personnel screening:**

- Screen HCP with extensive index patient contact (e.g., high-contact patient care activities such as bathing, toileting, wound care, or providing care to the patient for an extended period) if the risk of HCP colonization following contact with a patient colonized or infected with the novel organism/mechanism is not known or

if epidemiology suggests that the organism may have spread to patients from colonized or infected HCP or from colonized or infected patients to HCP.

- o Home health workers who cared for the patient for extended periods of time at home should also be considered among the potential HCP contacts.
- o Prior to screening HCP, decisions should be made about how colonized or infected HCP will be managed (e.g., work restrictions and rescreening).

### **Household contact screening:**

- Screen close household contacts (e.g., contacts who help care for the index patient or share a bed or bathroom with the patient). Similarly, consider screening family and friends who do not reside with the index patient but are physically cared for the patient.
  - o Screen additional household contacts if specific actions might be implemented for those found to be colonized. For example, if household contacts have health issues that might result in admission to a healthcare facility in the near future (e.g., following six months), screening results might influence the need for transmission-based precautions at admission.
  - o If household contacts are HCP, prior to pursuing screening, consider what actions will be taken if they are colonized (e.g., work restrictions and rescreening).

### **Contact screening in other settings:**

- Evaluate residential care settings, such as intermediate care facilities and some group homes, to determine if screening is appropriate:
  - o Screen roommates and residents who share a bathroom or living space with the index patient (e.g., use a common day room) or have common caregivers. This most typically will be all residents of a group home and all residents of a housing unit (e.g., a floor) in an intermediate care facility.
  - o Consider screening staff if practices result in significant exposure to the staff member (e.g., assisting residents with MDROs with toileting and bathing without use of personal protective equipment or hand hygiene).
  - o Prior to screening residents and staff in congregate living settings, decide how colonized or infected individuals will be managed (e.g., changing rooms or bathrooms for residents and work restrictions and rescreening for staff). Congregate living settings should not deny housing based on MDRO colonization.
- Some situations might warrant screening in other non-healthcare settings (e.g., resistant organism from a young child who attends daycare). As for all screening, a decision should be made prior to screening of what actions will be taken for a positive, negative, or indeterminate test result, and that information should be communicated to the patient (or guardian) as part of the test consent process.

## **(4) Conduct clinical laboratory prospective and retrospective surveillance.**

*These steps review laboratory testing results, typically from clinical cultures, from healthcare facilities where the index patient recently received care to assess for additional cases. They also establish additional testing of clinical cultures prospectively. These steps augment case detection through colonization screening.*

- Engage clinical microbiology laboratories that serve healthcare facilities where the index patient received care in the previous 30 days (or in the period since suspected acquisition, if longer than 30 days) for prospective and retrospective surveillance to identify organisms with similar resistance profiles from clinical cultures.
  - o Perform *prospective surveillance* for at least three months after identification of the index patient or, if transmission is identified through surveillance or screening, three months after the last case is identified.
    - ◇ Ensure the clinical laboratory promptly submits all isolates identified during prospective surveillance for resistance mechanism testing. The laboratory performing mechanism testing should save isolates because additional testing at public health laboratories might be indicated.
  - o Perform *retrospective surveillance* (laboratory lookbacks) of results from these clinical laboratories to identify organisms with similar resistance patterns, extending six months prior to identification of the

index case (or to the time of suspected acquisition, if shorter). If available, these retrospective isolates should be tested (e.g., at a public health laboratory) to see if they have the same resistance mechanism as the organism of interest.

- Prospective and retrospective surveillance approaches should augment, and are not intended to replace, state, tribal, local, and territorial case reporting and isolate submission requirements.

## **(5) Environmental cultures.**

*Environmental cultures can help clarify the role of the environment in transmission of a novel MDRO and may also help identify environmental reservoirs leading to ongoing transmission. Environmental sampling plans should be developed in consultation with public health and environmental microbiology experts.*

- The threshold to do environmental cultures should generally be lower for Tier 1 organisms than for organisms for which the role of the environment in transmission (e.g., environmental persistence, effectiveness of disinfectants) is understood. Cultures should primarily be reserved for:
  - o Organisms with a known or suspected persistence in the environment (e.g., *Acinetobacter spp.*) and transmission is identified or suspected.
  - o Situations in which the degree to which an organism contaminates the environment or the effectiveness of standard cleaning and disinfection methods against that organism are unknown.
  - o Situations where epidemiological data suggest an environmental reservoir is contributing to transmission and transmission continues despite control measures.
  - o If questions are primarily about the completeness of cleaning, as opposed to environmental persistence and effectiveness of disinfectants in the clinical setting, then consider using non-culture-based techniques (e.g., removal of fluorescent markings) in lieu of or prior to culture-based approaches.

