

**Guidelines for the Management of
Multidrug-Resistant and Other
Epidemiologically Important Organisms
along the Health Care Continuum**

**Delaware Health and Social Services
Division of Public Health**

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Introduction:

The Delaware Division of Public Health (DPH) receives many inquiries from non-acute, residential care facilities along the health care continuum, including but not limited to nursing homes, rehabilitation centers, psychiatric and assisted living facilities, regarding the appropriateness of placement and care of persons with multidrug-resistant organisms (MDRO). The most common questions concern persons who are colonized or infected with methicillin-resistant *Staphylococcus aureus* (MRSA) or vancomycin-resistant enterococcus (VRE), and increasingly those with highly resistant Gram-negative bacilli (GNB), such as carbapenem-resistant *Enterobacteriaceae* (CRE), *Pseudomonas*, and *Acinetobacter* species. Due to concern about MDRO, some facilities have restricted the admission of persons known to be infected or colonized with MDRO, or have required negative screening cultures prior to transfer.² This has caused persons with MDRO to experience delays or denial of admission to long term care, psychiatric and other facilities.^{3,4} There is no evidence that restricting the admission of persons with MDRO is effective in keeping such facilities free of MDRO. Because residents are not generally screened for MDRO, colonization is often not detected. Therefore, a policy restricting the admission of persons with MDRO may lead to a false sense of security that a facility is free of MDRO.⁵ In addition, there is often concern regarding the transfer of patients recovering from transmissible gastrointestinal infections, particularly *Clostridium difficile* and Norovirus (Norwalk-like virus).

This guideline is intended to address all of the above “epidemiologically important” organisms, which for the purposes of this document will be collectively referred to using the general term MDRO. Guidance that is pertinent only to specific organisms will be designated as such. In addition, the term extended care facility (ECF) will refer to all non-acute, residential care facilities along the health care continuum, including but not limited to nursing homes, rehabilitation centers, psychiatric and assisted living facilities.

DPH Position Statement:

Based on currently available knowledge from the Centers for Disease Control and Prevention (CDC), the Society for Healthcare Epidemiology of America (SHEA), the Association of Professionals in Infection Control and Epidemiology (APIC), and other sources, persons with MDRO should not be denied admission solely on the basis of a positive MDRO culture from any site, past history of any MDRO, or because they have recently been diagnosed with an MDRO.^{5,6} Also, it is not appropriate for ECFs to refuse to re-admit residents who have been found to have MDRO after transfer from the ECF to an acute care facility. New or returning residents should be admitted to ECFs based on the ability of the facility to provide necessary care to the resident and should not be based on MDRO status. Denying admission or re-admission based on MDRO status alone is discriminatory, may lead to review by government agencies, and is in violation of 16 Del. C., 1121(18). The CDC, SHEA, APIC, the American Hospital Association (AHA) task force and the Veterans’ Affairs (VA) consensus panel all oppose restricting the access of MRSA-colonized residents to ECFs.⁶⁻⁸ Guidelines published by other states also oppose such restrictions.⁹⁻¹¹

ECFs should be prepared to implement appropriate infection control measures for all prospective or current residents colonized or infected with MDRO. This guideline, which is based on the best current recommendations, describes infection control measures for ECF residents with MDRO in non-outbreak situations. It is important to note that due to incomplete data specific to certain issues in the community extended care setting,

extrapolation from studies done in other settings and/or situations has been necessary. As additional research is published, this guideline will be revised as necessary.

Background:

- The presence of MDRO colonization in ECF residents appears to be quite common. Studies have estimated that more than 20% of ECF residents may be colonized with MRSA and more than 10% may be colonized with VRE.¹²⁻²⁵ Among patients hospitalized with invasive MRSA infections with onset in the community, one-third were admitted from ECFs.²⁶ In addition to MRSA and VRE, antibiotic-resistant gram-negative bacilli (GNB) are also common in this setting (e.g., *E. coli*, *Pseudomonas aeruginosa*, *Klebsiella* species, and *Acinetobacter* species).^{15,16,27,28} The most highly resistant examples with this group are CRE, which may be common in some ECFs while never seen in others.²⁹ In addition, increasing numbers of *C. difficile* infections have been reported,³⁰ as well as higher hospital burden of *C. difficile* in facilities with higher rates of transfer from ECFs.³¹ It has been shown that a significant portion of residents are already colonized with MRSA and VRE upon admission to ECFs and fewer residents acquire MRSA or VRE during their ECF stay.^{12,32} The admission of persons with MDRO into ECFs does not appear to increase ECF infection rates or commonly result in excess morbidity or mortality.³³
- Although MDRO colonization may result in infection, it has been demonstrated that ECF residents colonized with MRSA and VRE are less likely to develop infections due to these organisms than are hospitalized patients.³⁴ Despite more frequent colonization, infections were less commonly due to MRSA or VRE than resistant GNB.³⁵ In studies of VA-affiliated ECFs, few deaths resulted from MRSA infection^{12,13} and in a study of VRE colonization in an ECF found subsequent development of infection to be rare.¹⁴ One study indicated that patients colonized with MRSA had higher 3-year mortality than non-colonized patients, but only among those with severe cognitive impairment.³⁶ A point-prevalence study of VA nursing homes demonstrated a 5.2% prevalence of nursing home-associated infections, with residents with any indwelling device having a 3-fold greater risk of infection.³⁷ Studies involving MRSA and VRE indicate that roommate to roommate transmission of these MDROs in the ECF setting, although possible, is not common.^{14,38-40} Therefore, control measures that may be appropriate in the acute care setting are not generally indicated in the ECF setting. As in acute care hospitals, however, person-to-person spread via direct contact, particularly between residents and the transiently colonized hands of health care workers, is considered the principal mode of transmission.⁵ The importance of hand hygiene cannot be overemphasized in either the acute care or ECF setting.
- The prevalence of *C. difficile* in ECFs in the absence of a recognized outbreak has ranged from 4-20%. Between 10-20% may acquire *C. difficile* during their stay; however, most residents may remain asymptomatic.⁴¹ There has been a shift in *C. difficile* disease epidemiology, with increasing proportion of cases originating in the community, including ECFs. One study found nearly half of *C. difficile* cases originated in ECFs, and only 15% of these patients had diarrhea as an acute presenting complaint upon transfer to acute care settings.⁴² Viral gastroenteritis (caused by rotavirus, enteroviruses or norovirus) and bacterial gastroenteritis (including *C. difficile*) are well-known causes of diarrhea outbreaks in ECFs. The elderly in particular are at increased risk for infectious gastroenteritis because of age-related decreases in gastric acid. Person-to-person spread, especially when bathrooms, dining and rehabilitation facilities

