# West Virginia Prevention and Control of Multidrug-Resistant Organisms (MDRO) Strategic Work Plan 2026

West Virginia Department of HEALTH
BUREAU FOR PUBLIC HEALTH

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## Introduction and Background

The West Virginia (WV) Bureau for Public Health's (BPH) Division of Healthcare Quality Promotion, Prevention, and Response (DHQPPR) is dedicated to protecting patients and healthcare personnel (HCP) by promoting safety and quality. Preventing and reducing antimicrobial resistance (AR) is a top priority. Having a multidrug-resistant organism (MDRO) workplan in place is crucial in meeting this goal because it provides a structured, proactive framework for preventing, managing, and controlling the spread of highly dangerous infections. The following document delineates our strategic work plan for multidrug-resistant organisms (MDROs) for the year 2026. It will be reevaluated and revised annually or more often if necessary.

Threats caused by AR pathogens vary nationwide, but it has been identified in every state. In WV, cases of infection caused by MDROs, particularly carbapenem-resistant organisms (CROs), have steadily increased over time. When the state's Reportable Disease Rule (64 CSR-7) was updated to mandate reporting of emerging infectious diseases in 2013, seven MDRO cases were reported; three of which were CROs. Subsequently, the state observed a clearer trend in the number of drug-resistant infections. In 2024, the number of MDRO cases in West Virginia increased to nearly 400.

Inappropriate prescribing and overconsumption of antibiotics contribute to this growing problem. WV has among the highest rates of per capita outpatient antibiotic prescribing nationally. CDC estimates that number was 1,184 prescriptions per 1,000 people written in 2022. While it's impossible to know the exact number of these prescriptions that were ordered for illnesses that respond to antibiotics, as opposed to viral or other non-bacterial infections, it's reasonable to conclude that the number was substantial. This greatly contributes to AR which causes more than 2.8 million illnesses and 35,000 deaths in the United States (US) annually.

Carbapenems, as mentioned previously, are a class of broad-spectrum antibiotics used to treat severe bacterial infections. An order of bacteria called *Enterobacterales* that commonly colonizes the human digestive tract has become increasingly resistant to the carbapenems. These organisms can cause a wide range of infections including those of the urinary tract, in wounds, the respiratory system, and in the blood; potentially leading to sepsis. Infections caused by these organisms are often extremely difficult to treat and are associated with a high mortality rate: Up to 50% in some studies. The spread of carbapenem resistance is considered an urgent public health threat, as published by the Centers for Disease Control and Prevention (CDC) in the 2019 AR Threats Report | Antibiotic Resistance Threats in the United States.

Resistance to carbapenems is not the only concern. Some organisms have developed the ability to acquire mobile genetic elements, also known as plasmids, that carry genes that can produce enzymes that actively hydrolyze, or break down, carbapenem antibiotics. This mechanism is very efficient. *Klebsiella pneumoniae* carbapenemase (KPC) is most common in the US, followed by New Delhi metallo-β-lactamase (NDM) and oxacillinase-like carbapenemase (OXA-like). In

2024, there were 117 carbapenemase-producing organisms (CPO) reported in WV. Of those, about 56% were KPC positive. The next most common was OXA-like at 32%. Remaining cases included NDM, Verona integron-encoded metallo-β-lactamase (VIM), and other unknown types. In 2023, there were 97 CPOs reported, half of those being KPC positive. Prior to that, testing for carbapenemase production was extremely limited. Any that were identified were included with CROs for reporting purposes.
These plasmids are easily exchanged between different bacteria, thus facilitating the rapid spread of carbapenem resistance. CDC recommends more stringent infection prevention practices in areas where CPO is prevalent, as these organisms are suspected to be responsible for much of the spread throughout the country. Infections may be carbapenem-resistant without being carbapenemase-producing, vice versa, or have both characteristics.

Antimicrobial Stewardship (AS) is the effort to measure and improve how antimicrobials (both antibiotics that combat bacteria and antifungals that work against fungal infections) are prescribed by clinicians and used by patients. Improving prescribing and use is critical to effectively treat infections, protect patients from harm caused by unnecessary antimicrobial use and combat resistance. Based upon data from the CDC's Patient Safety Atlas, 96% of reporting hospitals met all seven core elements for AS required by the Centers for Medicare Services (CMS) and The Joint Commission (TJC). Some 82% of nursing homes met core element compliance. The *Multidrug-Resistant Organism (MDRO) Prevention and Containment Plan* addresses efforts to prevent, as well as respond to and contain MDROs across the healthcare continuum. The plan contains three sections:

**Prevention**
Strategies designed to:
- Proactively identify patients and/or residents who are infected or colonized.
- Reduce transmission of novel and targeted MDROs.

**Response and Containment**
Response-driven strategies/activities that aim to:
- Identify affected patients and/or residents.
- Ensure appropriate control measures are promptly implemented to contain further spread.
- Determine if transmission and dissemination are occurring.
- Characterize the organism or mechanism to guide further actions, patient management, and future responses.