## **(6) Implement a system to ensure adherence to infection control measures.**

*These steps outline assessment and ongoing support of measures to promote high levels of adherence to recommended infection control practices at facilities where the index patient received care, including the facility where the patient or resident is currently receiving care. Infection control steps typically occur concurrently with or even precede the contact investigation.*

- Healthcare facilities should:
  - o Educate and inform the HCP and index patient's visitors about the organism and precautions to prevent transmission.
  - o Ensure adequate supplies are available to implement Transmission-Based or Enhanced Barrier Precautions. Notify public health if adequate supplies are not available to implement recommended precautions.
  - o Conduct ongoing adherence monitoring of infection control practices and provide feedback to HCPs.
  - o Flag affected patients' medical records to initiate appropriate infection control precautions upon readmission.
  - o Make plans for how receiving facilities will be notified of affected patients' MDRO status, if the patient is transferred, including notification to health department prior to transfer.
- Health departments or other experts should conduct on-site IPC assessments at all healthcare facilities identified in the healthcare investigation (i.e., that cared for patients with the targeted MDRO), regardless of whether transmission is identified, and any outpatient facilities where patients or HCP may have had extensive contact with the index patient.
  - o If multiple healthcare facilities were identified as part of the healthcare investigation, prioritize assessments for the facility currently caring for the index patient and high-acuity post-acute care facilities (e.g., LTACHs and vSNFs).

- o Conduct IPC assessments on-site whenever possible.
  - ◇ If an on-site assessment cannot be conducted promptly, consider a remote video assessment in the interim, prior to the on-site assessment.
  - ◇ If many facilities are identified as part of the healthcare investigation, consider using remote video assessment to rapidly initiate identification and mitigation of IPC gaps and determine which facilities to prioritize on-site assessments first.
  - ◇ If a facility recently participated in a MDRO-focused infection control assessment (i.e., in the last three months, as part of MDRO response or prevention activities), a repeat assessment may not be needed. However, assess the facility's progress in mitigating previously identified infection control gaps.
- o Perform the IPC assessment using a standardized assessment tool, such as the [CDC Infection Control Assessment and Response \(ICAR\)](#) tools. Assessments can focus on domains most relevant to MDRO transmission by contact (i.e., hand hygiene, personal protective equipment (PPE) use, environmental cleaning, reprocessing of medical equipment and devices (e.g., mobile medical equipment, devices and equipment used for respiratory care, dialysis machines), and practices to prevent transmission from wastewater plumbing).
  - ◇ Include observations of infection control practices, specifically hand hygiene, PPE use, and environmental cleaning and disinfection and make verbal and written recommendations to address observed gaps.
  - ◇ Review policies for hand hygiene, PPE, environmental services (EVS), MDRO surveillance, and water management; these can be sent by the facility prior to the onsite assessment
  - ◇ Review facility-conducted audit results for hand hygiene, PPE use, and environmental cleaning and disinfection.
- o Conduct follow-up calls or on-site assessments to ensure that infection control gaps are fully addressed.
- o If the patient(s) with Tier 1 organisms will be transferred to another healthcare facility, provide education about the organism and precautions to prevent transmission. Consider proactively performing an infection control assessment, especially if the facility is a long-term care facility.
- Healthcare facilities and health departments should ensure the index patient's MDRO status and required infection control precautions are communicated at transfer to higher or lower levels of care.
  - o A decision to discharge a patient from one level of care to another (e.g., moving a patient from an intensive care unit to a medical ward) or to another healthcare facility should be based on clinical criteria and not colonization status.

## Tier 2 Organisms



For Tier 2 organisms, information is available from U.S. or comparable settings about how transmission of these organisms occurs and the groups primarily at risk. Tier 2 organisms include:

1. MDROs that are primarily associated with healthcare settings and are not commonly identified in the region. Generally, these have either not been previously identified in the region or have been limited to sporadic cases or small outbreaks (i.e., correspond to “not detected” or “limited to moderate spread” epidemiologic stages). However, these MDROs might be found more commonly in other areas of the United States or even in other regions or patient sharing networks within the same jurisdiction. In most of the U.S., carbapenem-resistant Enterobacterales (CRE) and carbapenem-resistant *Acinetobacter* spp. with OXA-48 or metallo- $\beta$ -lactamase carbapenemases (e.g., New Delhi Metallo- $\beta$ -lactamase (NDM), Verona-integron-mediated carbapenemase (VIM), and Imipenemase (IMP)), carbapenemase-producing *Pseudomonas* spp., and *Candida auris* meet the Tier 2 criteria. In many areas of the United States, carbapenem-resistant Enterobacterales producing *Klebsiella pneumoniae* carbapenemase (KPC-CRE) and *C. auris* also meet the Tier 2 criteria because they are not commonly identified.
2. Organisms for which no current treatment options exist (pan-not susceptible) and that have the potential to spread more widely within a region (e.g., have plasmid-mediated resistance mechanisms), even if more susceptible isolates of the same organism and mechanism are more commonly identified (i.e., Tier 3 or endemic).

The objective of Tier 2 investigations is to identify the extent of spread and implement measures to prevent further transmission in affected facilities and in the region.

### Strategies:

***Some response strategies may occur concurrently or in a different sequence from the numbered strategies in the guidance. The order of the strategies does not reflect their relative importance (e.g., Strategy 3: Conduct a contact investigation and Strategy 6: Implement a system to ensure adherence to infection control measures are equally impactful strategies).***

#### **(1) Identify initial response measures.**

*Initial response measures are intended to facilitate prompt implementation of appropriate infection prevention and control (IPC) measures (e.g., Contact Precautions if not already implemented for another indication) for the index patient, at the facility where they are currently admitted, to prevent transmission.*

- Upon identification of the organism or mechanism in a laboratory, the laboratory or healthcare facility should promptly notify the patient’s primary healthcare provider, healthcare personnel caring for the patient, infection control department, and other healthcare staff per facility policies. Generally, local and state public health departments should also be notified even if the organism does not fall under local reporting mandates.
- If the index patient is currently admitted to a healthcare facility:
  - o Health departments and healthcare facilities should ensure implementation of appropriate infection control measures (e.g., Contact Precautions), which may vary depending on the healthcare setting, and adequate supplies to implement these measures.
  - o Prioritize the facility for a rapid infection control assessment to identify and address any potential gaps in IPC (see Strategy 5).
- Notify the patient and family about the results and infection control measures.
- If the MDRO was present on admission, notification of the transferring facility should occur so appropriate review can occur at that facility.