are shared, plays an important role in viral gastroenteritis and *C. difficile* transmission.⁴³ However, while patients recovering from these infections may continue to shed organisms in their feces,⁴⁴ the cessation of diarrhea significantly decreases their infectivity to others.⁴³

Risk Factors for MDROs:

The following factors have been found to be associated with MDRO colonization: general disability, underlying illness; intravenous, urinary, or enteral feeding devices; antibiotic use; wounds; previous hospitalizations; decline in functional status; advanced dementia; chronic obstructive pulmonary disease; and increased intensity of nursing care.^{16–19,24,27} Factors that favor the spread of MDROs include high resident to staff ratios, lack of attention to basic infection control measures, use of common equipment without disinfection between residents, limited facilities for handwashing and the inappropriate use of antimicrobials.⁶ ECFs must follow acceptable infection control standards of practice as indicated by the CDC, APIC, SHEA, and state health authorities.

Diagnostic Testing:

While active surveillance cultures have been recommended for acute care hospitals to limit spread of MRSA and/or VRE,^{45–47} this practice remains controversial^{48,49} and active surveillance in ECFs is not recommended.³⁹ Requiring negative screening cultures for MDRO prior to acceptance of patients from acute care settings leads to a false sense of security for several reasons:

- (1) Imperfect sensitivity of screening cultures, particularly if only one site (i.e., the nares for MRSA) is sampled;¹⁸
- (2) Increasing prevalence of community-associated MRSA in patients admitted directly from the community or from acute-care settings, who may never have had this colonization detected;^{34,50}
- (3) Colonization may be intermittent,¹⁷ resulting in a patient whose initial screening cultures were negative but later becomes positive (but is undetected), particularly if the patient is placed on antimicrobial therapy.

It is not appropriate to require or request follow-up cultures of patients who have recovered from *C. difficile* or norovirus infection (i.e., a “test-of-cure”) and stool samples should never be sent for these pathogens from asymptomatic patients.⁴³ If a patient with a history of *C. difficile* develops diarrhea after transfer to the ECF, it would be appropriate at this time to send an unformed stool sample for analysis, as recurrent disease is common. An unformed stool is defined as one which takes the shape of the container it is placed in. Formed stool samples should never be sent for *C. difficile* testing.

Infection Control Measures:

In 2006 the CDC published the guideline *Management of Multidrug-Resistant Organisms in Healthcare Settings*.³⁴ This guideline expanded on previous similar guidelines in part by incorporating recommendations not only for acute care facilities but also including ECFs. This guidance acknowledged that “all healthcare settings are affected by the emergence and transmission of antimicrobial-resistant microbes” but that institutions “vary widely in physical and functional characteristics....Because of this, the approaches to prevention and control of these pathogens need to be tailored to the specific needs of each population and individual institution.” Modification of the recommendations is encouraged if the principles of epidemiology and disease transmission are maintained, and precautions are included to interrupt spread of infection by all routes that are likely to be encountered. In addition, the

CDC published the *Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007*,⁴⁰ and the *Guidance for Control of Carbapenem-resistant Enterobacteriaceae (CRE): 2012 Toolkit*,²⁹ both of which also incorporate recommendations for non-acute care settings. Information from these guidelines is summarized below.

Standard Precautions:

- Standard Precautions are based on the principle that all blood, body fluids, secretions, excretions (except sweat), non-intact skin, and mucous membranes may contain transmissible infectious agents. Standard Precautions include a group of infection prevention practices that apply to all patients, regardless of suspected or confirmed infection status, in any setting in which healthcare is delivered. These include: hand hygiene; use of gloves, gown, mask, eye protection, or face shield, depending on the anticipated exposure; and respiratory hygiene/cough etiquette.⁴⁰
- Most ECF residents with MDROs can be cared for using Standard Precautions (Attachment 1). Unless otherwise indicated (see below), Standard Precautions are adequate for ECF residents who have contained MDRO colonized or infected secretions/excretions.
 - Secretions/excretions (including wound drainage, stool and urine) are contained when they are unable to leak out of containment products. This includes wound dressings, incontinence products, urine bags, ostomy bags, etc.
- Because colonization with MDROs is often unrecognized and because other infectious organisms may also spread in ECFs, it cannot be emphasized too strongly that adherence with Standard Precautions is important in the care of all residents, whether or not they are known to have an MDRO. Emphasis should be placed on appropriate glove use and hand hygiene in ECFs.^{6,34,40}

Hand Hygiene:

- MDROs are transmitted primarily via the contaminated hands of staff. The *single most effective means* of reducing the potential for MDRO transmission is hand hygiene (destroying or removing transient microorganisms from the hands) before and after contact with residents with MDROs, including after glove removal.
- Hand hygiene can be accomplished by cleaning hands with antimicrobial soap or by using a waterless alcohol-based hand sanitizer.^{51,52} The use of a waterless alcohol-based hand sanitizer should be *strongly considered* in the care of all ECF residents. Recent studies show that such products are as effective as antimicrobial soaps, may increase handwashing compliance, and are not harmful to hands.⁵³⁻⁵⁵
- If hands are not visibly soiled and a waterless alcohol-based product is to be used for hand antisepsis, apply a sufficient amount of the product to wet hands thoroughly, rub hands together and cover entire surface of hands (including nails) and allow to dry. However, if hands feel sticky, or are visibly soiled with organic material or debris (e.g., feces, dirt), hands should be cleaned with soap and running water, rather than or prior to using a waterless product.
- Convenient access to hand hygiene products will improve adherence, therefore it is helpful to install pump dispensers of waterless alcohol-based hand sanitizer in or near each resident room. Small containers of waterless alcohol-based hand sanitizer may also be carried by staff and residents for use when handwashing facilities or pump dispensers are not readily accessible. This may be particularly useful for facilities/areas where placement of pump dispensers of alcohol-based products is not appropriate, such as psychiatric and dementia units.

- Caregivers should be cognizant of providing hand hygiene to the dependent resident population, especially before meals and after toileting, and should ensure educational efforts are provided for the residents in this area.
- For patients with *C. difficile* infection, alcohol-based products are not effective in removal of spores, although they will destroy any vegetative organisms present. Preferential use of soap and water instead of alcohol-based products for handwashing is a recommended consideration for outbreak situations.⁴³ Glove use has been shown to significantly reduce the spread of *C. difficile* in hospitals.⁵⁶

Respiratory Hygiene/Cough Etiquette:⁴⁰

- This strategy is targeted at patients and accompanying family members and friends with undiagnosed transmissible respiratory infections, and applies to any person with signs of illness including cough, congestion, rhinorrhea, or increased production of respiratory secretions when entering a healthcare facility
- The elements of Respiratory Hygiene/Cough Etiquette include 1) education of healthcare facility staff, patients, and visitors; 2) posted signs, in language(s) appropriate to the population served, with instructions to patients and accompanying family members or friends; 3) source control measures (e.g., covering the mouth/nose with a tissue when coughing and prompt disposal of used tissues, using surgical masks on the coughing person when tolerated and appropriate); 4) hand hygiene after contact with respiratory secretions; and 5) spatial separation, ideally >3 feet, of persons with respiratory infections in common waiting areas when possible.
- Healthcare personnel are advised to observe Droplet Precautions (i.e., wearing a mask) and perform hand hygiene when examining and caring for patients with signs and symptoms of a respiratory infection.
- Healthcare personnel who have a respiratory infection are advised to avoid direct patient contact, especially with high risk patients. If this is not possible, a mask should be worn while providing patient care. Institutional sick leave policies should be flexible and non-punitive, to allow ill healthcare workers to remain home rather than working while ill and exposing patients/residents.⁵⁷

Room Placement:

Residents with MDROs are not required to be placed in a private or single room. Single rooms may be limited in number and should be prioritized for those who have conditions that pose a risk of transmission to other residents/roommates either due to the specific MDRO or the ability to contain the infectious material (e.g., draining wounds, uncontained secretions). Single rooms are preferred for residents requiring Contact (see pg. 12) or Droplet precautions⁴⁰ and for patients with active *C. difficile* infection and fecal incontinence. If available, a single room should be considered for all *C. difficile* patients until diarrhea resolves.⁴¹ Patients transferred from acute care facilities after treatment for an episode of *C. difficile* infection do not require private rooms or cohorting, presuming diarrhea is resolved.

If a single room is not available, residents with MDROs may be placed with appropriate roommates.⁴⁰ An appropriate roommate is either a resident with the same MDRO (cohorting) **or** a resident who:

- has intact skin with no significant open wounds or breaks in skin (superficial tears or breaks in the skin, such as minor scratches, are acceptable) *and*

- has no invasive devices, indwelling vascular or urinary catheters or drainage devices (e.g., tracheostomy or tracheal tubes, chest tubes, gastrostomy tubes, central venous catheters, intravenous lines, etc.) *and*
- is not significantly immunocompromised (e.g., due to organ transplantation, neutropenia, serious acute or chronic infection, systemic steroids or chemotherapy)
 - please note that based on age alone, most “healthy” elderly residents are not considered significantly immunocompromised,
- and is not colonized or infected with a different MDRO.

Contact DPH’s Office of Infectious Disease Epidemiology (302-744-4990 or 888-295-5156 after hours) if assistance is needed with placement issues. Situations in which a current resident is found to have an MDRO and there is concern about risk in a roommate should be evaluated on a case by case basis.

