2018

Multidrug-Resistant Organisms (MDROs) Toolkit

For Long-Term Care Facilities

NC SHARPPS Program

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Table of Contents

Introduction 3

What are MDROs? 4

What types of infections do MDROs cause? 7

What causes MDROs? 7

How are MDROs spread? 7

How can MDROs be prevented? 8

- Administrative measures 8
- Education and training of healthcare personnel 9
- Surveillance 9
- Use Standard and Transmission-Based Precautions as the situation warrants 9
  - Hand hygiene 10
- Environmental measures 12
- Antibiotic stewardship 12

How do I know if a resident is infected or colonized with a MDRO? 13

What precautions should I consider to prevent MDRO transmission? 13

- What are Standard Precautions? 14
- What are Contact Precautions? 17
  - When should residents be placed on Contact Precautions? 18

What are other recommendations for managing MDROs in the long-term care setting? 18

- Can residents infected or colonized with a MDRO participate in group activities? 18

APPENDICES 20

- Appendix A. CDC Core Elements of Antibiotic Stewardship for Nursing Homes. 20
- Appendix B. Contact Precautions sign for display outside resident rooms. 21
- Appendix C. Additional recommendations for management of multidrug-resistant organisms in long-term care facilities. 23
- Appendix D. Additional MDRO resources. 24

Multidrug-Resistant Organisms (MDROs) Toolkit

For Long-Term Care Facilities

Introduction

Antibiotic resistance is a major threat to public health. The Centers for Disease Control and Prevention (CDC) estimate that every year approximately 2 million people in the United States get infections that are resistant to antibiotics, drugs that treat infections caused by bacteria, and at least 23,000 people die as a result. The extent and severity of disease caused by antibiotic resistant bacteria, also called multidrug-resistant organisms (MDROs), depends on the population affected.

MDROs can be found in virtually any healthcare setting. Because healthcare settings differ in population served, physical and functional characteristics, and resources, approaches to MDRO prevention and control may vary between healthcare settings. Regardless of these differences, the goal of these approaches is the same: to prevent transmission to others within and between healthcare settings. In this toolkit, we describe approaches to MDRO prevention and control that are recommended for long-term care facilities. Long-term care facility residents, including individuals who live in nursing homes, skilled nursing facilities, combination homes, assisted living facilities, or adult care homes may be at increased risk for acquiring a MDRO due to factors such as increased age, frequent healthcare exposures, pre-existing comorbidities, presence of indwelling or invasive devices, and congregated living environments. This makes control and prevention of MDROs in this population and these healthcare settings especially important. The approaches described in this toolkit may not be applicable or feasible for all long-term care facilities but are presented as "best practices" to consider for controlling and preventing MDROs. Facilities should assess the level of risk for MDRO transmission for their population based on the individuals they serve and the services they provide and ensure that appropriate strategies to prevent MDRO transmission are fully implemented, regularly evaluated for effectiveness, and adjusted as appropriate.

This toolkit was written to help those in charge of infection prevention and control programs at long-term care facilities implement recommended MDRO prevention and control approaches. The material provided is appropriate for those with training in infection prevention and control but may also be informative for other long-term care facility staff, including administrators and other facility leadership as well as frontline staff such as nurses, nursing assistants, ancillary services staff (e.g. physical therapists), and environmental services staff. The content of this toolkit may be used for many purposes, including but not limited to: creating or updating infection prevention and control programs, conducting staff in-services pertaining to prevention and control of MDROs, or as part of facility staff orientation procedures.

What are MDROs?

When a drug that can normally be used to treat an infection does not work to treat the organism causing the infection, the organism is called "resistant" to that drug. Multidrug-resistant organisms (MDROs) are organisms or microbes that have become resistant to multiple types of drugs that are normally used to treat them. MDROs can include fungi, viruses, and parasites, but many are bacteria. Antimicrobial resistance is the ability of these microbes to resist the effects of drugs – that is, the germs are not killed, and their growth is not stopped. One type of antimicrobial resistance is antibiotic resistance, when bacteria are resistant to the antibiotics used to treat them. We will discuss antibiotic resistance in more detail in this toolkit.

There are many kinds of MDROs. Some examples of MDROs are:

- Carbapenem-resistant Enterobacteriaceae (CRE)
- *Clostridioides difficile* (formerly *Clostridium difficile*; C. diff)
- Extended Spectrum Beta-Lactamase Producers (ESBLs)
- Methicillin-resistant *Staphylococcus aureus* (MRSA)
- Multidrug-resistant *Acinetobacter*
- Vancomycin-resistant Enterococci (VRE)

More information about these MDROs can be found in Table 1.