## (2) Conduct a healthcare investigation.

*These steps identify healthcare settings at risk of transmission from the index patient. They also can provide more information about when and where the organism/mechanism was likely acquired.*

- Review the patient's healthcare exposures from approximately 30 days prior to the initial positive culture up to the present. Exposures of interest include overnight stays in healthcare settings (both domestic and international), outpatient visits, and home health visits to identify facilities where transmission could have occurred.
  - Prioritize collecting information about the index patient's admission/discharge dates, care location(s) within a facility, presence and duration of roommates, types of care received (e.g., respiratory therapy, wound care, hemodialysis, invasive mechanical ventilation), functional status (e.g., bedbound, incontinent of stool), laboratory culture and screening results for organism of interest, timing of healthcare facility implementation of transmission-based precautions (if any), and history of travel and/or healthcare outside the U.S. in the prior 12 months.
  - Additional epidemiological case-level data such as chronic medical conditions, recent antimicrobial exposure, and detailed information about medical procedures may be gathered after the initial healthcare investigation commences, to avoid delays in assessing for and preventing spread.
- If information is available about the time that the organism was most likely acquired (e.g., patient was hospitalized outside of the United States in a country where the organism and mechanism are known or believed to be common or traveled to a country where the organism and mechanism is associated with community exposure), then consider this period the risk period for transmission for investigation. If this period is longer than 30 days, review the entire period from the time of suspected acquisition for healthcare exposures.

## (3) Conduct a contact investigation.

*These steps use colonization screening to identify individuals with targeted MDROs, to facilitate implementation of appropriate precautions, and evaluate for potential transmission. Only a subset of colonized individuals will also have clinical cultures with the target MDRO; therefore, colonization screening is more sensitive approach to evaluate for transmission compared to clinical cultures alone.*

**In general, the recommendations below apply to all inpatient healthcare exposures of the index patient in the 30 days prior to the identification of the target organism (unless information is available about the time that the organism was most likely acquired) to the present, prioritizing the facility where the index patient is currently located and settings with highest risk of transmission, as determined by the healthcare investigation. Depending on the type of exposure and organism, contact investigations may sometimes include healthcare facilities where the patient received care but did not stay overnight (e.g., outpatient clinics) and community contacts.**

### **Patient screening to assess for transmission:**

- If the index patient had recent inpatient healthcare exposure, screen epidemiologically linked patients. Screening should occur even if the index patient was being managed with Contact Precautions or Enhanced Barrier Precautions (see exceptions below).
  - Screen roommates and patients who shared a bathroom with the index patient. Screen these contacts even if they have been discharged from the facility to another inpatient setting. If discharged to home, consider notifying the contact and offering screening or flagging the chart to facilitate preemptive Contact Precautions and admission screening if they are readmitted in the next six months.
  - Screen the patient *currently* admitted to room(s) and bed spaces where the index patient stayed at least one night in healthcare facilities identified during the healthcare investigation, due to the risk of persistent environmental contamination for some organisms (e.g., carbapenem-resistant *Acinetobacter baumannii* or *Candida auris*) and transmission through the premise plumbing for others (e.g., carbapenemase-producing Enterobacterales and *Pseudomonas* spp.).

- o In most situations, perform broader screening to comprehensively assess for transmission
  - ◇ Options—broader screening using point prevalence surveys is preferred. Alternatively, broader screening may initially target contacts who are at higher risk due to overlap on the same ward as the index patient and presence of a risk factor for MDRO acquisition (e.g., bedbound, high levels of care, receipt of antimicrobials, or mechanical ventilation), and who are still admitted.
  - ◇ Considerations—When deciding whether to use a risk-factor-based approach, PPS, or both strategies in combination, consider individual facility characteristics, local epidemiology, characteristics of index patient, feasibility of identifying contacts, and laboratory capacity.
    - » If it will take several days to identify higher risk contacts or if most higher risk contacts have been discharged from a facility, perform a unit-wide point prevalence survey promptly.
    - » Consider flagging charts of contacts who have been discharged, to facilitate preemptive Contact Precautions and admission screening if they are readmitted in the next six months. If these individuals have been discharged to high-acuity post-acute care, health departments should consider screening these individuals.
  - ◇ Prioritization—A healthcare investigation can identify multiple healthcare facilities where the index patient had contacts. Prioritize the most extensive contact screening (e.g., both screening of higher risk contacts and unit-wide PPS) for:
    - » Healthcare settings with high-acuity patients and longer lengths of stay, including some hospital units with longer lengths of stay and patients at higher risk of MDRO acquisition and infection (e.g., burn ICU, units that care for solid organ or hematopoietic transplant patients).
    - » Any setting where the index case likely acquired the organism during their stay (e.g., targeted organism identified in patient without any risk factors prior to hospitalization).
  - ◇ Exceptions—In some situations, broader screening may not be recommended by public health. For example,
    - » If the index patient’s length of stay was very short (e.g., <24 hours), screening may not be indicated.
    - » During a response to a single case in an acute care hospital unit with a short average length of stay where patients are ambulatory and not mechanically ventilated, broader screening could be limited to situations where the index case is currently admitted or recently discharged (<7 days prior).