Staff cohorting:

In certain circumstances, limiting the number of unique staff who care for MDRO-colonized or -infected residents may be advisable. Examples include:

- Assigning staff who have recently recovered from suspected/confirmed norovirus infection to care for residents who are ill with gastroenteritis (as they may be temporarily immune from re-infection).⁵⁷
- Housing residents with CRE in the same ward, if not the same room, and designating certain staff to care for them.²⁹

Group Activities:

Residents with MDROs may use common living areas, recreational areas, and group dining facilities. Such activities serve an important purpose in maintaining quality of life for ECF residents. Control measures that limit resident activity and movement, such as those used in the acute care setting, are generally not necessary and may result in emotional and social deprivation in the ECF setting.^{5,6} The following factors should be considered in terms of group activities:

- Hand antisepsis is a very important component of participation in group activities. Residents with MDROs should have their hands cleaned with soap and water or a waterless alcohol based hand sanitizer prior to leaving their room and whenever they again become contaminated, when the resident is outside of their room.
- Residents with MDROs should have clean, dry wound dressings that adequately contain any drainage. Residents with MDROs in stool or urine, who are incontinent of either, should be clean and wear an incontinence product when leaving their room. In addition, all residents with MDROs should wear clean clothes or a clean cover gown when leaving their rooms.
- Residents with MDROs who are cognitively or behaviorally impaired and cannot maintain hygienic practices present challenges for ECFs. However, in most cases strategies can be devised that will address infection control issues as well as allow the resident the opportunity for movement and socialization. In rare cases some restriction of movement may be necessary (e.g., residents who may be shedding large numbers of MDRO bacteria and who have been linked to the development of infection in other residents). To discuss specific situations, please contact the DPH Office of Infectious Disease Epidemiology at 302-744-4990 or 888-295-5156 (after hours).
- Temporary suspension of group activities may be considered in the setting of an outbreak of an MDRO or other transmissible disease (such as norovirus).⁵⁷

Environmental Cleaning:

While the immediate patient environment (e.g., bed rails and tables) may become contaminated with MDRO, environmental cultures from common patient areas, including dining rooms, therapy areas, etc., are seldom positive.³⁹

- **Room cleaning** - Standard facility procedures can be followed for cleaning the rooms of residents with MDRO in the ECF setting. Use of the facility's standard disinfectant is adequate, but it is important to monitor compliance with manufacturer's recommended application procedures and contact times. *C. difficile* spores and norovirus are relatively resistant to standard disinfection. Facilities may consider use of sodium hypochlorite (bleach)-containing cleaning agents for rooms housing patients with these organisms, particularly if the facility is experiencing high rates of infection that have not been controlled using standard means.^{41,43}
- **Physical and recreational therapy equipment** - The hands of residents with MDROs should be cleaned before the resident uses recreational or physical therapy equipment. Standard facility procedures should be followed for routine cleaning and disinfection of recreational and physical therapy equipment used by residents with MDROs. However, this equipment should be disinfected before use by another resident if it becomes soiled with body secretions/excretions.
- **Trash disposal** - Follow standard facility procedures for trash and medical waste disposal. No special handling is necessary.⁴⁰

Shared Bathrooms, Showers, Tubs:

As previously stated, roommate to roommate transmission does not appear to be common in ECFs. Hygienic toileting practices (including thorough hand cleaning) are important for all residents, especially those dependent upon staff.

- **Bathrooms** - In situations where a resident with an MDRO shares a bathroom with a roommate who does not have the same MDRO, the bathroom should be cleaned and disinfected using standard facility procedure (e.g., daily and when visibly soiled). Commodes may be useful for certain residents with MDROs and should not be shared with roommates who do not have MDROs.
- **Showers, Tubs** - Shared tubs and showers should be cleaned and disinfected per standard facility procedure after use by residents with MDROs. It may be practical to bathe residents with MDROs after other residents.

Dishes, Glasses, Cups and Eating Utensils:

No special precautions are needed for dishes, glasses, cups or eating utensils. The combination of hot water and detergents used in institutional dishwashers is sufficient to decontaminate these items. All residents should be discouraged from sharing any of these items.

Laundry:

Standard precautions are adequate for handling laundry from all residents. However, soiled laundry, especially bed linens and towels from residents with uncontained stool, urine or other secretions/excretions, should be handled in such a way as to minimize contamination of staff and the environment. Gloves and long sleeved gowns should be worn when changing the beds of residents with uncontained stool, urine or other secretions/excretions and all soiled laundry should be placed directly in a moisture resistant container and not on the floor or other room surfaces. Special handling (i.e., double bagging, etc.) is not

necessary. Laundry should not be rinsed at point of use. Laundry staff should wear gloves and long sleeved gowns when sorting laundry. No special laundering procedure is required.

Decolonization:

Routine decolonization for MRSA is not recommended for ECF residents.^{5,34}

Decolonization should not be required prior to admittance to an ECF.⁵ Decolonization therapy for MRSA may result in the emergence of resistance to the agents used and because recolonization is common, decolonization has had little impact on the incidence of infections experienced by ECF residents. There is no proven decolonization regimen for VRE, resistant GNB, or *C. difficile*. Among ECF residents, VRE colonization is likely to persist for extended periods of time and perhaps indefinitely.¹² The duration of CRE colonization is unknown but likely persists >6 months.²⁹

Indications for Contact Precautions (in addition to Standard Precautions):

Although Standard Precautions and hand antisepsis are sufficient for most residents with MDROs, Contact Precautions (see below) may be indicated for residents with MDROs who are potentially more likely to shed MDRO bacteria into their environment. A private room for ECF residents on Contact Precautions is recommended if available,⁶ but is not required.

The components of Contact Precautions that should be emphasized in this population are glove use and hand antisepsis. Residents for whom Contact Precautions, in addition to Standard Precautions, are indicated include the following:

- Residents who have MDRO-infected or -colonized wounds that cannot be fully covered by dressings or who have drainage that cannot be contained by dressings.
- Residents with fecal or urinary carriage of MDROs whose urine or stool cannot be contained in incontinence products, urine bags or ostomy bags.
- Residents who are ventilator-dependent.
- Residents with a tracheostomy who have an MDRO-colonized or -infected respiratory tract and large amounts of uncontained respiratory secretions.
- Residents who are totally dependent on health care workers for their activities of daily living.
- Residents who have been epidemiologically linked to MDRO infections in other residents (or additional residents if an MDRO outbreak occurs).