**Infection Control Assessment and Response (ICAR)**
Core infection prevention and control (IPC) practices are designed to block the spread of infection and reduce transmission among patients and residents. When in place, these practices reduce the risk of infection and transmission. The ICAR program can improve facility IPC practices through:
- Education
- Provision of resources and tools

- Recommendations
- Coaching/mentoring

Since 2020, WV's ICAR program has completed over 1780 ICAR assessments in various healthcare settings, including:

- Acute and critical access hospitals
- Assisted living facilities
- Behavioral healthcare centers
- Dialysis centers
- Long-term acute care hospitals
- Nursing homes
- Other outpatient facilities

Annual analysis of identified gaps in Infection Prevention and Control Programs across the State guides efforts to provide additional support. Recently, opportunities for improvement were identified in practice areas such as transmission-based precautions (TBP), personal protection equipment (PPE), hand hygiene (HH) compliance and environmental services (EVS). This resulted in the development of guidance documents, toolkits, templates and educational programs to assist facilities in mitigating these gaps.

The MDRO Prevention Response and Containment plan falls under the direction of the DHQPPR Director. However, day-to-day duties and responsibilities may be delegated to individual program leads for the various programs housed within the division. This plan will be reviewed and updated annually.

## West Virginia Targeted MDROs

### *Tier Levels for Organisms*

Targeted organisms have been chosen based upon local epidemiology, recommendations from the CDC and from the Healthcare-Associated Infection-Antimicrobial Resistance - Multidisciplinary Advisory Group (HAI-AR MAG). Organisms are classified into tier levels. Response recommendations are implemented according to their level.

**Tier Level One:** Includes organisms or resistance mechanisms that have never (or very rarely) been identified in the US, and for which experience in the US is extremely limited. The objective of level one organism investigations is to identify all cases and prevent further transmission. Because experience with a tier one organism in US healthcare settings is, by definition, limited, more extensive evaluation is needed to define the risk for transmission and the extent of spread.

**Tier Level Two:** Primarily associated with healthcare settings. These organisms may not be commonly identified or may have limited to moderate spread in the state. May be pan-non susceptible and have no current treatment options.

**Tier Level Three:** Information available regarding transmission and identifying those individuals who are at risk. Identified for their clinical significance and have the potential to spread rapidly. Identified numerous times but are not considered endemic.

**Tier Level Four:** Endemic in a region but can be less common in other areas of the US. They have been targeted by public health for their clinical significance and potential to spread rapidly. Information is available from the US about how transmission of these organisms occurs and the groups of people who are primarily at risk.

Targeted organisms in WV with their tier level classification include:

- Vancomycin-Resistant *Staphylococcus aureus* (VISA/VRSA)-Tier Level 1
- Carbapenem-Resistant *Enterbacterales* (CRE)-Tier Level 2
- Carbapenemase-Producing Organisms (CPO)-Tier Level 2
- *Candidozyma auris (C. auris)*-Tier Level 2
- Carbapenem-Resistant *Acinetobacter baumannii* (CRAB)-Tier Level 2
- Carbapenem-Resistant *Pseudomonas Aeruginosa* (CRPA)-Tier Level 2
- *Clostridioides difficile* (*C. diff*)-Tier Level 3

# Prevention

## Facility Risk Assessment

Healthcare facility inventories have been prepared by setting type as part of the ICAR program. These inventories are reviewed and as needed. They include acute (ACHs) and critical access (CAHs) hospitals; long-term acute care (LTACs) hospitals; nursing homes or long-term care (LTCs); assisted living (ALs); dialysis clinics; psychiatric and behavioral centers, as well as other outpatient facilities. Risk stratification further places facilities in a category of influential, highly connected influential or other.

**Influential Facilities:** Highest risk of experiencing MDRO importation and transmission. These typically include LTACs or facilities that have had substantial transmission and can impact regional prevalence. Characteristics considered for this category include:

- Length of stay
- Acuity
- Influence on prevalence

Thirteen influential facilities have been identified for this plan, comprising eight ACHs and five LTACs. The LTACs are co-located within five ACHs throughout the state.

**Highly Connected Influential Facilities:** Linked through patient sharing. These typically include ACHs and skilled nursing facilities (SNFs). Characteristics considered for this category include:

- Length of stay
- Frequently receives transfers
- Patient and/or resident discharge

A total of 157 facilities have been identified as highly connected influential for the purpose of this plan.

"Other" facilities are those that may have a diminished role in influencing MDRO prevalence within a given region. However, implementing prevention activities in these settings can still yield benefits. This category may encompass dialysis centers, wound care clinics and various other outpatient centers. Specifically, there are 41 dialysis centers, eight ambulatory surgery centers, 56 rural health centers (RHCs) and approximately 372 federally qualified health centers (FQHCs). While these are generally classified as "other" facilities, FQHCs offer services that could potentially warrant a reclassification. Such facilities will be assessed based on their regional context and the populations they serve.

## Education and Training

Education is a crucial element of this plan. It is imperative to provide education to HCPs, including administrative and executive leadership, utilizing diverse approaches and platforms to foster engagement and adherence. The objectives for training and educational opportunities are to:

- Raise awareness regarding targeted organisms in WV
- Emphasize the importance of reporting and conducting appropriate investigations
- Implement prevention efforts to mitigate antimicrobial resistance
- Establish containment measures to prevent and control transmission

## *On-Site ICAR*

Completed for prevention and in response to outbreaks involving MDROs. While an Infection Preventionist (IP) from the ICAR team is working with representatives from the facility, education is provided. This may include using Project Firstline (PFL) curriculums or other educational resources developed within the agency. Education may be related to a specific organism, review interventions to stop transmission, outline outbreak management and/or be focused on other topics identified during the assessment or from data obtained from prior assessments.