**Patient screening when transmission is suspected or ongoing:**

- Wider point prevalence surveys are indicated if there is evidence or suspicion for ongoing transmission (e.g., isolates from multiple patients) or if initial targeted screening of high-risk patients identifies new cases.
  - o If new cases are identified, periodic (e.g., every two weeks) point prevalence surveys are recommended until transmission is controlled. Control is generally defined as two consecutive point prevalence surveys with no new MDRO cases identified, or, in facilities with high colonization pressure (i.e., >30%), substantially decreased transmission.
    - ◇ In healthcare facilities with high colonization pressure, consider continuing point prevalence surveys at increasing intervals (e.g., monthly and then quarterly) after transmission is controlled, to ensure transmission remains low.
    - ◇ Assess whether facilities would benefit from proactive, prevention-focused point prevalence surveys and infection control assessments after response activities conclude. See Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs), Strategy 3: Detect colonized individuals.
  - o If high levels of transmission persist across multiple point prevalence surveys in long term care settings, consider increasing the interval between surveys (e.g., performing every 4-6 weeks) or temporarily pausing them while reassessing infection control and implementing interventions.

- ◊ If screening is paused or performed with reduced frequency, implement measures such as admission screening from facilities with ongoing transmission or preemptive Contact Precautions and/or admission screening at receiving facilities to prevent new outbreaks.
- o Admission screening can help distinguish importation from ongoing transmission within a healthcare facility, such as in situations where the Tier 2 organism or mechanism is believed to be present at other facilities in the region.
  - ◊ Prioritize admission screening in settings with good adherence to recommended infection control practices, due to higher likelihood that identification on admission will reduce intra-facility transmission.
    - » Public health laboratory-supported admission screening may be available for a time-limited period.
    - » After an initial pilot period, the facility and public health should evaluate the utility of continuing admission screening as a long-term prevention strategy (see Public Health Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs), Strategy 3).
- o Implement measures to reduce the risk of further MDRO spread within the region at facilities known to regularly admit/receive patients from the facility where transmission occurred. At a minimum, notify the facilities and request retrospective and prospective evaluation of clinical cultures to identify organisms with similar resistance patterns. Consider performing an infection control assessment and admission screening and/or PPSs, particularly at high-acuity post-acute care facilities, especially if the facility is not engaged in prevention activities or there has been a long interval between the last infection control assessment or point prevalence survey.
- Screen outpatients who were seen in the same clinic as the index patient if contact between the patient and the clinic healthcare personnel or environment was extensive (e.g., wound care, invasive procedure) and gaps in adherence to infection control practices are identified or if patients were exposed to common devices (e.g., whirlpools, etc.) and infection control practices such as cleaning of the devices may not have been adequate.
- Rescreening patients known to have the novel or targeted MDRO that is the focus of the investigation is not recommended; for more information, please see FAQ #12: **If an individual is known to carry *Candida auris* or a carbapenemase-producing organism (CPO), under what circumstances should they be screened for response or prevention activities?**

#### **Healthcare personnel screening:**

- In the absence of known or suspected transmission from HCP or other strong epidemiologic links, HCP screening is not recommended.

#### **Household contact screening:**

- Screen household contacts who have extensive contact (e.g., share a bed or assist with personal care) with the index patient if the household contact has frequent inpatient healthcare exposure to determine if transmission-based precautions are necessary for their subsequent admissions.
- Consider screening other household contacts if household transmission is suspected.
- If household contacts are HCP, prior to pursuing screening consider what actions will be taken if they are colonized (e.g., work restrictions and rescreening).

#### **Contact screening in other settings:**

- Evaluate residential care settings to determine if screening is appropriate.
  - o Prioritize roommates and residents who share a bathroom with the index patient and residents with frequent inpatient exposure. If transmission is identified, consider broader screening to inform infection control measures in the facility (e.g., dedicating certain bathrooms for use by positive or negative residents) and in the event the resident is transferred to a higher level of care.

- o Consider screening staff if practices result in significant exposure to the staff member (e.g., assisting residents with MDROs with toileting and bathing without use of personal protective equipment or hand hygiene) and the staff member has frequent hospital admissions, or if there is known or suspected transmission to or from a staff member.
- o Prior to screening residents and staff in residential care settings, decide how colonized or infected individuals will be managed (e.g., changing rooms or bathrooms for residents, work restrictions and rescreening for staff). Congregate living settings should not deny housing based on MDRO colonization.
  - ◇ Some situations might warrant screening in other non-healthcare settings (e.g., resistant organism from a veterinary setting or a young child who attends daycare), where the risk of transmission is not well-understood but is theoretically high, or experience has demonstrated potential for transmission.