Contact Precautions: Gloves

- In addition to wearing gloves as necessary for Standard Precautions, gloves (clean, nonsterile gloves are adequate) should be worn when providing direct care (changing clothing, toileting, bathing, dressing changes, etc.) to residents with MDROs.
- Gloves should also be worn when handling items potentially contaminated by MDROs. Potentially contaminated items include bedside tables, overbed tables, bed rails, bathroom fixtures, television and bed controls, IV poles, suction and oxygen tubing and electronic equipment, especially control knobs. Gloves should be worn when handling urine/stool containers or bags, but then promptly removed and hand hygiene performed..
- During the course of providing care for residents, gloves should be changed and hands cleaned after contact with material that could contain high concentrations of microorganisms (e.g., stool, urine or wound drainage).
- Wearing gloves is not a substitute for hand antisepsis. Gloves should be removed and discarded and hands cleaned (see Hand Antisepsis above) after providing care

to a resident with an MDRO and before leaving the resident's immediate environment or providing care to another resident. Avoid touching items in the resident's room with contaminated gloves and avoid touching potentially contaminated surfaces or items after glove removal and hand antisepsis.

Contact Precautions: Gowns

- For all residents, gowns should be worn as necessary for Standard Precautions. In addition, when caring for residents on Contact Precautions clean, non-sterile gowns should be worn if direct care (e.g., bathing, lifting) will be provided or when substantial contact with secretions/excretions (e.g., linen changes) is anticipated. When such contact is anticipated it is generally most practical to put on a gown before entering the room or before approaching the resident. Long-sleeved gowns should be used to protect contamination of the forearms.
- Gowns should also be worn when contact with environmental surfaces and items in the resident's room which are likely to be contaminated (those close to or used by the resident) is anticipated. This is particularly true if the resident is incontinent of urine or stool or has diarrhea, an ileostomy, a colostomy, or wound drainage not contained by a dressing.
- Gowns should be removed and discarded before leaving the resident's environment. After gown removal, ensure that clothing does not contact potentially contaminated environmental surfaces.
- Gowns should not be reused, even by the same staff member, making multiple trips into the same room.

Contact Precautions: Patient Care Equipment

- Dedicate patient care equipment to a single resident (e.g., commodes, thermometers, blood pressure cuffs, and stethoscopes). If equipment is to be shared it must be cleaned and disinfected before use by another resident. Use of standard facility disinfectants is adequate. Personal items of residents with MDROs should not be shared with other residents unless they have been cleaned and disinfected. (See Environmental Cleaning)

Masks, Eye Protection, Face Shields:

MRSA, VRE, CRE and other resistant GNB, and *C. difficile* are not known to be transmitted via the airborne route and masks are not a routine component of Contact Precautions. However, masks and eye protection or face shields should be worn during the care of any resident if indicated by Standard Precautions. Masks and eye protection or face shields should be worn during resident care activities that are likely to generate splashes or sprays of blood, body fluids, secretions or excretions. Such activities include suctioning or working within 3 feet of a resident who is likely to expel droplet secretions (e.g., those with uncontained respiratory secretions, those with tracheitis and a tracheostomy tube in place, or those with suspected norovirus infection who are actively vomiting).

Discontinuing Contact Precautions:

When the condition of a resident with an MDRO changes (e.g., drainage is contained) and they therefore no longer meet the criteria for needing Contact Precautions, they may be cared for using Standard Precautions. However, if the resident continues to have secretions or excretions that are not contained, Contact Precautions should be continued.

It is appropriate to obtain cultures for clinical reasons, such as determining if infection is present or to guide antimicrobial treatment. However, non-clinically indicated cultures to determine if a resident remains colonized with an MDRO are not generally recommended. It is likely that ECF residents who are colonized with MDROs will continue to be colonized for significant lengths of time and repeated culturing will not be beneficial.

Communication with Other Facilities:

It is important for ECFs and acute care facilities to work together in an attempt to control the spread of MDROs. Effective communication between ECFs and acute care facilities is important in ensuring that the MDRO status of residents is known and that appropriate precautions are instituted or maintained in both types of facilities. Because of the acuity level, the frequent presence of invasive devices, and the vulnerability of many patients in the acute care setting, Contact Precautions are generally implemented for all patients known to have MDROs in the acute care setting. Because Contact Precautions may not be indicated for the same resident in the ECF, the rationale for the difference in precautions (as described above) should be explained to the resident and their family. When a resident is discharged from an acute care facility or transferred from an ECF, an adequate history should be provided to ensure that the receiving facility can institute the proper precautions.

Staff Education:

Continuing education programs for staff who have direct contact with residents or the items in the residents' environment is strongly encouraged. Staff who are responsible for making decisions regarding the care of residents should receive information about MDROs and should thoroughly review the information presented in this guideline. When educating staff about MDRO it should be noted that healthy people are at very little risk of developing an infection with MDRO. In addition, there are no special precautions for pregnant staff who work with residents with MDRO.

