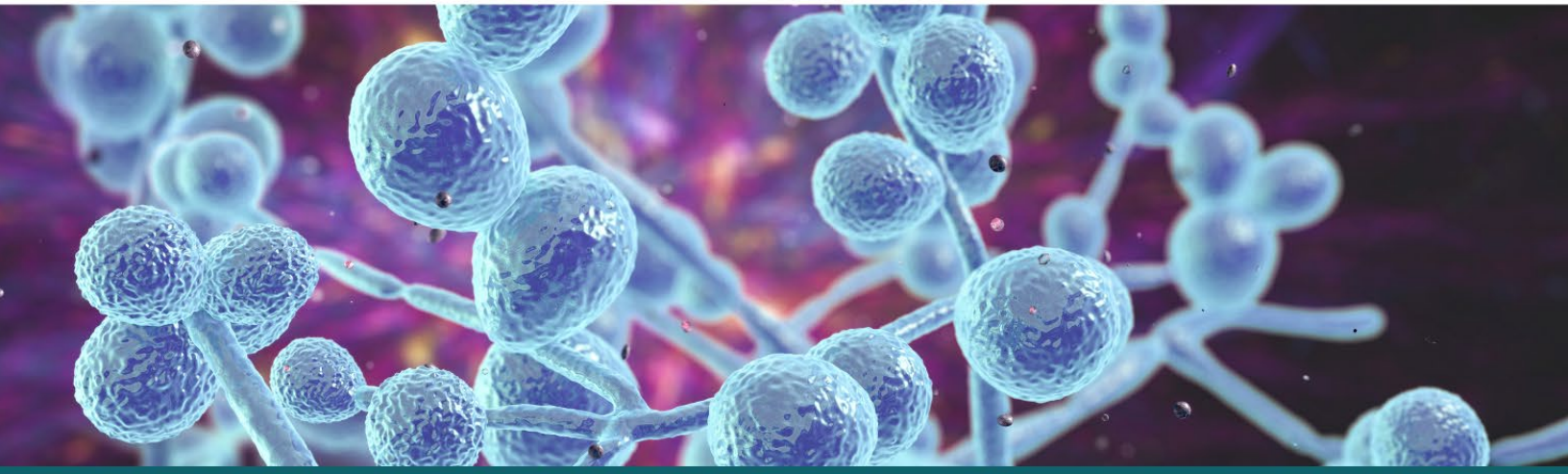

Recommendations for Prevention and Control of Multidrug-Resistant Organisms

For Health Care Settings

Wisconsin Healthcare-Associated Infections (HAI) Prevention Program,
Division of Public Health, Wisconsin Department of Health Services

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WISCONSIN DEPARTMENT of HEALTH SERVICES

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Background and Purpose

Multidrug-resistant organisms (MDROs) are an emerging threat to global public health. As highlighted in the Centers for Disease Control and Prevention's (CDC) 2019 *Antibiotic Resistance Threats in the United States*, more than 2.8 million antibiotic-resistant infections occur in the U.S. each year and more than 35,000 people die from them. Inappropriate antibiotic use and lack of infection prevention measures in one facility can affect other facilities because of the interconnected system of health care as patients are transferred among facilities and shared health care providers.

MDROs are well recognized by CDC and other public health entities as a concern in health care settings. The potential for rapid spread of MDROs within health care facilities and the difficulties of treating these infections make it critically important for health care personnel to be prepared to prevent and respond to a potential outbreak.

This document is designed to aid in the prevention and control of MDROs in:

- Acute care and long-term acute care facilities
- Home health and hospice
- Dialysis facilities
- Outpatient clinics, ambulatory surgery centers, and rehabilitation facilities

Facilities should note that these recommendations are not exhaustive and implementation of all strategies and measures may not be appropriate or feasible in all situations. Health care facilities should consult facility policy to inform infection prevention and control practices. Facility-level assessment of the situation should be made by the facility's leadership in consultation with their local or Tribal health department (LTHD) and the Wisconsin HAI Prevention Program, as appropriate.

For detailed recommendations for nursing home and assisted living facility settings, please refer to these separate guides from the Wisconsin Department of Health Services (DHS):

- *Recommendations for Prevention and Control of Targeted Multidrug-Resistant Organisms in Wisconsin Nursing Homes*
- *Recommendations for Prevention and Control of Targeted Multidrug-Resistant Organisms for Assisted Living Facilities*

Please note this document is not a guide for medical treatment of people who are colonized or infected with MDROs. Health care facilities should consult with individual providers for treatment decisions.

Multidrug-Resistant Organisms Reportable in Wisconsin

Historically, transmission of MDROs is most frequently documented in skilled care facilities, including acute care hospitals and skilled nursing; however, all health care settings are increasingly affected by the emergence and transmission of these organisms. Health care personnel can be a common mode of transmission. Studies have shown that MDROs can be present on the hands of health care personnel after performing care activities such as bathing, wound debridement and dressing, tracheostomy care, and catheter care, which can lead to further transmission of the organism. Additionally, MDROs can be found on equipment and surfaces in health care settings. These findings highlight the need for adherence to hand hygiene by health care personnel, improved environmental cleaning and disinfection, and the use of transmission-based precautions.

Risk factors for MDRO infections include underlying medical conditions, frequent hospitalizations, recent surgeries or medical procedures, indwelling medical devices (such as urinary catheters, endotracheal tubes and central veinous catheters), and broad-spectrum antibiotic use.