#### **(4) Conduct clinical laboratory prospective and retrospective surveillance.**

*These steps review laboratory testing results, typically from clinical cultures, from healthcare facilities where the index patient recently received care to assess for additional cases. They also establish testing of clinical cultures prospectively. These steps augment other case detection activities (e.g., colonization screening).*

- Engage clinical microbiology laboratories that serve healthcare facilities identified in the healthcare investigation (or in the period since suspected acquisition) for prospective and retrospective surveillance to identify organisms with similar resistance profiles from clinical cultures.
- Laboratories should perform prospective surveillance for at least three months after identification of the index patient or, if transmission is identified through surveillance or screening, three months after the last case is identified.
  - o All isolates identified during prospective surveillance should be promptly tested to investigate whether they have the same mechanism of resistance as the index case; isolates should be saved as additional testing at the state, regional or CDC laboratory might be indicated.
- Perform retrospective surveillance (laboratory lookbacks) of results from these clinical laboratories to identify organisms with similar resistance patterns, extending three months prior to identification of the index case (or to the time of suspected acquisition, if shorter). If available, these retrospective isolates should be tested (e.g., at a public health laboratory) to see if they have the same mechanism of resistance as the index case.

#### **(5) Identify environmental cultures.**

*Most public health responses to Tier 2 organisms and mechanisms will not require environmental cultures. However, in some situations, environmental cultures may help identify environmental reservoirs or evaluate the effectiveness of cleaning and disinfection.*

- Environmental cultures are recommended only if transmission is identified or suspected and there is epidemiologic evidence implicating an environmental reservoir in ongoing transmission.

#### **(6) Implement a system to ensure adherence to infection control measures.**

*These steps outline assessment and ongoing support of measures to promote high levels of adherence to recommended infection control practices at facilities where the index patient received care, including the facility where the patient or resident is currently receiving care. Infection control steps typically occur concurrently with or even precede the contact investigation.*

- Healthcare facilities should:
  - o Educate and inform the HCP and visitors for the index patient about the organism and precautions indicated to prevent transmission.
  - o Ensure that adequate supplies are available to implement Transmission-Based or Enhanced Barrier Precautions.
  - o Conduct ongoing adherence monitoring of infection control practices and provide feedback to HCP.

- o Flag affected patients' medical records to initiate appropriate infection control precautions upon readmission.
- o Make plans for how receiving facilities will be notified of affected patients' MDRO status, if the patient is transferred, including whether to notify the health department prior to transfer.
- Health departments or other experts should conduct on-site IPC assessments at all healthcare facilities identified in the healthcare investigation and any outpatient facilities where patients or HCP may have had extensive contact with the index patient, such as wound care clinics.
  - o If multiple healthcare facilities are identified as part of the healthcare investigation, prioritize assessments for the facility currently caring for the index patient, for any facilities with evidence of transmission, and for high-acuity post-acute care facilities (e.g., LTACHs and vSNFs).
  - o Conduct IPC assessments on-site whenever possible:
    - ◇ If an on-site assessment cannot be conducted promptly, consider a remote video assessment in the interim, prior to the on-site assessment.
    - ◇ If many facilities are identified as part of the healthcare investigation, consider using remote video assessment to rapidly initiate identification and mitigation of IPC gaps and determine which facilities to prioritize for on-site assessments first.
    - ◇ If a facility has recently participated in a recent infection control assessment (e.g., in the last three months), a repeat assessment may not be needed, but health departments should assess the facility's progress in mitigating previously identified infection control gaps
  - o Perform the IPC assessment using a standardized assessment tool, such as the [CDC Infection Control Assessment and Response \(ICAR\) tools](#). Assessments can focus on domains most relevant to MDRO transmission by contact (i.e., hand hygiene, personal protective equipment use, environmental cleaning, reprocessing of medical equipment and devices (e.g., mobile medical equipment, devices and equipment used for respiratory care, dialysis machines) and practices to prevent transmission from wastewater plumbing).
    - ◇ Review policies for hand hygiene, PPE, EVS, MDRO surveillance, and water management; these can be sent by the facility prior to the onsite assessment
    - ◇ Include observations of infection control practices and make verbal and written recommendations to address observed gaps.
    - ◇ Review facility-conducted audit results for hand hygiene, PPE use, and environmental cleaning and disinfection.
  - o Conduct follow-up telephone or video calls or on-site assessments to ensure that infection control gaps are fully addressed.
- Healthcare facilities and health departments should ensure the index patient's MDRO status and required infection control precautions are communicated at transfer to higher or lower levels of care.
  - o A decision to discharge a patient from one level of care to another (e.g., moving a patient from an intensive care unit to a medical ward) or to another healthcare facility should be based on clinical criteria and not colonization status.
- In general, screening individuals with a history of colonization or infection with a targeted MDRO with the aim of discontinuing transmission-based precautions is not recommended.

# Tier 3 Organisms



For Tier 3 organisms, information is available from U.S. about how transmission of these organisms occurs and the groups primarily at risk. These are MDROs targeted by the facility or region for their clinical significance and potential to spread rapidly (e.g., to other regions where they are less common). Tier 3 MDROs have been identified more frequently across a region than Tier 2 MDROs, and are typically in stages of advanced spread but are not considered to be endemic. These organisms might be endemic in other areas of the United States.

Examples include KPC-CRE, *Acinetobacter baumannii* with plasmid-mediated oxacillinases with carbapenemase activity that are more commonly identified (e.g., OXA-23, OXA-24/40), and *C. auris* in regions of the United States where these organisms are more regularly identified but are not endemic.