**Target audience**: Frontline HCP, providers, administrators, IPs, environmental services (EVS) staff and others as identified.

**Approach**: Training is conducted by a member of the ICAR team (or an appointee) in-person while on-site at the facility.

**Progress**: During every ICAR completed in either a preventive capacity or in response to an outbreak, the IPs present MDRO education utilizing materials such as the Core Elements of Antibiotic Stewardship, Project Firstline | CDC (PFL) and Multidrug-resistant Organisms (MDRO) Management Guidelines | Infection Control | CDC. Internally developed resources and tools, such as the WV Inter-facility Infection Control Transfer Form, are disseminated as well. Others include assessment forms, surveillance protocols, MDRO Outbreak Toolkits, Annual MDRO Report, along with CRO and *C. auris* management education.

**Next Steps**: ICARs will continue to be completed for prevention and in response to outbreaks. MDRO-related education and training tools developed by the CDC or internally will be presented and shared with facilities as indicated.

Based on ICAR findings in 2024, the team identified the need for EVS education regarding preventing and controlling the spread of MDROs. In response, they created the Healthcare-Associated Infections Antimicrobial Resistance Program EVS toolkit reflecting CDC guidance to be used by all types of healthcare settings. This toolkit, along with the CDC's EVS and the Battle Against Infection interactive training, is reviewed during preventive and outbreak response ICAR assessments. The toolkit is currently available online via the link above.

In addition to the identified needs within Environmental Services, ICAR assessments have highlighted a need for education concerning the reprocessing of healthcare equipment across all healthcare settings. To address this gap in infection prevention and control programs (IPCPs), a comprehensive reprocessing toolkit and educational program will be developed and disseminated.

## *IPC Demonstrations*

Preventive ICARs are performed on-site in influential and highly connected influential facilities. While the IP is working with representatives within a facility, demonstrations for a variety of IPC practices are reviewed including HH and donning and doffing of PPE.

**Target audience**: Local Health Departments (LHDs), Regional Epidemiologists (RE) and HCP from across the healthcare continuum.

**Approach**: Training is conducted by a member of the ICAR team (or an appointee) in person while on-site at the facility.

**Progress**: During preventive ICARs, the team presented influential facilities with contamination training tools that use lotions, gels, powders and a blue light to demonstrate cross-contamination on hands, items and surfaces. After the initial presentation, facilities were given the tool and encouraged to use it to train additional staff. The remaining contamination training tools were dispersed to influential facilities that had not received one previously. Proper PPE donning and doffing was demonstrated by video or physical demonstration using available PPE and other equipment.

**Next Steps**: IPs will continue to demonstrate a variety of IPC practices as indicated by identified gaps during ICAR assessments. The contamination training tool will be used to demonstrate HH, cross-contamination and surface cleaning during a preventive and MDRO response ICARs in influential and highly connected influential facilities.

## *Webinars*

Developed to provide information about the history, definition and roles and responsibilities of various entities related to reporting of CROs, CPOs, *C. auris* and MDROs in general.

**Target audience**: LHDs, REs and HCP from across the healthcare continuum.

**Approach**: Includes both in-person and virtual options.

**Next steps**: DHQPPR will be offering quarterly office hours for all different types of healthcare settings entitled **You, Me and ICP**. The program will host a short educational and updates session, as well as a question-and-answer session. A panel of subject matter experts (SMEs) will be present during each webinar to interact with and inform attendees.

## *Educational Symposiums/Conferences*

The HAI/AR team works collaboratively with partners to provide education during conferences and symposiums annually and more often when possible. These opportunities include partnerships with professional organizations such as the West Virginia Association for Professionals in Infection Control and Epidemiology (WV APIC), the West Virginia Health Care Association (WVHCA) and the West Virginia Academy of Family Physicians (WV AFP).

**Target audience**: LHDs, EVS, physicians, nurse practitioners, physician assistants, etc.

**Approach**: In-person and virtual.

**Progress**: The team and collaborators have provided education to over 900 HCPs through in-person and virtual platforms. IPC topics included IPC basics, breach management, outbreak management, *C. Auris* and CPO/CRO, EVS, HAI Program, ICAR assessments and AS. These educational offerings were presented during regional collaboratives, in healthcare facilities, in healthcare learning centers and through various professional organizations.

**Next Step**: In collaboration with WVHCA, education on the reprocessing of healthcare equipment in different settings will be developed and presented. An LTC-CIP certification training course is being planned for employees of LTC facilities, also in collaboration with WVHCA, at a training event.

## *Workshops*

With employee turnover in health departments being an issue, the outbreak team identified a knowledge gap related to outbreak reporting and investigation. Training was developed that included participants working through case-based scenarios in which an MDRO had been identified. This was interactive with prevention, response and educational strategies being incorporated. Participants had the opportunity to develop resources, complete a case report form, identify errors to correct, provide guidance/recommendations, etc.

**Target audience**: LHDs, REs. May also include facility IPs.

**Approach**: In-person.

**Progress**: The outbreak team, with assistance from MDRO staff, conducted workshops in five of the seven surveillance regions. Two of the regions have RE vacancies, so LHDs were invited to attend workshops in nearby regions. Representatives from 40 LHDs, totaling 98 individuals, were in attendance. Attendees included administrators, IPs, RNs and others from LHDs.