Colonization vs. infection

It is important to note that people can be **"colonized" or "infected"** with MDROs.

Someone who is **colonized** with an MDRO is carrying the organism in or on their body, often for very long periods of time, but the organism is not causing symptoms or making them ill. People who are colonized with an MDRO can, however, spread the organism to surfaces in their environment and to other people. Note that someone colonized with an MDRO can also become infected later with the organism.

Someone who is **infected** with an MDRO has the organism in or on their body and it is causing symptoms or illness.

While any drug resistance affects clinical management and infection prevention practices, select MDROs are of greater concern to public health than others. Factors that make MDROs especially concerning to public health are high transmissibility, ability for patients to be silent carriers of the organism, and difficulty of treating diseases caused by the organism. Some MDROs with these characteristics are reportable in Wisconsin. Factors that may help facilities determine whether other MDROs are epidemiologically important include:

- Local epidemiology.
- Presence of ongoing or past outbreaks.
- Propensity for transmission in health care facilities.
- Association with severe outcomes.

- Targeting for local prevention efforts.

Candida auris (C. auris)

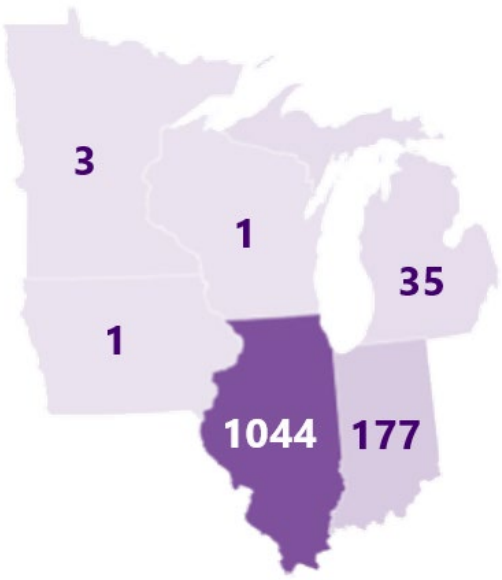
Candida auris (C. auris) is a rare but potentially life-threatening type of fungus that is resistant to most antifungal medications. *C. auris* has spread in health care facilities and is hard to get rid of once it is in a facility.

While still relatively rare, this fungus is becoming more common. *C. auris* has been found in over 30 countries and was first identified in the U.S. in 2013. After first being found in each of its border states, Wisconsin identified its first case of *C. auris* in January 2022 (Figure 1). As of July 1, 2022, *C. auris* is a reportable condition in Wisconsin. The Case Reporting and Investigation Protocol details the process of reporting a case in Wisconsin.

C. auris is often multidrug-resistant and some strains are resistant to all three available classes of antifungals (azoles, polyenes, and echinocandins). *C. auris* is difficult to identify and is often misidentified by commonly used, automated hospital laboratory yeast identification methods. Misidentification can lead to inappropriate patient management and treatment.

C. auris, unlike other yeast, can persist in the health care environment for weeks, highlighting the need for placing patients in contact precautions and thorough environmental cleaning. *C. auris* has been linked to numerous health care facility outbreaks with high rates of transmission among patients on units due to contamination in the environment or shared equipment, as well as through person-to-person transmission.

Figure 1. Clinical *C. auris* cases detected in Wisconsin and border states, as of December 2022



Data source: CDC Tracking *C. auris*

Carbapenemase-producing organisms (CPOs)

Carbapenemase-producing organisms (CPOs) are MDROs that produce carbapenemase enzymes that hydrolyze carbapenem antibiotics. They can also transfer this resistance to other organisms. Examples of the most common carbapenemases include: Klebsiella pneumoniae carbapenemase (KPC), New Delhi Metallo-beta-lactamase (NDM)-1, OXA, IMP, and VIM. CPOs include members of the Enterobacterales order (such as *E. coli, Klebsiella*), *Acinetobacter baumannii,* and *Pseudomonas aeruginosa*.

The Wisconsin State Laboratory of Hygiene (WSLH) began testing carbapenem-resistant Enterobacterales (CRE) organisms for KPC and NDM-1 via molecular testing (PCR) in 2010. Shortly thereafter, OXA-48 was also added to the standard tests for CRE. With the support of CDC's Antibiotic Resistance Lab Network (ARLN), WSLH added testing for VIM and IMP in 2017. WSLH has continued to add to its CPO testing capacity, including the addition of PCR testing for carbapenemases commonly found in *Acinetobacter baumannii* (OXA-23, OXA-24/40, OXA-58) in 2019. WSLH also has the capacity to perform whole genome sequencing on isolates to support outbreak investigation. Carbapenemase-producing carbapenem-resistant Enterobacterales (CP-CRE) was made reportable in Wisconsin in 2018. As of July 2022, carbapenemase-producing carbapenem-resistant *Acinetobacter baumannii* (CP-CRAB), carbapenemase-producing carbapenem-resistant *Pseudomonas aeruginosa* (CP-CRPA) became reportable in Wisconsin.

While changes in surveillance activities and reporting requirements may have played a role in increased cases being identified, it is clear that MDROs are present in Wisconsin.

Table 1. Reported cases of CP-CRAB, CP-CRE, CP-CRPA, *C. auris* and Vancomycin-intermediate *Staphylococcus aureus* (VISA) in Wisconsin, 2019–2023

MDRO type	2019	2020	2021	2022	2023
CP-CRAB	46	42	153	112	153
CP-CRE	45	30	42	45	37
CP-CRPA	0	2	2	4	3
C. auris	0	0	1	5	21
VISA	3	1	1	2	4

Data source: Wisconsin Electronic Disease Surveillance System (WEDSS)

Cases are deduplicated and include both clinical and colonization screening isolates, besides VISA. Colonization screenings for VISA are not conducted at this time. Additional data on reportable MDROs in Wisconsin is available on the DHS website.