Table 1. Examples of common MDROs, laboratory evidence for detection, and precautions to consider.

Type of MDRO	Definition	Laboratory Evidence*	Precautions†
Carbapenem-resistant Enterobacteriaceae (CRE)	Enterobacteriaceae are a family of Gram-negative bacteria that normally live in the human gut. CRE are Enterobacteriaceae that have developed resistance to last-resort antibiotics called carbapenems.	Any member of the bacterial family Enterobacteriaceae (e.g. *Escherichia coli*, *Klebsiella pneumoniae*, *Enterobacter* species) with susceptibility results that indicate resistance (R) to ertapenem, doripenem, imipenem, and/or meropenem.	Standard + Contact
Clostridioides difficile (formerly *Clostridium difficile*; C. diff)	Spore-forming, Gram-positive bacteria that can cause inflammation of the colon (colitis).	Positive laboratory result for *Clostridioides difficile* toxin A and/or B or toxin-producing *Clostridioides difficile* organism	Standard + Contact Use soap and water to clean hands. Alcohol-based hand rub is not effective against *Clostridioides difficile*
Extended Spectrum Beta-Lactamase Producers (ESBLs)	Extended-spectrum beta-lactamase is an enzyme (chemical tool) that allows bacteria to become resistant to a wide variety of antibiotics including penicillins and cephalosporins. Several types of Gram-negative bacteria can produce these enzymes and be classified as ESBLs.	Not all laboratory test results specifically confirm ESBL-positive specimens. The Clinical Laboratory Standards Institute (CLSI) has developed broth microdilution and disk diffusion ESBL screening and confirmation tests using selected antimicrobial agents. Contact your laboratory for details.	Standard + Contact
Methicillin-resistant *Staphylococcus aureus* (MRSA)	Gram-positive bacteria that are resistant to several types of antibiotics.	Positive result for laboratory test for MRSA detection or culture of *S. aureus* with susceptibility results that indicate resistance (R) to oxacillin, cefoxitin, or methicillin.	Standard + Contact

Multidrug-resistant *Acinetobacter*	Gram-negative bacteria that are resistant to several types of antibiotics.	Any *Acinetobacter* species testing non-susceptible (either resistant (R) or intermediate (I)) to at least one agent in at least 3 of the following 6 antimicrobial classes: aminoglycosides (amikacin, gentamicin, tobramycin); carbapenems (imipenem, meropenem, doripenem); fluoroquinolones (ciprofloxacin, levofloxacin); beta-lactam/beta-lactam beta-lactamase inhibitor combination (piperacillin, piperacillin/tazobactam); cephalosporins (cefepime, ceftazidime); sulbactam (ampicillin/sulbactam)	Standard + Contact
Vancomycin-resistant Enterococci (VRE)	Enterococci are Gram-positive bacteria that are normally present in the human gut and can sometimes cause infections. When enterococci become resistant to the drug vancomycin, they are called vancomycin-resistant enterococci (VRE).	Positive result for laboratory test for VRE detection or culture of *Enterococcus faecalis*, *Enterococcus faecium*, or *Enterococcus species unspecified* with susceptibility results that indicate resistance (R) to vancomycin.	Standard + Contact

*Multidrug-Resistant Organisms & Clostridium difficile Infection (MDRO/CDI) Module Protocol, January 2018. Available from https://www.cdc.gov/nhsn/pdfs/pscmanual/12pscmdro_cdadcurrent.pdf.

†Decisions regarding use of Contact Precautions should be based on guidance provided in "When should residents be placed on Contact Precautions?" and Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006.

What types of infections do MDROs cause?

MDROs can cause infection in any part of the body. Common locations for infections may include: bloodstream, lungs, skin, surgical site, urinary tract, and wounds.

What causes MDROs?

Inappropriate use of antibiotics is a primary cause of antibiotic resistance. For example, upper respiratory tract infections and bronchitis are usually caused by viruses. Despite this, approximately 50% of upper respiratory tract infections and 80% of acute bronchitis are inappropriately treated with antibiotics, drugs that only treat infections caused by bacteria. This has contributed to the rise in antibiotic-resistant bacteria. When antibiotics are used inappropriately, they can also kill good bacteria that protect the body from infections with bacteria that make you sick. This can allow bacteria that are drug resistant to grow and multiply (Figure 1).