**Next steps**: Outbreak reporting by schools could be enhanced with better reporting from Local Health Departments. Additionally, HCPs are awaiting guidance for vaccine recommendations. The outbreak team, along with ICAR and MDRO staff, will work with the West Virginia Department of Education (WVDE) and the West Virginia Association of School Nurses (WVSNA) to educate and support school nurses. The team will provide public health training during annual and intermittent training events throughout the year. An outbreak team member will be assigned as a contact person for schools in their assigned surveillance regions. Ongoing check-ins will occur regularly between outbreak team members, LHDs and schools.

## *Collaboratives*

### MEDALS

A program has been developed for nursing homes to combat AR and promote AS, referred to as MEDALS. MEDALS is an acronym for *Maximizing Efforts Dedicated to Antimicrobial Leadership and Stewardship.* This initiative is an honors program designed as a way for nursing homes

exclusively to achieve different levels of excellence based on specific criteria. Facilities receive a banner indicating their participation and their award level.

**Target audience**: Nursing homes and their staff.

**Approach:** In-person and virtual will be conducted to confirm compliance with the criteria.

**Progress:** More than nursing homes have participated. Certificates of achievement have been mailed to successful applicants. The deadline to apply is June 30, 2026.

**Next steps:** The team will continue to encourage nursing homes to apply. Facilities that can work toward a higher level will be supported and provided with additional resources. We are also looking at expanding a similar program into the outpatient setting. More information to follow.

**Regional MDRO Collaboratives**

The goals of these collaboratives are to reduce the possibility of cross-institutional spread of MDROs by: Facilitating communication among key stakeholders; implementing AR prevention best practices both within individual facilities and during transitions of care and facilitating colonization screenings for surveillance and outbreak purposes.

**Target audience**: LHDs, REs, Emergency Medical Services (EMS) and healthcare professionals from across the healthcare continuum in each of the seven surveillance regions.

**Approach**: In-person.

**Progress:** The southern regional MDRO collaborative started in April 2023. Two years later, in April 2025, the northeast regional MDRO collaborative was launched.

**Next steps:** The Mid-Ohio Valley (MOV) region is set to begin its collaboration in November 2025. The central and western regions will be evaluated later for readiness to launch their own groups.

**SHAIP UP**

The Strengthening Healthcare-Associated Infection Prevention Using Practice (SHAIP UP) State-Wide Collaborative aims to achieve the following goals: enhance HAI outcomes, as evidenced by a reduction in reported HAIs, through fostering communication among key stakeholders, implementing prevention collaboratives, and offering training opportunities and sharing of best practices. The NHSN coordinator, supported by other members of DHQPPR, will facilitate these efforts.

**Target audience**: ACH and CAH IPs.

**Approach:** In-person and virtual.

**Progress:** An announcement was published in the 2nd quarter HAI/AR newsletter. An email with a registration link went out in August 2025. Registration deadline was September 30, 2025.

**Next steps:** As applications are received, the NHSN coordinator will reach out to schedule one-to-one sessions to review each facility's understanding and usage of NHSN. An analysis of individual facility HAI rates will be discussed. Monthly webinars will be provided targeting each of the measures facilities report in NHSN.

## Strengthening Clinical Laboratory Surveillance

The WV Office of Laboratory Services (OLS) currently tests CRE, CRPA and CRAB isolates for carbapenemase production. An algorithm is followed for each type of isolate to determine testing that is appropriate for that organism.

CRE and CRPA isolates are tested with Etest, mCIM and Carba-R assay as needed (if mCIM is positive). CRAB isolates are only tested with Etest currently (mCIM is not performed on CRAB isolates per current guidelines). OLS is unable to perform PCR testing to determine the presence of genes other than the "BIG 5" (KPC, NDM, VIM, IMP, and OXA-48-like genes) present in the Carba-R assay. Through recent data studies, it has been determined that most CRAB isolates have an OXA carbapenamase gene present other than OXA-48. Consequently, OLS no longer performs the Carba-R assay on CRAB isolates. After collaboration with the Maryland regional lab, it was decided that all CRAB isolates would be sent there for PCR testing to determine the presence of carbapenemase genes. This collaboration has decreased costs for lab supplies (Carba-R kits, agar plates, antibiotic discs, etc.) at OLS by not requiring the Carba-R assay to be performed on each CRAB isolate. However, delays in testing results can occur due to the additional shipping time and relaying of these results back to OLS. OLS is currently working with the Maryland Regional Lab to streamline results.

OLS is working toward adding colonization screening for rectal swabs to our testing algorithm. To date, they have validated the testing procedure and verified that they are able to isolate CRO organisms from rectal swabs. Barriers to implementing this test are having enough staff available to perform the additional amount of lab work that this testing entails and obtaining the funding to purchase additional Carba-R kits and supplies. Outbreak investigations and initial healthcare facility screenings, where large numbers of samples are submitted, will necessitate a large expense. Currently, OLS has four staff members who are proficient in CRO testing methods to help with colonization screening efforts.

In addition to adding CPO colonization screening testing, OLS is seeking funding to validate a screening method for *C. auris*. Staff have been participating in webinars that provide information on *C. auris* testing in the lab for both screening and culture confirmation. Because *C. auris* is often mistaken in identification by labs, OLS has explored several possible testing methods for this organism. Real-time PCR has been chosen as our most feasible and reliable option. OLS has determined two options to perform *C. auris* colonization screening in-house. First would be to utilize a newly acquired Panther Fusion and develop a lab developed test (LDT). This method will initially be quite expensive to develop but easy to sustain once validated. The second option would be to use current PCR equipment to perform a CDC-developed Reverse Transcription-Polymerase Chain Reaction (RT-PCR) method for the detection of *C. auris* from axilla-groin swabs. Once funding for either option is obtained, OLS will begin the next steps toward validation, which include purchasing reagents, kits, and consumables.