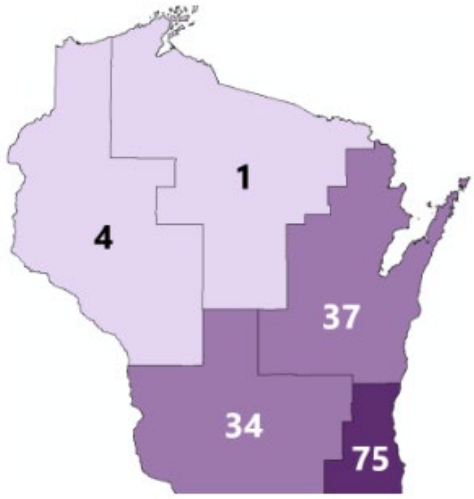
Carbapenemase-producing carbapenem-resistant *Acinetobacter baumannii* (CP-CRAB)

Acinetobacter baumannii is a species of gram-negative bacteria commonly found in the environment, such as in soil and water. If introduced to the health care setting, this organism can survive for a long time on surfaces, which poses a challenge for environmental services when infection or colonization cases are identified. Many isolates of *Acinetobacter baumannii*

contain carbapenemase genes that make the bacteria resistant to carbapenem antibiotics, such as ertapenem or meropenem. Some isolates of CP-CRAB are resistant to all available antibiotics (pan-resistant).

As part of the national AR Lab Network, WSLH began testing for CP-CRAB-specific carbapenemase genes (OXA-23-like, OXA-24/40-like, OXA-58-like) in August 2019. The majority of CP-CRAB cases were initially found in the southeastern public health region of Wisconsin, though CP-CRAB has now been detected in every region of the state. The most common carbapenemase detected in Wisconsin CP-CRAB isolates is OXA-24/40 (99%). CP-CRAB is also more commonly detected in patients with wounds, artificial airways, and in patients with post-acute care connections. The frequent movement of patients or residents between facilities can increase transmission, especially when their MDRO status is not explicitly communicated. CP-CRAB was added as a Category II reportable disease in Wisconsin in 2022. The Case Reporting and Investigation Protocol details the process of reporting a case in Wisconsin.

Figure 2. Reported CP-CRAB Cases by Wisconsin public health region, 2023



Data source: WEDSS

Cases are deduplicated and include both clinical and screening isolates.

Carbapenemase-producing carbapenem-resistant Enterobacterales (CP-CRE)

Enterobacterales is an order of bacteria commonly found in healthy human intestines. There are several species of bacteria within the Enterobacterales order, which include but are not limited to *Escherichia, Klebsiella, Enterobacter, Salmonella, Shigella, Citrobacter,* and *Yersinia*. CRE are Enterobacterales species that are resistant to at least one carbapenem antibiotic (for example, ertapenem, meropenem, imipenem, or doripenem).

There are several types of resistance common in Enterobacterales species. Some isolates have intrinsic resistance to certain antibiotics, including species such as *Proteus* spp., *Morganella* spp., and *Providencia* spp., which have intrinsic resistance to imipenem (a carbapenem

antibiotic). Infections with organisms that have resistance mechanisms, such as extended spectrum beta-lactemase (ESBL)-producing Enterobacterales, often need to be treated with carbapenem antibiotics, which are considered an antibiotic of last resort. Other enzymes called carbapenemases can increase resistance to these antibiotics as well. Because carbapenem antibiotics are so important for treatment, the CDC considers CRE to be an urgent threat, the highest level. Wisconsin initiated CRE surveillance in 2011 among hospitals using a laboratory-identified case definition for *E. coli*, certain Klebsiella species, and Enterobacter species. Skilled nursing facility (SNF) CRE surveillance was added in 2016. CP-CRE is now a Category II reportable disease in Wisconsin. This applies to any species of CRE that tests positive for a carbapenemase such as KPC, NDM-1, OXA, IMP, or VIM. The Case Reporting and Investigation Protocol details the process of reporting a case in Wisconsin.

Carbapenemase-producing carbapenem-resistant *Pseudomonas aeruginosa* (CP-CRPA)

Pseudomonas aeruginosa is a species of gram-negative bacteria commonly found in the environment, such as in soil and water. CRPA has also been found to survive in biofilms in health care facility drains, making water management plans an essential component of reducing the spread of CRPA in health care. Many isolates of *Pseudomonas aeruginosa* have high levels of intrinsic resistance to antibiotics, including carbapenems such as imipenem and meropenem. CP-CRPA that contain mobile resistance elements are rare but can be highly resistant and cause serious infections. *Pseudomonas aeruginosa* also commonly colonizes and infects hospitalized patients in LTCFs. CP-CRPA was added as a Category II reportable disease in Wisconsin in 2022. The Case Reporting and Investigation Protocol details the process of reporting a case in Wisconsin.