The objective of Tier 3 investigations is to identify patients with targeted MDROs and find and address gaps in detection or infection control that could facilitate transmission. For Tier 3 organism responses, broad point prevalence surveys may be used to bridge traditional “containment” response and prevention activities. However, recurring, response-driven PPS are generally not recommended outside of facilities experiencing an acute outbreak.

## Strategies:

**Some response strategies may occur concurrently or in a different sequence from the numbered strategies in the guidance. The order of the strategies is not a reflection of their relative importance (e.g. Strategy 3: Conduct a contact investigation and Strategy 6: Implement a system to ensure adherence to infection control measures are equally impactful strategies despite having different orders).**

### (1) Identify initial response measures.

*Initial response measures are intended to facilitate prompt implementation of appropriate infection prevention and control (IPC) measures (e.g., Contact Precautions if not already in place for another indication) for the index patient at the facility where they are currently admitted, to prevent transmission.*

- Upon identification of the organism or mechanism in a laboratory, the laboratory or healthcare facility should promptly notify the patient’s primary healthcare provider, patient care personnel, and other healthcare staff per facility policies. Depending on local regulations, state or local health departments might need to be notified.
- Health departments and healthcare facilities should ensure implementation of appropriate infection control measures (e.g., Contact Precautions, Enhanced Barrier Precautions), which may vary depending on the healthcare setting.
- The patient and family should be notified about the results and infection control measures.
- If the MDRO was present on admission, notification of the transferring facility should occur so appropriate investigation can occur at that facility.

### (2) Conduct a healthcare investigation.

*These steps identify healthcare settings at risk of transmission from the index patient. In general, the healthcare investigation in response to new identification of Tier 3 organisms has a narrower scope than for Tier 2 organisms.*

- Review the patient’s healthcare exposures prior to the positive culture to present, including overnight stays in healthcare settings. Investigations for Tier 3 organisms are generally limited to the current admission. However, if the admission immediately prior was within 30 days of specimen collection and occurred at a facility where the organism has never or rarely been identified, health departments should consider expanding the investigation to include this facility, especially if the patient was admitted to a unit with high-acuity and/or long lengths of stay.
  - o Note whether the facilities identified in the healthcare investigation are participating in ongoing prevention-driven infection prevention assessments and colonization screening for the identified

organism (e.g., acute care hospitals performing admission screening and high acuity post-acute care facilities performing periodic point prevalence surveys). This information will help guide decisions about contact screening.

### **(3) Conduct a contact investigation.**

*These steps use colonization screening to identify individuals with targeted MDROs, to facilitate implementation of appropriate precautions and evaluate for potential transmission. Only a subset of colonized individuals will also have clinical cultures with the target MDRO; therefore, colonization screening is a more sensitive approach to evaluate for transmission compared to clinical cultures alone.*

#### **Patient screening to assess for transmission:**

*In general, the goal of screening for Tier 3 organisms is to identify colonized individuals for placement in appropriate Transmission-based Precautions, thus augmenting prevention-driven screening, rather than to perform successive rounds of screening until there is evidence that transmission is controlled, as is recommended for Tier 1 and 2 Novel or Targeted MDROs.*

- Health department recommendations for patient screening in response to identification of a Tier 3 organism should be tailored to the local epidemiology, laboratory capacity, and ongoing prevention activities and objectives in the jurisdiction. Recommendations therefore may differ in intensity from the measures described.
- Prioritize broader screening, such as a unit or facility-wide point prevalence survey, in the following situations:
  - o If the index patient likely acquired the MDRO in the facility (e.g., index patient is person without healthcare risk factors prior to their current admission or had a negative admission screening test).
  - o If there is other evidence or suspicion for transmission on the unit (e.g., isolates from multiple patients representing an increase over baseline, clinical case on a unit that previously had low prevalence or had not been screened).
  - o If the case was on a unit or in a facility with long average length of stay (e.g., SNF, LTACH, some ACH units) and the facility is not participating in prevention-driven screening for the Tier 3 organism (e.g., recurring point prevalence surveys, recent ad hoc point prevalence survey, or admission screening), or if the facility is participating in prevention-driven point prevalence surveys and has not previously had cases or has maintained a very low prevalence.
- If new cases are identified on screening, consult with public health regarding follow-up screening.
  - o In general, follow-up screening should prioritize implementation of sustained, prevention-driven strategies described in the **Public Health Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs)** (Strategy 2: Detect Colonized Individuals) over intermittent periods of intensive, recurring point prevalence surveys performed in response to a newly identified case.
  - o After the initial response-driven PPS, additional screening may be indicated for a facility experiencing an acute outbreak or pronounced increase in prevalence of a Tier 3 organism. For example,
    - ◊ If an acute outbreak is suspected, periodic point prevalence surveys can serve as an infection control intervention and inform the epidemiologic investigation. These should generally have clear goals and a defined endpoint, such as reduced transmission with demonstrated IPC improvement.
      - » Coupling this with admission screening can help to distinguish importation from ongoing transmission of Tier 3 organisms and complement ongoing infection control measures.
- Rescreening patients known to have the novel or targeted MDRO that is the focus of the investigation is not recommended; for more information, please see FAQ #12: **If an individual is known to carry *Candida auris* or a carbapenemase-producing organism (CPO), under what circumstances should they be screened for response or prevention activities?**