## Point-Prevalence Survey (PPS) Colonization Screening and Surveillance

Colonization is characterized by the presence of an organism within or on the body without inducing symptoms or disease. Individuals exhibit no clinical indicators of active infection and have not mounted an immune response. Identifying individuals colonized with MDROs is a crucial step in containing their dissemination. Furthermore, it is important for individuals to be aware of their MDRO colonization status to facilitate communication with healthcare providers. This awareness enables providers to implement appropriate precautions when patients are hospitalized or admitted to long-term care facilities and to prescribe optimal antibiotics when clinically warranted. MDRO colonization presents a substantial public health risk, as carriers can asymptomatically transmit MDROs to vulnerable populations, thereby increasing the likelihood of infections and instigating outbreaks in healthcare and community settings.

**Colonization screening**

- Prevention-driven colonization screenings are encouraged to be performed facility-wide in LTACs and nursing home facilities in a designated region. A phase-in approach has been used, beginning with the focus on LTACs.
- Prevention-driven colonization screening is performed on all newly admitted residents.
- Residents found to be colonized with targeted MDROs receive education about their MDRO status and are placed in appropriate contact precautions.
- IPs at these facilities report screening results to the Lab-Epi Liaison and/or the HAI-MDRO Epidemiologist (Epi).
- The Lab-Epi Liaison and/or the HAI-MDRO Epi follows up with facilities to ensure appropriate precautions are in place and engages with the ICAR team for help if needed.

**Surveillance**

All reportable MDROs are entered into the West Virginia Electronic Disease Surveillance System (WVEDSS). Cases are investigated using WVEDSS investigation forms and managed by the LHD, the Lab-Epi Liaison and/or the HAI-MDRO Epi. The Lab-Epi Liaison analyzes and compiles data annually in the form of a published report. It outlines incidence and prevalence of CROs and CPOs by facility; county and region; patient/case demographics; and other risk factors that may establish trends and detect outbreaks. Beginning with the 2024 annual report, details about *C. auris* were added, and the report was renamed the MDRO annual report to reflect expanded focus on resistance to antifungal medications.

## Communication and Lab-Epi Coordination

Both laboratory and epidemiology personnel are integral to the effective communication of information required for the management, response, containment and surveillance of novel and targeted MDROs. The Lab-Epi Liaison and/or the HAI-MDRO Epidemiologist serve as a critical link between clinical laboratories, LHDs and OLS within the BPH for the transmittal of isolates to

OLS, the regional laboratory in Maryland and/or the Centers for Disease Control and Prevention (CDC) for advanced characterization.

The Antimicrobial Resistance (AR) Lab Expert provides technical assistance regarding testing methodologies and results interpretation, serves as a comprehensive resource for testing requirements and shipping protocols, and offers essential support to the epidemiologist.

**Alert Values**

- For results indicating an alert value, the CDC receives notification via REDCap and/or the Epidemiology and Laboratory Capacity (ELC) Cooperative Agreement Management Platform (CAMP), both of which are web-based reporting systems.
- The AR Lab Expert or designee notifies the epidemiologist via phone.
- The AR Lab Expert or designee notifies providers via phone and hard copy paper results.
- In follow-up to alert values, the Lab-Epi Liaison and/or the HAI-MDRO Epi contacts facilities to ensure appropriate precautions are in place.
- All alert values are addressed and reported within two business days.

As previously stated, the selection of targeted organisms has been based on local epidemiology, recommendations from the CDC, the MDRO Collaborative, and HAI-MAG, as well as internal program staff. The organisms have been categorized into tier levels, and corresponding response recommendations will be implemented.

# Response and Containment

## Response and Containment Activities

During response and containment activities, it is crucial to acknowledge the involvement of various programs (local, regional, and state), contingent upon the scope of these activities. Effective communication and maintaining situational awareness are pivotal elements of a response, given that diverse support activities and interventions may transpire concurrently. Therefore, meticulous coordination of activities is essential to mitigate/contain transmission, foster efficiency and preclude duplication, while simultaneously disseminating information requisite for the effective identification, management, response and surveillance of novel and targeted MDROs.

**State Responsibilities**

During response and containment activities, state health department staff will:

- Offer technical expertise and consultation regarding MDRO cases/outbreaks.
- Provide facilities, HCPs, and patients with resources, tools, and guidance.
- Maintain awareness of new developments through ongoing surveillance of scientific literature.
- Act as a liaison between clinical laboratories, LHDs, and OLS for isolate shipment to state, regional, and/or CDC labs for further characterization.

**Regional Epidemiologist (RE) Responsibilities**

During response and containment activities, the RE will:

- Offer support to both local and state health departments, as necessitated by the investigation.

**LHD Responsibilities**

LHDs are responsible for completing case report forms for specified disease conditions and inputting the data into WVEDSS, in accordance with disease-specific protocols. LHDs are also tasked with case investigation, which involves communicating with and collecting information from patients, their contacts, healthcare providers and laboratories, as well as providing education and resources.