Vancomycin-intermediate *Staphylococcus aureus* (VISA) and vancomycin resistant *Staphylococcus aureus* (VRSA)

Evidence that *Staphylococcus aureus* has become less susceptible to vancomycin began to be reported in the 1990s. The first documented case of VISA infection was reported in 1996 in a patient in Japan. Since then, infections with VISA have been reported in patients from the U.S., Europe, and Asia. Per a CDC January 2022 lab update report, 16 cases of VRSA have been reported in the U.S. since 2002. Although there is currently no evidence of transmission in health care settings, surveillance to detect these very difficult-to-treat organisms should be implemented in inpatient settings. VISA and VRSA cases are reportable in Wisconsin. The Case Reporting and Investigation Protocol details the process of reporting a case in Wisconsin. No known cases of VRSA infections have been reported in Wisconsin. Approximately 50 cases of VISA infections have been reported since they become a reportable communicable disease in 2007.

Other MDROs to consider

Other kinds of resistant organisms exist and are present in Wisconsin, but individual cases are not reportable to state public health authorities unless they are causing an institutional

outbreak. While individual cases are not reportable, these MDROs may have significant clinical implications and may be of epidemiological importance. Policies and procedures for transmission-based precautions for these organisms may apply, depending on the health care setting and individual facility policies. Examples of such MDROs include but are not limited to:

- Methicillin-resistant *Staphylococcus aureus* (MRSA).
- Vancomycin-resistant Enterococci (VRE).
- Extended spectrum beta-lactemase (ESBL)-producing Enterobacterales.
- AmpC-producing Enterobacterales.
- Non-carbapenemase-producing CRE.
- Multidrug-resistant *Pseudomonas aeruginosa*.

Infection Prevention Measures in All Health Care Settings

A large proportion of people with a history of MDRO colonization or infection are either intermittently or permanently colonized. Past histories of one or more negative cultures from previously colonized or infected patients do not guarantee that they will remain free of MDROs. Transmission of MDROs in a health care facility is an indicator that other organisms are also being transmitted, and that infection prevention and control measures need to be evaluated for effectiveness and adherence. Strict adherence to infection prevention and control measures should help reduce transmission of targeted MDROs, as well as many other organisms, in the health care setting. Infection prevention and control measures used to prevent transmission of resistant organisms will depend on the type of health care facility and the prevalence of MDROs in the facility.

The following are general prevention and control measures that should be instituted by facilities, including acute care, long-term acute care, home health, hospice, dialysis, outpatient, ambulatory surgery, and rehabilitation facilities.

Infection prevention and control plan

Each facility should develop a comprehensive, institution-specific plan to detect, prevent, and control colonization and infection with MDROs. Additionally, the plan should include strategies of antibiotic stewardship to minimize over-prescribing of unnecessary antibiotics based on national best practices and guidelines, as well as local antibiogram trends. The infection prevention and control plan should be developed and reviewed by a multidisciplinary committee annually or when the scope of services or practice changes.

Hand hygiene

In 2002, the CDC published *Guideline for Hand Hygiene in Health-Care Settings (2002)*. This guideline provides specific recommendations to promote improved hand hygiene practices and

reduce transmission of pathogenic microorganisms to patients, residents, and personnel in health care settings.

Health care personnel, regardless of setting, should perform hand hygiene throughout their shift, especially at key times including:

- Before and after contact with a patient.
- Before an aseptic task, such as inserting an IV or preparing injectable medications.
- Immediately after touching blood, body fluids, non-intact skin, mucous membranes, or contaminated items (even when gloves are worn during contact).
- Immediately after removing personal protective equipment (PPE).
- When moving from contaminated body sites to clean body sites while providing patient care.
- After touching objects and medical equipment in the immediate patient-care vicinity.
- Before eating.
- After using the restroom.
- After coughing or sneezing into a tissue as part of respiratory hygiene.

Hand hygiene supplies should be readily available and easily accessible. Facilities should educate staff on the importance of hand hygiene, as well as when hand hygiene with alcohol-based hand sanitizer versus soap and water should be done. Patients who are colonized or infected with an MDRO should also be educated and encouraged to perform hand hygiene routinely.

Standard precautions

Standard precautions are a basic method of infection control designed to reduce risk of transmission of infectious agents from both recognized and unrecognized sources. This applies to all patients, regardless of their medical diagnosis.

Standard precautions also entail the use of PPE, such as gowns, gloves, masks, face shields, and goggles to protect health care personnel when anticipating contact with:

- Blood.
- All body fluids, secretions, and excretions (except sweat).
- Non-intact skin.
- Mucous membranes.

Transmission-based precautions

Transmission-based precautions are the second tier of basic infection control, beyond hand hygiene and standard precautions, and are to be used for patients or residents who may be

infected or colonized with certain infectious agents for which additional precautions are needed to prevent transmission. There are three general categories of transmission-based precautions: contact precautions, droplet precautions, and airborne precautions.

Transmission-based precautions are used when the routes of transmission are not completely interrupted using standard precautions alone. It is highly recommended that contact precautions, particularly in the acute care setting, should be part of the standard of care for individuals with MDROs, including patients or residents infected or colonized with *C. auris*, MRSA, VISA/VRSA, VRE, CRE, CRPA, ESBL, or other drug-resistant organisms in which the individual may be considered a high-risk for transmission. Contact precautions are indicated for the following:

- On units or in facilities where ongoing transmission is documented or suspected.
- In the presence of acute diarrhea, draining wounds, or other sites of secretions or excretions that are unable to be covered or contained.
- Among individuals who are colonized or infected with MDROs.

Health care personnel who are caring for patients or residents on transmission-based precautions should be made aware of appropriate control measures prior to room entry. This can be done by placing specific instructional signage on the door to the patient or resident room and flagging the patient or resident medical record.