### **Healthcare personnel and household contact screening, and contact screening in other settings:**

- In the absence of known or suspected transmission from HCP or other strong epidemiologic links, HCP screening is not recommended.
- Screening household contacts is generally not recommended for Tier 3 organisms; however, consider screening household contacts who have frequent inpatient healthcare exposure and have had extensive contact with the index patient to determine if Transmission-Based Precautions are necessary for subsequent admissions.
- In residential care settings, consider contact screening for residents if facility and situation meet the criteria for considering broader screening for healthcare contacts in Tier 3 investigations.
  - o Prioritize roommates and residents who share a bathroom with the index patient and residents with frequent inpatient exposure. If transmission is identified, consider broader screening to inform infection control measures in the facility (e.g., dedicating certain bathrooms for use by positive or negative residents) and in the event the resident is transferred to a higher level of care.
  - o Prior to screening residents in congregate living settings, decide how colonized or infected individuals will be managed (e.g., changing rooms or bathrooms for residents and work restrictions and rescreening for staff). Congregate living settings should not deny housing based on MDRO colonization.
- Screening in other non-healthcare settings is generally not recommended unless an outbreak is suspected.

### **(4) Clinical laboratory prospective and retrospective surveillance.**

- Clinical laboratories that perform cultures from healthcare facilities identified in the healthcare investigation should report any organisms with similar resistance profiles from clinical cultures to public health and follow public health guidance regarding forwarding isolates for appropriate testing at a public health laboratory to investigate whether they match the organism of interest.
- Retrospective surveillance is generally not performed for Tier 3 organisms, but could be considered in certain situations (e.g., first recognized case of an organism and/or mechanism in a facility, suspect acute or point source outbreak).

### **(5) Environmental cultures.**

- Environmental cultures are generally not recommended unless transmission is identified or suspected and there is epidemiologic evidence implicating an environmental reservoir in ongoing transmission.

### **(6) Implement a system to ensure adherence to infection control measures.**

- Healthcare facilities should:
  - o Educate and inform the HCP and visitors for the index patient about the organism and precautions indicated.
  - o Ensure that adequate supplies are available to implement precautions.
  - o Conduct ongoing adherence monitoring of infection control practices and provide feedback to HCP.
  - o Flag affected patients' medical records to initiate appropriate infection control precautions upon readmission.
  - o Make plans for how receiving facilities will be notified of affected patients' MDRO status if the patient is transferred.
- Healthcare facilities, particularly long-term care facilities, should ideally receive regular (e.g., at least yearly) infection control assessments using a standardized assessment tool and with observations of infection control practices and recommendations to address observed gaps. Repeat on-site assessments might be needed to ensure that infection control gaps are fully addressed.

- o If facilities identified during the healthcare investigation have not had a recent infection control assessment, consider performing an onsite or remote video assessment.
  - ◇ Prioritize assessments for facilities that are at highest risk of MDRO importation and transmission (see influential facilities in the Facility Risk Stratification in the **Public Health Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs)**), that regularly share patients with these facilities, or that are known or suspected to have fewer infection control resources than most other facilities in the region.
  - ◇ If a facility has recently participated in a recent infection control assessment, assess the facility's progress in mitigating previously identified infection control gaps, either through a remote video assessment or in-person.
- If transmission is identified in a healthcare facility that has not had a recent infection control assessment, health departments or other experts should prioritize an on-site visit using a standardized assessment tool.
- Healthcare facilities and health departments should ensure the index patient's MDRO status and required infection control precautions are communicated at transfer to higher or lower levels of care.
  - o A decision to discharge a patient from one level of care to another (e.g., moving a patient from an intensive care unit to a medical ward) or to another healthcare facility should be based on clinical criteria and not colonization status.

## Tier 4 Endemic Organisms



Endemic (Tier 4) organisms are endemic in a region but can be less common in other areas of the United States. These are MDROs that have been targeted by public health for their clinical significance and potential to spread rapidly (e.g., to other regions where they are less common). Information is available from the U.S. about how transmission of these organisms occurs and the groups primarily at risk.

In some areas of the U.S., KPC-CRE, *Candida auris*, and *Acinetobacter baumannii* with certain plasmid-mediated oxacillinases with carbapenemase activity (e.g., OXA-23-like, OXA-24/40-like) are endemic.

### For Endemic (Tier 4) organisms, health departments and healthcare facilities should:

- Ensure that healthcare facilities and providers promptly receive testing results, to facilitate implementation of appropriate infection prevention and control measures for the affected patient.
- Confirm measures are in place to ensure adherence to infection control and communication of patient MDRO status at transfer.
- Prioritize prevention measures described in the Public Health Strategies to Prevent the Spread of Novel and Targeted Multidrug-resistant Organisms (MDROs) over a public health response to single cases, as is done for organisms in Tiers 1–3.
- Remain vigilant for outbreaks and changes in regional epidemiology that may suggest additional measures (e.g., enhanced screening, expansion of prevention activities) are needed.