## Response Recommendations by Tier Level

The recommendations below may occur independently or simultaneously.

### *Tier Level One Organisms*

#### Initial Measures

- Expedite IPC for the index case.
- Confirm/recommend contact precautions, ensuring adequate supplies.

- Conduct on-site ICAR(s) within **two business days** from the date of the initial notification.
- Consider periodic testing of index patient/colonized individuals due to limited transmissibility data.
- Notify patient, family, provider, local/state health departments, and transferring/receiving facilities.

## Healthcare Investigation

Review the patient's healthcare exposures from at least 30 days prior to the initial positive specimen collection up to the present. Details should include:

- Admission/discharge dates (in-state, other states and international)
- Care unit locations (private room, roommates, etc.)
- Type of care (surgery, dialysis, respiratory, wound care, etc.)
- Comorbidities
- Antimicrobial use

## Contact Investigation

Screening for transmission includes:

- Roommates and patients/residents who shared a bathroom with the index patient, including those discharged.
- Patients/residents currently admitted to rooms where the index case stayed at least one night.
- Patients/residents on the same unit.
- Patients/residents who shared the same HCP.
- Perform PPS in units where the patient was admitted.
- If resources are limited, prioritize screening patients/residents who:
    - Overlapped with the index case on the same unit for three or more days.
    - Are currently in healthcare settings with high-acuity patients and longer lengths of stay.
- Flag charts of any unscreened contacts for preemptive contact precautions and admission screening if readmitted within six months.

Suspected or Ongoing Transmission

- Screen further (clinical isolates from multiple patients/residents or if screening identifies new cases).
- Screen contacts of identified cases on units where they were located.
- Follow-up PPS:
    - Conduct periodic PPS (e.g., every two weeks) on units with suspected or confirmed transmission until controlled.
    - Conduct PPS at facilities/units receiving patients/residents from transmission areas.
- Screen outpatients seen in the same clinic as the index patient/resident if:
    - Extensive contact occurred between patient and clinical HCP or environment.
    - Patients/residents were exposed to common devices that may not have been adequately cleaned.

HCP Screening

- HCP with extensive index patient contact (e.g., bathing, toileting, wound care, or extended care) if the risk of HCP colonization is unknown, or if epidemiology suggests organism spread between patients/residents and HCP.

Household Contact Screening

- Close household contacts
- Additional contacts if close contact actions are implemented.

Contact Screening in Other Settings (i.e., Residential Care)

- Screen roommates and residents sharing a bathroom or living space with the index patient.
- Consider screening staff if practices result in significant exposure.
- Before screening in congregate living, decide how colonized or infected individuals will be managed.

## Clinical Laboratory Surveillance

- Engage clinical microbiology labs for 30-day prospective and retrospective surveillance.
- Perform prospective surveillance for at least three months after the index patient's identification, or three months after the last case if transmission is identified.
- Submit all isolates from prospective surveillance for resistance mechanism testing.
- Conduct retrospective surveillance (laboratory lookbacks) for six months prior to the index case (or suspected acquisition if shorter) to identify organisms with similar resistance patterns.

## Environmental Cultures

- 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:
    - Organisms with a known or suspected persistence in the environment (e.g., *Acinetobacter spp*.) and transmission are identified or suspected.
    - Standard cleaning and disinfection methods against that organism are unknown.

## Ensure Adherence to IPC Measure

These steps outline the assessment and ongoing support of measures to promote high levels of adherence to recommended IPC 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:

- Educate and inform HCP and index patient visitors about the organism and precautions to prevent transmission. Consider using the CRO Patient FAQ.
- Ensure adequate supplies are available to implement Transmission-Based Precautions

(TBP) or Enhanced Barrier Precautions (EBP). Notify public health if adequate supplies are not available.
- Conduct ongoing adherence monitoring of infection control practices and provide feedback to HCPs.
- Flag affected patients' medical records to initiate appropriate infection control precautions upon readmission.
- Make plans for how receiving facilities will be notified of affected patients' MDRO status, if the patient is transferred, including notification to the health department prior to transfer. Consider using the West Virginia Inter-Facility Infection Control Transfer form.

Health departments or other experts should:
- Conduct on-site ICARs at all healthcare facilities identified in the 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.
- If multiple healthcare facilities were identified as part of the investigation, prioritize ICARs for the facility currently caring for the index patient and high-acuity post-acute care facilities (e.g., LTACHs and vSNFs).
- Conduct ICARs on-site whenever possible.
    - If an on-site ICAR cannot be conducted promptly, consider a tele-ICAR in the interim, prior to the on-site assessment.
    - If many facilities are identified as part of the investigation, consider using tele-ICAR to rapidly initiate identification and mitigation of IPC gaps and determine which facilities to prioritize on-site ICARs first.
    - If a facility recently participated in an MDRO-focused ICAR (i.e., in the last three months, as part of MDRO response or prevention activities), a repeat ICAR may not be needed. However, assess the facility's progress in mitigating previously identified infection control gaps.

For additional Tier Level One recommendations, visit MDRO Containment Strategies.

## *Tier Level Two Organisms*

### Initial Measures

- Quickly implement IPC measures for the index case.
- Confirm/recommend contact precautions and ensure adequate supplies.
- Conduct onsite ICAR(s) within **five business days** of initial notification if feasible for the facility.
- Notify patient, family, provider, local and state health departments, and transferring/receiving facility.
- If Tier 2 patients transfer to another facility, educate them on the organism and precautions.
- For transfers to LTC or influential facilities, the ICAR team will proactively assess infection control.