Environmental cleaning and disinfection

Studies have implicated environmental reservoirs as sources of MDRO infection and colonization. **All health care facilities should establish policies for cleaning and disinfection of the health care environment.** These policies should include attention to training and competency of environmental and housekeeping staff, as well as a review of cleaning and disinfection products used.

Use single-use or dedicate non-critical medical items for patients with a known MDRO infection or colonization when possible. Dedication of non-critical patient or resident care equipment to individuals or cohorting patients or residents with the same pathogen may also be useful in preventing spread of organisms. Facilities considering these measures must determine if they possess adequate resources (both equipment and staff) to implement these measures without compromising standard medical care for their patient and resident population. If not, meticulous cleaning and disinfection of equipment between uses are critical for preventing transmission. Ideally, patients who are colonized or infected with an MDRO should have their own lift sling that is not used with other patients. Launder slings after they are used with patients who are infected or colonized with an MDRO before using with other patients.

Disinfectants used should be Environmental Protection Agency (EPA)-registered products that show proven efficacy against the targeted organisms. Check the master labels of the disinfectants being used against the EPA list of registered disinfectants to be sure they are

effective against the organism(s) you desire to kill. These products should be used according to the manufacturer's instructions for use (IFU).

Facilities in which *C. auris* is identified or may be prevalent in the region should use products on List P: Antimicrobial Products Registered with EPA for Claims Against *Candida auris*. Ensure that environmental services staff are using these products to clean and disinfect rooms (daily and terminal), as well as shared and mobile equipment of patients with *C. auris* infection or colonization.

Use disinfectants according to the label instructions. Contact time is how long a disinfectant needs to remain wet on a surface for it to be effective. Ensure staff are aware of contact time requirements and use products appropriately. If the contact time poses difficulties, facilities may also consider changing to another product with a shorter contact time.

Clean and disinfect surfaces starting from the areas with a lower likelihood of contamination to areas with highly contaminated surfaces. This includes cleaning non-affected wings and patient rooms prior to the rooms of patients who are colonized or infected with an MDRO.

Increase the frequency of routine environmental cleaning, including cleaning shared areas, such as tub or shower rooms, and the area surrounding the living space of patients who are infected or colonized with the targeted MDRO. Pay particular attention to cleaning objects and surfaces that are frequently touched.

Change privacy curtains on a routine basis, if they become soiled, and after a patient on isolation is discharged or transferred.

Environmental cleaning practices should be routinely monitored to prevent transmission of pathogens. The use of cleaning checklists for personnel, high-touch surface marking to assess areas that might be missed during cleaning, and direct observation are useful for documenting compliance and process improvement. Routine environmental culturing (bacterial culturing of swabbed surfaces) for contamination is not recommended for any MDROs.

Strategies for Reducing the Risk of MDRO Transmission in Health Care Settings

Administrative measures

Reducing the burden of MDROs should be an institutional goal that is supported by administrative and managerial leadership. Administration should ensure that all necessary resources are available to the facility’s infection prevention program, and management personnel should promote, support, and exemplify infection prevention practices among their staff.

Each health care facility should have a staff person designated to infection prevention practices and a multidisciplinary committee that will oversee infection prevention activities throughout the facility. Committee membership will vary by facility type, but at a minimum should include:

- Infection prevention staff
- Physicians
- Nursing staff
- Quality assurance personnel
- Risk management staff
- Environmental services staff

The goal of the committee is to bring together individuals with expertise in different health care areas to prevent and control HAIs, including MDROs.

Measures that should be included in facility infection prevention programs and committees

- **Administrative representation:** A representative from administration should be included as a member of the institution infection prevention committee. This is a requirement for acute care facilities under Federal Conditions for Participation for Hospitals Part 482.
- **Compliance monitoring:** Rates of compliance with hand hygiene, appropriate use of PPE, and cleaning and disinfection practices among patient care staff should be routinely monitored, with regular performance feedback given to staff, managers, and administrative personnel.
- **Adherence to other guidelines:** The facility should adhere to other infection prevention guidelines which will help reduce the risk of acquiring infections from MDROs and other healthcare-associated microorganisms, should be monitored.
- **Education:** The facility should provide education for staff on the sources of MDROs, how they are spread in health care facilities, the significance of MDRO infections in patients or residents, and how to prevent and control the spread of resistant organisms. Patients, residents, and their families should be educated on good hand hygiene practices and other strategies for preventing the spread of MDROs within the institution, as well as any specific MDROs if they test positive for one.
- **Inter-facility cooperation:** Administrative leadership should develop collaborative relationships and regional strategies such as partnerships between health care systems and LTHDs. These partnerships should apply these strategies consistently across the continuum of care in a geographic location. This also includes notifying medical transport personnel of patient or resident isolation needs. It is important to reinforce with staff at all levels how interconnected all area health care entities are due to their shared care of patients at different points in their care plans. Facilities are encouraged to use the CDC inter-facility infection control patient transfer forms to assist in fostering communication during transitions of care.

Antimicrobial stewardship

The overuse and misuse of antimicrobials is a major contributing factor in the development of drug resistance in bacteria and yeast, as well as colonization and infection by drug-resistant organisms. Antibiotic pressure selects for organisms resistant to antibiotic agents used, which can lead to colonization and infection by MDROs. Antimicrobial stewardship encourages judicious use of antimicrobial agents with the goal of slowing the spread of MDROs.