Resident, Family, Visitor Education:

- Residents and their families and visitors should be educated about the MDRO and the precautions to be taken in the ECF, including hand antisepsis and methods to limit environmental contamination with stool, urine, and respiratory secretions.
- Family and visitors should clean their hands before entering and leaving the room of a resident with an MDRO. Family/visitors should wear gloves when handling the secretions/excretions of residents with MDROs or when providing direct care (e.g., bathing). Hands should be cleaned after glove removal.
- Regardless of whether additional infection control precautions (Contact Precautions) are in place for a particular resident, it is important to encourage all family/visitors to clean their hands before and after visiting any resident.
- In addition, families, visitors and other residents must have sufficient education to alleviate their concerns, ensure that precautions are maintained, and understand that residents with MDROs need not be avoided.²⁷

Surveillance:

- Surveillance is an important component of all infection control programs, including those in ECFs.^{6,40} Surveillance should include the regular review of all microbiology culture and susceptibility data to detect MDRO and other epidemiologically important organisms.^{5,6,40}

- Although residents known to have MRSA and VRE are likely to represent only a portion of the residents with MDRO, screening residents for MDRO is **not** indicated as a routine infection control measure in ECFs.⁴⁰
- Facilities should ensure that the laboratories to which patient cultures are sent have protocols in place that facilitate the rapid notification of appropriate clinical and infection prevention staff whenever MDRO are identified from clinical specimens to ensure timely implementation of control measures. This is true for both facilities with on-site laboratories and those sending cultures off-site.²⁹
- A confidential line list of residents with MDROs should be maintained.
- Surveillance of cultures obtained for clinical reasons can establish baseline rates of MDRO infections for a facility. High rates of endemic infection (e.g., more than 1 case per 1,000 resident-care days) or an outbreak (e.g., > 3 infections in one week or twice the number of infections per month observed for 3 consecutive months) may be identified by surveillance.^{6,40}
- Facilities can use surveillance data in educational programs to reinforce infection control practices and to prioritize infection control activities.
- Culture and susceptibility data can be used to guide the choice of empiric therapy. Empiric therapy is the antimicrobial treatment that is prescribed based on a presumed diagnosis before culture and susceptibility results are known. Monitoring culture and susceptibility data will provide information on antimicrobial susceptibility and resistance patterns in a particular facility. Communicating this information can help guide physicians in the selection of the most appropriate empiric therapy for residents with infections.

Because of its emerging nature, CRE screening is recommended as a core measure for all healthcare settings.²⁹ This could take the form of screening epidemiologically-linked residents (such as a former roommate of a resident found to have CRE, or ones with the same nursing assignments) or a point prevalence survey (screening all residents in a given location at one time to determine if CRE is present). Aggressive screening and control measures are warranted in facilities that have little/no CRE, to prevent these organisms from becoming established in the facility. Please refer to the CDC and APIC CRE toolkits for further guidance.^{29,58}

Discharge Home:

- Family members should be advised that healthy persons have very little risk of developing an infection due to an MDRO.
- Family members should wear gloves when handling secretions/excretions that are known to contain MDROs and should clean their hands with soap and water or a waterless alcohol based hand sanitizer after glove removal. When gloves have not been used, family members should clean their hands after providing direct care.
- The resident's usual healthcare providers should be informed of the MDRO.
- The person with an MDRO should clean his/her hands frequently with soap and water or a waterless alcohol based hand sanitizer.
- No special laundering procedures are necessary. The clothes of all family members can be washed together using standard detergent. Bleach can be added for items that are heavily soiled with body secretions/excretions.
- Regular cleaning with household disinfectants of surfaces and items frequently touched by hands or contaminated by secretions/excretions is recommended.
- Family members of persons with MDRO should clean their hands with soap or a waterless alcohol based hand sanitizer before preparing food and before eating.

- Persons who are very ill or have compromised immune systems should avoid handling secretions/excretions known to contain MDRO. Such persons should also clean their hands with soap and water or a waterless alcohol based hand sanitizer after contact with a person with an MDRO.

Antimicrobial Use:

The appropriate use of antimicrobials is **the most important** method of controlling antimicrobial resistance. One of the ways resistance develops is through the use and overuse of antimicrobials (antimicrobial pressure). When bacteria are exposed to an antimicrobial, those bacteria that are susceptible to the antimicrobial are killed and those that are resistant survive and may become predominant. These antimicrobial resistant organisms may then be transmitted to other persons. Overuse of antimicrobials is a problem in ALL healthcare settings. Studies have repeatedly documented that much of the antimicrobial use in ECFs is inappropriate,⁵⁹ and antibiotic exposure is associated with MDRO colonization in ECF settings.⁶⁰

Attempts to control antimicrobial use in ECFs are complicated by many factors, including the fact that clinical diagnosis is often difficult in this population due to the frequent absence of typical signs and symptoms of infection (e.g., fever). However, ECFs should attempt to develop and institute programs and policies to monitor and control the use of antimicrobials in all residents. The CDC's "Get Smart for Healthcare" program (<http://www.cdc.gov/getsmart/healthcare/>) is a useful source of information and resources about appropriate antimicrobial use in healthcare settings. SHEA has published a position paper on antimicrobial use in long-term care facilities.⁵⁹ This position paper outlines concerns about inappropriate antimicrobial use and recommends approaches to promote the rational use of antimicrobials in this setting. The CDC has also published a guideline regarding the prudent use of vancomycin.⁶¹