## Healthcare Investigation

- Review patient's healthcare exposures from 30 days prior to the initial positive specimen collection to the present.
- Information to include:
    - Admission/discharge dates (in-state, other states, international)
    - Care unit locations
    - Roommate presence/duration
    - Type of care (surgery, dialysis, respiratory, wound care, etc.)
    - Functional status
    - Comorbidities
    - Antibiotic use

## Contact Investigation

Targeted MDRO screening uses colonization screening to identify individuals, implement precautions, and assess transmission. Recommendations apply to all inpatient healthcare exposures of the index patient from 30 days prior to identification to the present, prioritizing the current facility and high-risk settings.
Screening to assess for transmission includes:

- Roommates and patients/residents sharing a bathroom with the index patient.
- Patients/residents currently admitted to rooms where the index case stayed at least one night.
- Screening current patients/residents in rooms and bed spaces where the index patient stayed at least one night in healthcare facilities.
- Performing Point Prevalence Surveys (PPS) for comprehensive transmission assessment.

Patient screening when transmission is suspected or ongoing:

- Wider PPS indicates ongoing transmission or if initial screening identifies new cases.
- Periodic PPS on units with suspected/confirmed transmission (e.g., every two weeks) until controlled, then increase intervals to ensure low transmission.
- Consider admission screening.

HCP screening is not recommended.

- 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 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.

Contact screening in other settings.

- Evaluate residential care settings to determine if screening is appropriate.

- Consider screening staff if practices result in significant exposure to the staff member.

## Clinical Laboratory Surveillance

- Engage clinical microbiology labs for prospective and retrospective surveillance.
- Conduct prospective surveillance for at least three months after the index patient's identification, or three months after the last case if transmission is identified.
- Perform retrospective surveillance of lab results to identify similar resistance patterns, extending three months prior to the index case (or suspected acquisition if shorter).

## Environmental Cultures

Most public health responses to Tier two organisms and mechanisms will not require environmental cultures. However, in some situations, they may help identify environmental reservoirs or evaluate 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.

## Ensure Adherence to IPC Measures

These steps outline the 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:

- Educate and inform HCP and index patient visitors about the organism and precautions to prevent transmission. Consider using the CRO Patient FAQ.
- Ensure that adequate supplies are available to implement Transmission-Based or EBP.
- Conduct ongoing adherence monitoring of infection control practices and provide feedback to HCP.
- Flag affected patients' medical records to initiate appropriate infection control precautions upon readmission.
- 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. Consider using the West Virginia Inter-Facility Infection Control Transfer form.

Health departments or other experts should conduct on-site ICARs at all healthcare facilities identified in the investigation and any outpatient facilities where patients or HCP may have had extensive contact with the index patient, such as wound care clinics.

- If multiple healthcare facilities are identified as part of the investigation, prioritize ICARs 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).
- Conduct ICAR(s) on-site whenever possible:
    - If an on-site ICAR cannot be conducted promptly, consider a tele-ICAR in the

interim, prior to the on-site assessment.
    - If many facilities are identified as part of the investigation, consider using tele-ICAR 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 ICAR (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
- Conduct the ICAR utilizing a standardized assessment instrument. ICARs may prioritize domains most pertinent to multidrug-resistant organism (MDRO) transmission via contact, including hand hygiene, appropriate use of personal protective equipment, environmental sanitation, reprocessing of medical equipment and devices (e.g., mobile medical equipment, respiratory care devices, dialysis machines), and implementation of practices to prevent transmission from wastewater plumbing.
    - Review policies for HH, 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.
- Conduct follow-up telephone or video calls or on-site ICARs 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.

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.

For additional Tier Level Two recommendations, visit MDRO Containment Strategies.

## *Tier Level Three Organisms*

### Initial Measures

- Promptly implement IPC measures for the index case.
- Confirm/recommend contact/Enhanced Barrier Precautions (EBP in nursing homes).
- Ensure adequate supplies.

- Conduct ICAR(s) for tier three organisms within **ten business days** of initial notification if feasible for the facility.
- Notify the patient, family, provider, health departments, and transferring/receiving facilities.

## Healthcare Investigation

- Review the patient's healthcare exposures prior to the positive culture to present, including overnight stays in healthcare settings.
- Investigations are typically limited to the current admission.

**Contact Investigation**

Transmission assessment screening depends on local epidemiology, lab capacity, prevention efforts, and HAI AR program activities.

Consider wider PPS if:

- The MDRO was likely acquired in the facility.
- Transmission is suspected or ongoing (consider intermittent PPS, especially for new cases; do not rescreen patients with novel/targeted MDRO).
- The patient has had a long length of stay without prior preventive screenings.

Clinical Laboratory Prospective Surveillance: Engage microbiology labs to culture from healthcare facilities and report similar resistance profiles to public health.

For additional Tier Level Three recommendations, visit MDRO Containment Strategies.