Core tenets of antibiotic stewardship include:

- Treating true infections appropriately.
- Encouraging use of narrow spectrum agents or de-escalating therapy once culture results return.
- Treating true infections only, not colonization.
- Avoiding antibiotic prophylaxis.
- Monitoring local antibiotic resistance (antibiograms) to improve empiric antibiotic prescribing.
    - Monitor antimicrobial agent usage and implement a process to review appropriate antimicrobials.
    - Prepare and distribute reports that summarize findings and provide suggestions for improving antimicrobial usage.

The facility's consulting pharmacist or infectious disease specialist should ideally be consulted for assistance in establishing these measures, as well as for more complicated decision-making. For additional information, visit the DHS antimicrobial stewardship home page.

Education

Health care personnel, including contracted staff, should receive continuing education regarding basic infection prevention and control practices on a regular schedule, as well as whenever policies or procedures for transmission-based precautions change or are updated. Facilities should document the education given and the names of employees who complete the education. Education should also include MDRO sources and how they are spread in the health care setting, the significance of MDRO infections, and infection prevention measures used to prevent the spread of MDROs. An important part of health care personnel education is auditing practices such as hand hygiene and PPE use and providing follow-up and feedback to health care personnel to improve processes.

Patient and resident education is also essential for the prevention and control of MDROs. Educate patients and caregivers about their MDRO status, tailoring the education based on the individual's needs. Describe how patients can protect themselves and those who live with them. The Wisconsin HAI Prevention Program's fact sheet for patients, resident, and families (available in Spanish and Hmong) may be used to help facilitate this education.

Key concepts to review with patients who are colonized or infected with an MDRO

- Emphasize the importance of good hand hygiene with either an alcohol-based hand sanitizer or soap and water. Ensure patients and caregivers understand how and when to perform hand hygiene.
- Instruct patients to inform their health care provider of their MDRO status while receiving care.
- Encourage caregivers to use gloves during care activities that are higher risk, such as dressing changes and/or device care. Teach them the importance of performing hand hygiene after glove removal.
- For patients with chronic wounds, instruct patients and caregivers to place soiled dressings in a separate bag that can be tied off after the dressing change is complete. The sealed bag can be placed in the regular trash.
- Discuss the importance of routine (daily) cleaning and disinfection of frequently touched surfaces and equipment in the household and shared spaces, such as the bathroom. Frequently touched surfaces can include items such as television remotes and doorknobs.
- Ensure the patient understands how to use disinfectants appropriately. Teach them how to read the disinfectant's label for kill-claims and that they understand what the contact time means. Share resources that can help them clean and disinfect their home properly.
- The patient should use the highest heat setting possible for their laundry.
- Educate the patient on how to watch for signs and symptoms of an infection and to notify their primary physician if they have any questions or concerns.

Communication between health care facilities

All health care facilities (including acute care, ambulatory care, long-term acute care, long-term care facilities, home health, dialysis) that transfer a patient or resident are responsible for informing the receiving facility, ancillary service, and transport team of the patient's colonization or infection history and status prior to treatment or transfer. Facilities are encouraged to use the CDC inter-facility infection control patient transfer forms to assist in fostering communication during transitions of care.

If transmission-based precautions are used for patients or residents who are colonized or infected with an MDRO, identifying such persons at the time of readmission or transfer to a facility enables the appropriate precautions to be implemented promptly. Transmission-based precautions may vary by facility type, so it is also important to specify the MDRO history of the patient or resident being transferred. This remains a common gap in the transfer procedure and leads to patients being placed in inappropriate precautions, which can facilitate transmission to others in the facility. Numerous MDRO outbreaks in the state can be traced back to transfer communication gaps.

MDRO surveillance

Surveillance activities for MDROs include identifying sources, determining prevalence, monitoring rates of transmission in the health care facility, and determining host risk factors for carriage.

Surveillance activities include:

1. **Analyzing clinical culture data to monitor trends in the percentage of isolates that are resistant.** Examples of such analysis include but are not limited to:
    - Identifying trends in MDRO incidence rates.
    - Assisting with the identification of new MDROs not previously identified within the health care organization or community.
    - Generating data to create an antibiogram used to monitor resistance patterns and trends in geographic areas and guide clinicians on prescribing practices.
        - Ensure outsourced microbiology lab contacts specify that facility-specific susceptibility or local or regional aggregate susceptibility data will be provided.
2. **Maintaining line lists of known infected and colonized patients.** This will vary depending on the organism. An example of how this can be accomplished is through flagging patients who are positive for MDROs in the electronic medical record.
3. **Obtaining selective surveillance cultures of high-risk patients on admission to detect colonization or infection with certain MDROs.**
4. **Performing colonization screening** to identify host risk factors for colonization or infection with MDROs or for determining trends in the rates of resistant isolates in the facility.

All health care facilities should implement a surveillance program that includes items 1 and 2 above. The implementation of additional surveillance activities depends on the epidemiology of resistant organisms and risk factors in the patient population. Items 3 and 4 should be considered anytime:

- An organism previously unseen in the facility is detected.
- Endemic rates of MDROs are high relative to their own institutional baseline or are increasing.
- Ongoing transmission or outbreaks have not been brought under control.

If a facility is interested in conducting response-driven or admission colonization screening, email the Wisconsin HAI Prevention Program or call 608-267-7711 to coordinate a screening strategy with testing through WSLH. WSLH offers fee-exempt colonization testing for carbapenemase-producing organisms and *C. auris*.