**Table 1: Summary of Response Recommendations for Multidrug-resistant Organism (MDRO) Containment by Tier**

**Containment Tiers**

Epidemic Stages	No cases identified Limited spread	Limited to moderate spread	Moderate to advanced spread	Endemic
<b>Tiers with definitions</b>	<b>Tier 1</b> Organisms or resistance mechanisms never or very rarely identified in the United States	<b>Tier 2</b> Mechanisms and organisms not regularly found in a region.  Pan-not susceptible organisms with the potential for wider spread in a region	<b>Tier 3</b> Mechanisms and organisms regularly (i.e., frequently) found in a region but not endemic.	<b>Tier 4</b> Mechanisms and organisms that are endemic.

**Response Elements**

Elements	Tier 1	Tier 2	Tier 3	Tier 4
<b>Healthcare Investigation<sup>1</sup></b>				
<b>Review the patient’s healthcare exposures prior to and after the positive culture<sup>1</sup></b>	ALWAYS  Typical review period: 30 days prior to culture collection to present	ALWAYS  Typical review period: 30 days prior to culture collection to present	ALWAYS  Typical review period: Current admission and sometimes immediately prior admission	<b>Prioritize prevention;</b> containment principles generally do not apply.
<b>Contact Investigation<sup>1</sup></b>				
<b>Screening of healthcare contacts (i.e., residents and patients)<sup>2</sup></b>	ALWAYS	ALWAYS	USUALLY	<b>Prioritize prevention;</b> containment principles generally do not apply.
<b>Household contact screening</b>	USUALLY	RARELY	RARELY	
<b>Healthcare personnel screening</b>	USUALLY	RARELY	RARELY	
<b>Additional Actions if Transmission Identified in Healthcare</b>				
<b>Recurring response-driven point prevalence surveys<sup>3</sup></b>	ALWAYS	ALWAYS	RARELY	<b>Prioritize prevention;</b> containment principles generally do not apply.
<b>Evaluate potential spread to healthcare facilities that regularly share patients with the index healthcare facility<sup>4</sup></b>	USUALLY	USUALLY	RARELY	

CONTINUED...

Elements	Tier 1	Tier 2	Tier 3	Tier 4
<b>Clinical Laboratory Surveillance</b>				
<b>Retrospective lab surveillance<sup>6</sup></b>	ALWAYS	ALWAYS	RARELY	<b>Prioritize prevention;</b> containment principles generally do not apply.
<b>Prospective lab surveillance<sup>5</sup></b>	ALWAYS	ALWAYS	ALWAYS	
<b>Environmental Cultures</b>				
<b>Environmental sampling</b>	SOMETIMES	RARELY	RARELY	<b>Prioritize prevention;</b> containment principles generally do not apply.
<b>Infection Control Measures</b>				
<b>Notify healthcare providers; promptly implement appropriate transmission-based precautions</b>	ALWAYS	ALWAYS	ALWAYS	<b>Prioritize prevention;</b> containment principles generally do not apply.
<b>Infection control assessment with observations of practice</b>	ALWAYS	ALWAYS	SOMETIMES	
<b>Clear communication of patient status with transferring facilities</b>	ALWAYS	ALWAYS	ALWAYS	
<b>Link to Prevention Activities: All Novel and Targeted MDROs</b>				

PPS: point prevalence survey

\* ALWAYS: actions that should be a part of every response for a given response tier; USUALLY: actions that are indicated for most responses, but that might not be applicable for all novel and targeted MDRO responses for a given response tier; SOMETIMES: actions that that might apply, with implementation informed based on the specific scenario (including the setting and organism); RARELY: actions that generally are not performed for novel and targeted MDRO responses for organisms of a given response tier, but could be considered in certain situations. Decisions about implementing actions labeled “sometimes” or “rarely” should be made in consultation with public health.

<sup>1</sup> For Tier 1 and 2 organisms/mechanisms, healthcare exposures and healthcare contacts from the 30 days prior to identification of the target organism should be investigated unless information is available about the time the organism was most likely acquired. This includes any healthcare facility where the patient had an overnight stay during that time period. In some investigations; outpatient facilities and emergency departments might also be included. For Tier 3 organisms, investigation of healthcare exposures and healthcare contacts is generally limited to the current admission; however, if the admission immediately prior was within 30 days of specimen collection and occurred at a facility where the organism has never or rarely been identified, this may also be included in the investigation.

<sup>2</sup> This may include targeted screening of contacts at highest risk for acquisition and/or unit point prevalence surveys.

<sup>3</sup> Periodic (e.g., every two weeks) response-driven PPS should be conducted until transmission is controlled, defined as two consecutive PPS with no new cases identified or, in facilities with high colonization pressure, substantially decreased transmission. If high levels of transmission persist across multiple point prevalence surveys in long-term care settings, consider increasing the interval between surveys (e.g., performing every 4-6 weeks) or temporarily pausing them while reassessing infection control and implementing interventions.

<sup>4</sup> Conduct a laboratory lookback covering at least 6 months (Tier 1) and 3 months (Tier 2) prior to identification of index case.

<sup>5</sup> Prospective surveillance of clinical cultures should be conducted for 3 months after the last identified case.

<sup>6</sup> A public health investigation should also be initiated at healthcare facilities known to regularly share patients with healthcare facilities where transmission has occurred, such as post-acute care facilities. At a minimum, this should include notification of the facility and a request to retrospectively and prospectively evaluate clinical cultures for the phenotype of interest. This could also include admission screening of patients at the facility (e.g., transfers from the index facility) and/or point prevalence surveys of high-risk patients or units.