# *Tier Level Four Organisms*

## Initial Measures

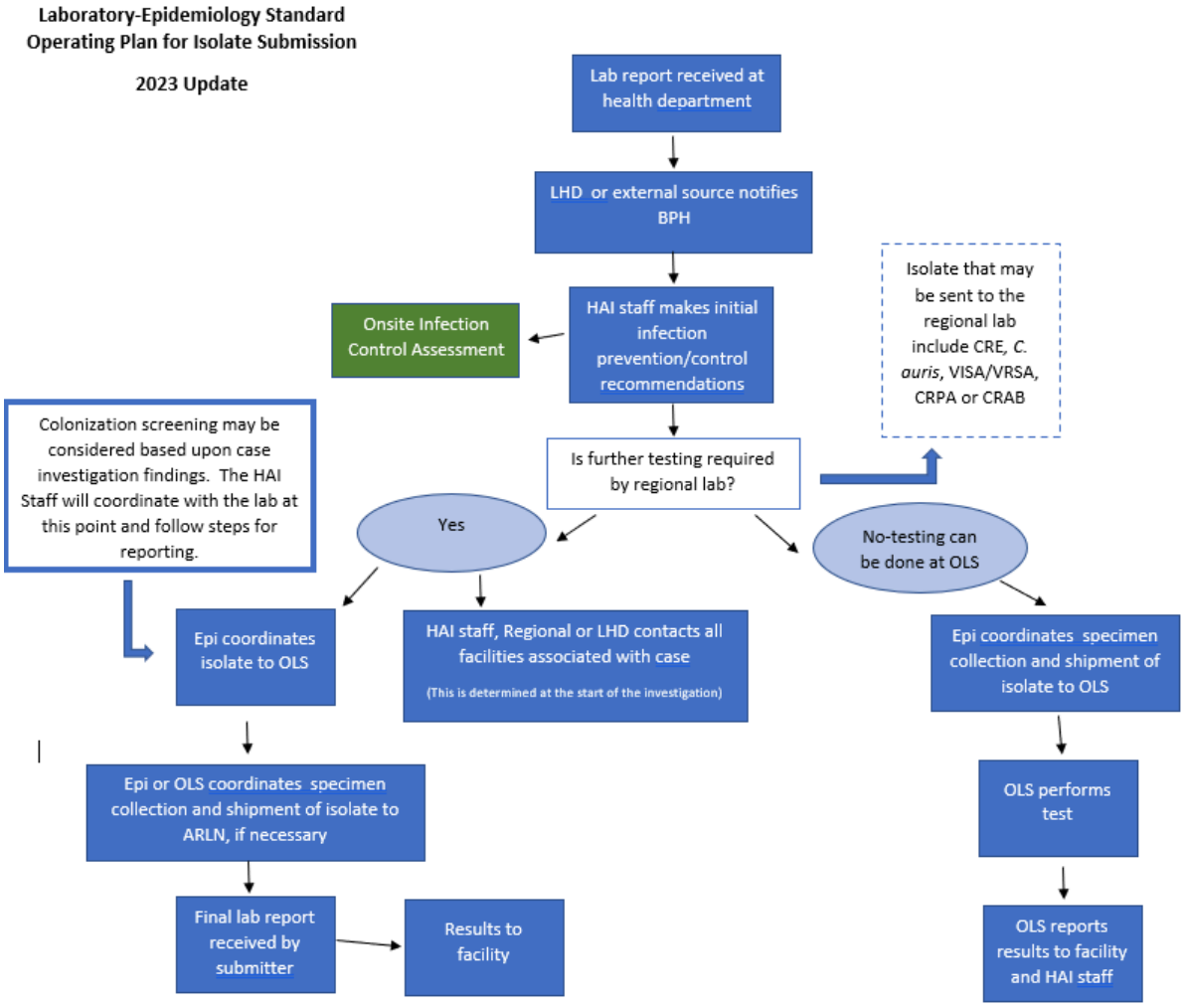
- Ensure prompt receipt of testing results.
- Confirm appropriate IPC measures for the affected patient.
- Tier four MDRO ICAR assessments are scheduled with facilities based on their needs. These regionally endemic, clinically significant organisms, targeted by public health, can spread rapidly. U.S. information on transmission and at-risk groups is available (CDC Containment Guidance, 2023).
- Confirm measures to communicate MDRO status at transfer.
- Prioritize prevention measures.
- Conduct surveillance to monitor for outbreaks and changes in regional epidemiology.

For additional Tier Level Four recommendations, visit MDRO Containment Strategies.

# Colonization Screening

Colonization screening is tiered by organisms.

- OLS typically sends swabs to the regional lab for testing; direct coordination may occur.
- Swabs must meet timeliness requirements.
- Results are submitted via the ARLN Web Lab Portal.
- Alerts are sent to the Lab-Epi Liaison and/or HAI-MDRO Epi and lab staff.



## Resources

*Candidozyma auris*:

- *Candidozyma auris (C. auris) | CDC*
- West Virginia OEPS - *Candidozyma Auris (C. auris)*

CRE:

- CDC's Carbapenem-Resistant Enterobacterales handout
- West Virginia OEPS - Carbapenem-Resistant Organisms (CRO)

CRPA:

- CRPA Carbapenem-Resistant *Pseudomonas aeruginosa* handout
- West Virginia OEPS - Carbapenem-Resistant Organisms (CRO)

CRAB:

- CRAB Carbapenem-Resistant *Acinetobacter baumannii* handout
- West Virginia OEPS - Carbapenem-Resistant Organisms (CRO)

Testing and Lab Resources

- Laboratory Resources for HAIs

Toolkits

- *Clostridioides difficile* (*C.diff*) Toolkit