Decolonization

Decolonization is generally not recommended as a routine component of controlling MDROs except for certain situations involving MRSA. MRSA decolonization can be targeted to MRSA-colonized persons or applied to populations deemed to be at high risk for infection, such as ICU or pre-surgical patients. MRSA decolonization therapy can include the administration of topical antimicrobial or antiseptic agents, with or without additional antimicrobial therapy. The decision to decolonize should be based on whether a patient would benefit clinically, the ability of the patient to tolerate the regimen, or the determination that ongoing transmission would be reduced.

Considerations for decolonization therapy

- Determine benefits of decolonization on a case-by-case basis. Consult with infectious disease specialists or hospital epidemiologists to determine appropriateness of decolonization.
- Consider decolonizing health care personnel only when there is epidemiologic evidence that they are sources of ongoing transmission.
- Implement additional strategies to increase the chances of successful eradication of MRSA if decolonization is attempted, such as:
    - Identify and treat all colonized sites.
    - Reduce bacterial load, such as adequate drainage, debridement, and device removal.
    - Consider close contacts, such as household contacts, as possible sources of re-colonization.

There are no recommendations for decolonizing people with *C. auris*, CPOs, ESBLs, or VRE.

Setting-Specific Considerations

While facilities should refer to this guidance document as a whole, this section provides supplemental considerations to aid health care personnel involved in the prevention, detection, and containment of targeted MDROs across the continuum of health care. Each facility type should assess their situation, consult clinical and administration leadership, and develop policies to implement guidance.

Acute care and long-term acute care facilities

Acute care facilities should follow the CDC's *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings (2007)* and *Guideline for Hand Hygiene in Health-Care Settings (2002).*

As discussed above, contact precautions should be part of the standard of care for individuals with MDROs. Decisions by acute care facilities to discontinue contact precautions for certain MDROs should take the following into account:

- Hand hygiene and PPE compliance among health care personnel and regular auditing of these practices.
- Patient populations served.
- Prevalence in the facility.
- Local transmission rates of specific MDROs.
- Best practices in infection prevention and published guidance from professional organizations.

The Society for Healthcare Epidemiology of America (SHEA) published expert guidance on the *Duration of Contact Precautions for Acute-Care Settings* in 2018 that expands upon this discussion. Additionally, CDC has provided guidance on the use of contact precautions for MRSA, which advocates for maintaining contact isolation in the acute care setting.

For additional strategies regarding the control of MDROs, including *C. auris*, MRSA, CRE, and VRSA, consult:

- Management of Multidrug Resistant Organisms in Health Care Settings, CDC
- Infection Prevention and Control for *Candida auris,* CDC
- Investigation and Control of Vancomycin-Resistant Staphylococcus aureus (VRSA): 2015 Update, CDC
- *A Compendium of Strategies to Prevent Healthcare-Associated Infections in Acute Care Hospitals: 2014 Update*, SHEA

Home health and hospice

Home health care personnel should refer to guidance included in the Infection Prevention Measures in All Health Care Settings section of this guide, in addition to the supplemental considerations below.

Use standard precautions for all patient care encounters with an emphasis on hand hygiene, PPE use for high-risk activities, and cleaning and disinfection of the environment and equipment. Home health care personnel should focus on preventing cross-transmission via clinical supplies, clothing, and other equipment carried to and from the patient's home.

If a patient is infected or colonized with an MDRO, efforts should be made to schedule the patient at the end of the day, when possible. In addition, the following measures should be implemented to prevent spread:

- Hand hygiene.
- It is recommended to implement contact precautions per agency policy and use PPE for high-risk activities. Examples include:
    - Use gown and gloves during extensive patient contact and contact with bodily fluids such as uncontrolled secretions, draining wounds, incontinence, and ostomy tubes and bags.
    - Wear masks during splash-generating procedures, such as wound irrigation or oral suctioning; when providing care for patients with open tracheostomies and the potential for projectile secretions; and in circumstances where there is evidence of transmission from heavily colonized sources, such as burn wounds.
- Environmental cleaning and disinfection.
    - Bring only supplies needed for the visit into the home. If possible, avoid bringing in medical bags and complete charting outside of the home.
    - Limit the use of reusable equipment that is brought into the home. If possible, dedicate the reusable equipment to that patient and leave in the home until the patient is discharged from home health services. Reusable equipment that cannot be left in the home should be cleaned and disinfected, according to the manufacturer's IFU prior to leaving the home. Items that cannot be cleaned in the home can be placed in a bag to transport to another site for cleaning and disinfection.
        - A double bag technique can be used for items that are needed for the encounter. The items can be placed in two disposable, doubled-bag bags, with the outer disposable bag discarded in the patient's care area. The equipment that will be carried out should be cleaned and disinfected and placed into the inner disposable bag.
- Communication between health care services.
    - Have a system in place to flag the patient's chart with the MDRO status.
    - Inform the receiving facility of the patient's MDRO status if the patient needs to be admitted or referred.
- Patient education.
- Surveillance.

In some circumstances, home health care providers may choose to utilize more stringent containment measures to control targeted MDROs. Refer to CDC's Core Infection Prevention and Control Practices for Safe Healthcare Delivery in all Settings for additional information on standard precautions, hand hygiene and environmental cleaning.

Outpatient clinics, ambulatory surgery centers, and rehabilitation facilities

The high volume and quick turnover of patients in outpatient clinics, ambulatory surgery centers, and rehabilitation facilities can present challenges in preventing the spread of MDROs. These types of facilities should refer to guidance on proper PPE use, hand hygiene practices, environmental cleaning, included in the Infection Prevention Measures in All Health Care Settings section of this guide, in addition to the supplemental considerations below.