- In particular, treatment of asymptomatic bacteriuria is very common in ECFs. Such treatment is often inappropriate and can induce the development of resistant organisms. More than 30% of non-catheterized residents and almost all chronically catheterized residents have asymptomatic bacteriuria.⁵⁹
- The use of antimicrobials for the treatment of viral upper respiratory infections is common and also considered to be inappropriate.⁶²
- Evaluation of residents' clinical signs and symptoms in conjunction with appropriate culture and susceptibility testing should be used to guide therapy.⁵⁹
- Although empiric antimicrobial therapy may be indicated in some situations, it is important that physicians are informed of culture and susceptibility results so that applicable changes in treatment can be made. Broad spectrum antimicrobials (which are often used for empiric therapy) should be replaced by narrower spectrum antimicrobials once culture and susceptibility results are known. The use of narrower spectrum antimicrobials that target specific microorganisms will lessen antimicrobial pressure. In addition, stopping empiric antimicrobials promptly if no bacterial infection is identified, and using antimicrobials for the shortest duration necessary to treat the infection (i.e., 7-8 days rather than 14 days for most healthcare-associated pneumonia),⁶³ are both important strategies to reduce antimicrobial pressure.
- Because residents with invasive devices are at greater risk of acquiring an MDRO, minimizing the use of invasive devices such as urinary catheters, feeding tubes, tracheostomies, etc., may be helpful in controlling MDROs in ECFs.⁵

- Avoiding antimicrobial use in patients with a history of *C. difficile* infection is particularly important, as repeated or continued antimicrobial use can lead to recurrent *C. difficile* infections that may be severe. For patients with a history of *C. difficile* who require antimicrobials, appropriate surveillance should be in place so that if diarrhea does recur, prompt diagnostic testing, infection control measures, and treatment if necessary can be instituted.

Summary:

This guideline was developed to assist Delaware ECFs in achieving the goal of prevention and control of MDRO while maintaining quality of life for those residents who are colonized or infected with these organisms. Using this guideline as a reference, ECF staff will be able to assess individual residents with MDRO and develop specific care plans to minimize both the restrictions imposed on the resident and the risk of transmission of MDRO to others. It is important that the staff who develop care plans and those who implement them have sufficient knowledge to make appropriate decisions.

Please remember that the DPH Office of Infectious Disease Epidemiology (302-744-4990 or 888-295-5156 after hours) is available for consultation regarding questionable or difficult situations, including possible outbreaks, at any time. DPH does not report any issues related to MDRO to any state or other regulatory agency.

Abbreviations:

- **APIC** = Association of Professionals in Infection Control and Epidemiology
- **CDC** = Centers for Disease Control and Prevention
- **CRE** = carbapenem-resistant *Enterobacteriaceae*
- **ECF** = extended care facility
- **DPH** = Division of Public Health
- **GNB** = Gram-negative bacilli
- **MDRO** = multidrug-resistant organisms
- **MRSA** = methicillin-resistant *Staphylococcus aureus*
- **SHEA** = Society for Healthcare Epidemiology of America
- **VRE** = vancomycin-resistant Enterococcus

Additional Resources:

Long-term care-specific guidance and toolkits are available from the following sites:

- CDC prevention resources for long term care: <http://www.cdc.gov/longtermcare/>
- Advancing Excellence in America's Nursing Homes: Infections: <https://www.nhqualitycampaign.org/goalDetail.aspx?g=inf>
- Get Smart: Know When Antibiotics Work (healthcare-specific): <http://www.cdc.gov/getsmart/specific-groups/hcp/index.html>

Definitions:

- **Carbapenems:** Class of broad-spectrum antibiotics that includes imipenem, ertapenem, meropenem, and doripenem.
- **Carbapenem-resistant *Enterobacteriaceae* (CRE):** *Enterobacteriaceae* are a class of Gram-negative bacteria that includes *E. coli*, *Klebsiella*, *Enterobacter*, *Proteus*, and many other species. Typically live in the GI tract. Resistant to antibiotics in the carbapenem class, including imipenem, meropenem, and others.
- ***Clostridium difficile* (C diff):** anaerobic bacteria that are the most common cause of antibiotic-associated diarrhea. May lead to asymptomatic infection or cause varying severity of diarrhea, pseudomembranous colitis, toxic megacolon, and death.
- **Cohort:** two or more patients colonized or infected with a specific MDRO, who are physically separated from other patients who are not known to be colonized or infected with the same MDRO.
- **Colonization:** the presence of microorganisms in or on a host with growth and multiplication but without tissue invasion or damage (*vs. Infection*).
- **Contact Precautions (or Isolation):** Additional procedures put in place to reduce spread of microorganisms that are spread by direct contact with patients or their environment.
- **Decolonization:** the administration of topical, oral, or systemic antibiotics or antiseptics for the purpose of eradicating MDRO colonization.
- **Decontamination:** the process of removing microorganisms and making an object safe for handling.
- **Disinfection:** a process that kills or destroys nearly all microorganisms, with the exception of bacterial spores, on inanimate objects.
- **Droplet Precautions (or Isolation):** Additional procedures put in place to reduce spread of microorganisms that are spread by large respiratory particles produced by coughing or sneezing. These droplets typically do not persist in the air beyond 3–6 feet of the patient, and standard surgical masks are used to protect healthcare workers.
- ***Enterococcus* species** (includes *E. faecium* and *E. faecalis*): common gram-positive microorganisms that are part of the normal flora in the gastrointestinal and female genital tract.
- **Extended care facility (ECF):** in this document, refers to all non-acute, residential care facilities along the health care continuum, including but not limited to nursing homes, rehabilitation centers, psychiatric and assisted living facilities.
- **Highly resistant Gram-negative bacteria (GNB):** a heterogeneous group of Gram-negative bacteria that have acquired resistance to commonly used antimicrobials. Includes organisms that produce extended spectrum beta-lactamases (ESBL) and carbapenemases, which inactivate beta-lactam (such as penicillins and cephalosporins) and carbapenem antibiotics, respectively. Common organisms include but are not limited to *E. coli*, *Klebsiella*, *Acinetobacter*, and *Pseudomonas* species. CRE are one type of highly resistant GNB.
- **Infection:** the entry and multiplication of microorganisms in the tissues of the host accompanied by clinical signs and symptoms (*vs. Colonization*).
- **Methicillin Resistant *Staphylococcus aureus* (MRSA):** strains of *S. aureus* that are resistant to the antibiotics methicillin, oxacillin, nafcillin and frequently other antimicrobials.