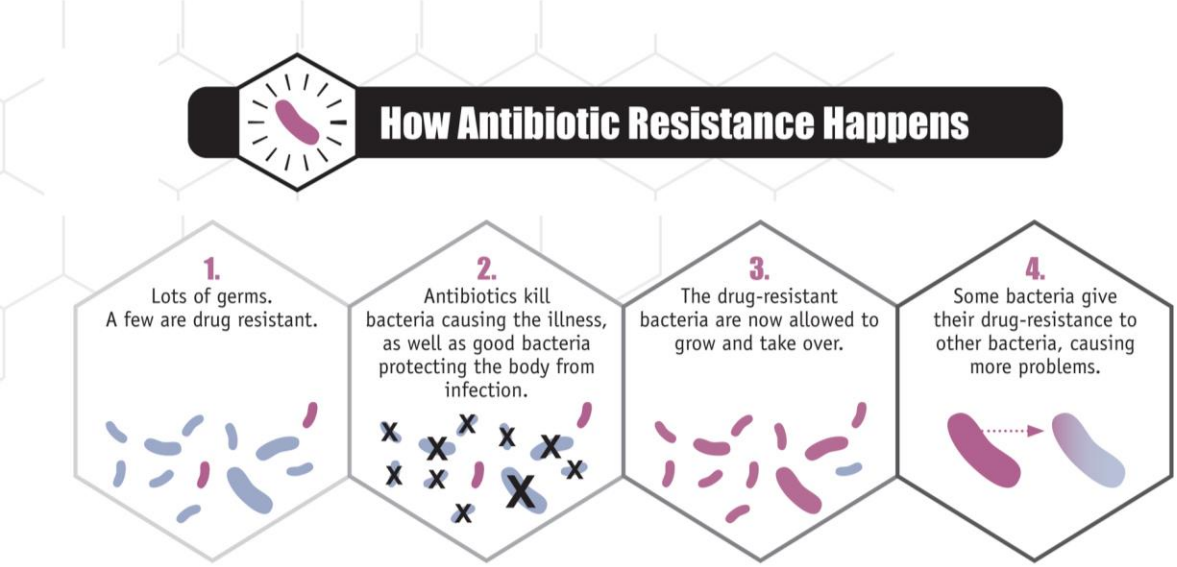

Figure 1. How germs become resistant. CDC. Available from Antibiotic Resistance Threats in the United States, 2013 (https://www.cdc.gov/drugresistance/biggest_threats.html).

How are MDROs spread?

MDROs may spread from person to person by the hands of healthcare personnel. They can also be spread on objects, such as bed rails, medication cart handles, bedside tables, IV tubes, and catheters. MDROs can also be spread from person to person through direct contact (Figure 2). Some people may have a MDRO in their body but not show any signs or symptoms of infection. These people are called "colonized" with the MDRO and can still spread the MDRO to others.