Use standard precautions for all patient care encounters with an emphasis on hand hygiene, appropriate PPE use and environmental and equipment cleaning and disinfection. All patients should be screened for a history of MDROs and the presence of productive coughs, draining wounds, or other signs and symptoms of infection. If a patient is infected or colonized with an MDRO, the following infection prevention measures should be implemented to prevent spread:

- Hand hygiene.
- PPE use.
    - Use gown and gloves during extensive patient contact and contact with bodily fluids such as uncontrolled secretions, draining wounds, incontinence, and ostomy tubes and bags.
    - Wear masks during splash-generating procedures, such as wound irrigation, oral suctioning, or intubation; when providing care for patients with open tracheostomies and the potential for projectile secretions; and in circumstances where there is evidence of transmission from heavily colonized sources, such as burn wounds.
- Environmental cleaning and disinfection.
    - Clean and disinfect any items or surfaces the patient may have had contact with, such as blood pressure cuffs, the examination table, chairs, rehab equipment, or stethoscopes.
    - Refer to evidence-based guidance to determine if your facility type warrants the implementation of enhanced cleaning procedures after caring for a patient with an MDRO. For example, surgery centers may refer to cleaning guidelines provided by the Association of perioperative Registered Nurses.

Facilities may refer to CDC's 2016 Guide to Infection Prevention in Outpatient Settings: Minimum Expectations for Care and CDC's Core Infection Prevention and Control Practices for Safe Healthcare Deliver in all Settings for additional information on standard precautions, hand hygiene and environmental cleaning.

Facility may choose to utilize more stringent containment measures to control targeted MDROs, in certain situations, such as:

- During times of known transmission in the clinic setting.
- High-risk patient populations or high-risk tasks that may promote spreading of the organism.
- The clinic or procedure area is shared between inpatients and outpatients and contact transmission is required for the inpatient setting. Implementing contact precautions for both settings would standardize the process, decreasing confusion for staff and patients.

Additional information on MDRO surveillance can be found in the Strategies for Reducing the Risk of MDRO Transmission in Health Care Settings section of this guide.

Dialysis settings

Use standard precautions, including the use of gloves, gowns, masks, and eye protection for all patients when appropriate. Encourage hand hygiene, including frequent glove changes, and the use of alcohol-based hand rub (ABHR) or hand washing with soap and water.

Due to the nature of hemodialysis treatment and the high potential for blood and bodily fluid contamination, additional precautions for hemodialysis units should include:

- Restricted use of shared medical supplies and equipment. Clean and disinfect shared medical equipment with an EPA-registered disinfectant, as directed by the manufacturer, before returning to common clean areas. Single use patient care items such as swabs, syringes, medication, tape, and gauze taken to a dialysis station should be dedicated to that patient. If unused, dispose of items taken to a dialysis station and do not return them to common clean areas.
- Preparation of medications in dedicated clean areas.
- Abstention from carrying any patient supplies, including medical supplies or medications, in pockets.
- Designation of clean areas for storage and preparation of medications, medical supplies, and equipment. Do not locate designated clean areas adjacent to contaminated areas.
- Maintenance, cleaning, and disinfection of dialyzers and other equipment, including environmental surfaces, between patients according to the manufacturer's instructions for use (IFU). Ensure staff leave enough time between patients for the area (machine, side table, and chairs) to be cleaned appropriately.

In 2016, the CDC updated selected information and recommendations in its 2001 *Recommendations for Preventing Transmission of Infections Among Chronic Hemodialysis Patients*. This document provides detailed guidelines for the prevention of infections, including MDROs and nonbacterial infectious diseases.

The CDC does not typically recommend contact precautions for MDROs in the outpatient dialysis clinics. However, some patients, such as those who are colonized, have an uncontained infected draining wound, or experience fecal incontinence or diarrhea, have special recommendations. These recommendations include:

- Wearing a separate gown dedicated to that patient, when caring for the patient. The gown should be discarded when patient care duties are completed.
- Dedicating staff to care for the patient.
- Cohorting the patients.
- Dialyzing the patient at a station with as few adjacent stations as possible, or dialyzing patient at the end of the day.
- Dedicating non-disposable equipment such as blood pressure cuffs and clamps to that patient.

Outbreak Response

Outbreaks of MDROs can occur in different types of facilities. Outbreaks may occur within a wing, ward, or unit or may be facility wide. Standard and contact precautions, as well as adherence to other infection control measures, should be reviewed and reinforced. Initiation of more targeted interventions, such as cohorting and increased isolation precautions, may be necessary. Wider application of contact precautions may be considered in non-colonized or infected individuals in conjunction with guidance from the Wisconsin HAI Prevention Program.

The CDC's 2019 *Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms (MDROs)* provides recommended guidance in response to a cluster or outbreak associated with these organisms.

When an emerging novel or targeted MDRO is identified, colonization screening is recommended by CDC as an important part of the public health response. Colonization screening is essential as it identifies unrecognized carriers so that infection control measures can be targeted to prevent the spread of disease or illness.

All suspected MDRO outbreaks should be reported to the LTHD and the Wisconsin HAI Prevention Program as a reportable condition. The Wisconsin HAI Prevention Program can provide tailored infection prevention guidance and laboratory support during outbreak investigations.

For more specific information on responding to MDRO outbreaks, refer to the DHS Reportable MDROs webpage.

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