- **Multidrug-resistant organisms (MDRO):** a term that is used collectively to refer to bacteria that have acquired resistance to 2 or more commonly used antimicrobials. Includes MRSA, VRE, and resistant GNB. For the purposes of this document, also refers to any epidemiologically important organism, such as *C. difficile* and norovirus, which are not technically multidrug-resistant.
- **Norovirus (also known as Norwalk-like viruses):** a type of calicivirus that causes highly contagious viral gastroenteritis characterized by nausea, vomiting and diarrhea that typically lasts 1-3 days.
- **Outbreak:** a definite increase in the number of new MDRO-infected patients above the endemic rate in a defined period of time (e.g., a month).
- **Prevalence:** the proportion of persons in the facility with MDRO during a specific time period.
- **Sanitation:** a process that decreases microorganisms on an inanimate object to a safe or relatively safe level.
- **Standard Precautions:** Procedures intended to be used for all patients to reduce spread of microorganisms (see Attachment 1).
- ***Staphylococcus aureus*:** a common species of gram-positive bacteria found on the skin and in the anterior nares of many people.
- **Surveillance:** monitoring the distribution of illnesses in a population.
- **Transmission:** the method or route by which microorganisms move from one location to another (e.g., by direct contact, airborne, droplet, or indirect contact with inanimate objects such as equipment).
- **Vancomycin-Resistant Enterococcus (VRE):** strains of enterococcus (*E. faecalis* and *E. faecium*) that are resistant to the antibiotic vancomycin and other antimicrobial.

The Delaware Division of Public Health wishes to express appreciation to the members of the Advisory Group for their assistance in the development of this guideline.

For more information or additional copies, please call the DPH Office of Infectious Disease Epidemiology at 302-744-4990 or 888-295-5156 (after hours). This document may also be downloaded at: <http://www.dhss.delaware.gov/dhss/dph/epi/haihomepage.html>.

Attachment 1:

STANDARD PRECAUTIONS

From: **Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings 2007.**²⁹

RECOMMENDATIONS FOR APPLICATION OF STANDARD PRECAUTIONS FOR THE CARE OF ALL PATIENTS IN ALL HEALTHCARE SETTINGS

The application of Standard Precautions during patient care is determined by the nature of the health care worker-patient interaction and the extent of anticipated blood, body fluid, or pathogen exposure. For some interactions (e.g., performing venipuncture), only gloves may be needed; during other interactions (e.g., suctioning), use of gloves, gown, and face shield or mask and goggles is necessary.

COMPONENT RECOMMENDATIONS

A. Hand hygiene

- (1) After touching blood, body fluids, secretions, excretions, contaminated items; immediately after removing gloves; between patient contacts.
- (2) Wash hands regardless of whether gloves are worn.
- (3) It may be necessary to wash hands between tasks and procedures on the same patient to prevent cross-contamination of different body sites.

B. Personal protective equipment (PPE)

- (1) Gloves for touching blood, body fluids, secretions, excretions, contaminated items; for touching mucous membranes and non-intact skin
- (2) Gown during procedures and patient-care activities when contact of clothing/exposed skin with blood/body fluids, secretions, and excretions is anticipated..
- (3) Mask, eye protection (goggles), face shield* during procedures and patient-care activities likely to generate splashes or sprays of blood, body fluids, secretions, especially suctioning, endotracheal intubation

*During aerosol-generating procedures on patients with suspected or proven infections transmitted by respiratory aerosols (e.g., SARS), wear a fit-tested N95 or higher respirator in addition to gloves, gown, and face/eye protection.

C. Respiratory hygiene/cough etiquette (source containment of infectious respiratory secretions in symptomatic patients, beginning at initial point of encounter e.g., triage and reception areas in emergency departments and physician offices)

- (1) Instruct symptomatic persons to cover mouth/nose when sneezing/coughing
- (2) Use tissues and dispose in no-touch receptacle
- (3) Observe hand hygiene after soiling of hands with respiratory secretions
- (4) Wear surgical mask if tolerated or maintain spatial separation, >3 feet if possible.

D. Patient placement

- (1) Prioritize single-patient rooms for patients at increased risk of transmission, likely to contaminate the environment, does not maintain appropriate hygiene, or is at increased risk of acquiring infection or developing adverse outcome following infection.

E. Soiled patient-care equipment

(1) Handle in a manner that prevents transfer of microorganisms to others and to the environment; wear gloves if visibly contaminated; perform hand hygiene.

F. Environmental control

(1) Develop procedures for routine care, cleaning, and disinfection of environmental surfaces, especially frequently touched surfaces in patient-care areas.

G. Textiles and laundry

(1) Handle in a manner that prevents transfer of microorganisms to others and to the environment

H. Needles and other sharps

(1) Do not recap, bend, break, or hand-manipulate used needles; if recapping is required, use a one-handed scoop technique only

(2) Use safety features when available

(3) Place used sharps in puncture-resistant container

I. Patient resuscitation

(1) Use mouthpiece, resuscitation bag, other ventilation devices to prevent contact with mouth and oral secretions

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