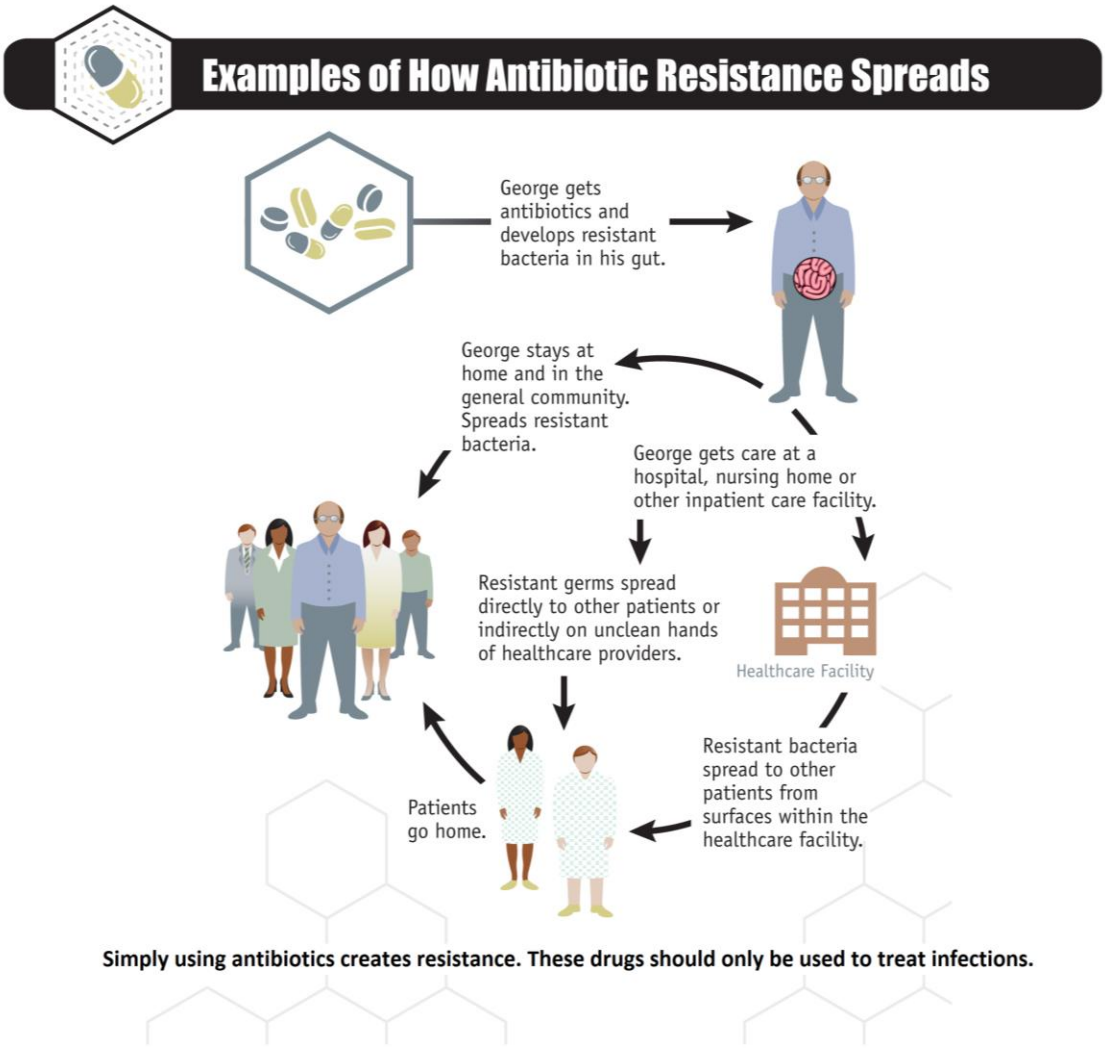

Figure 2. Examples of how antibiotic resistance spreads. CDC. Adapted from Antibiotic Resistance Threats in the United States, 2013 (https://www.cdc.gov/drugresistance/biggest_threats.html).

How can MDROs be prevented?

Administrative measures

Administrative measures recommended for all healthcare settings for the prevention of MDROs include:

- Make MDRO prevention/control an organizational resident safety priority.
- Provide administrative support and both fiscal and human resources to prevent and control MDRO transmission.
- Identify experts who can provide consultation in analyzing epidemiologic data, recognizing MDRO problems, or devising effective control strategies

- Implement systems to communicate information about reportable MDROs to administrative personnel and as required by state and local health authorities
- Implement a multidisciplinary process to monitor and improve healthcare personnel adherence to recommended practices for Standard and Contact Precautions
- Implement systems to designate residents known to be colonized or infected with a targeted MDRO and to notify receiving healthcare facilities and personnel prior to transfer of such residents within or between facilities
- Support participation of the facility in local, regional, and national coalitions to combat emerging or growing MDRO problems
- Provide updated feedback at least annually to healthcare providers and administrators on facility and resident-care-unit trends in MDRO infections. Include information on changes in prevalence or incidence of infection, results of assessments of system failures, and action plants to improve adherence to and effectiveness of recommended infection control practices to prevent MDRO transmission

Education and training of healthcare personnel

Healthcare facilities should provide education and training on risks and prevention of MDRO transmission during orientation and periodic educational updates for healthcare personnel. Education should include information on organizational experience with MDROs and prevention strategies.

Surveillance

Healthcare facilities should establish systems to ensure that clinical microbiology laboratories promptly notify appropriate facility staff (e.g. infection control staff, medical director/designee, etc.) when a MDRO is detected. Long-term care facilities should also develop and monitor unit-specific antimicrobial susceptibility reports and establish a frequency (at least annually) for preparing summary reports based on the volume of clinical isolates. Providing facility-specific susceptibility data or local or regional aggregate susceptibility data to identify prevalent MDROs and trends in the geographic area served may be specified by contract with a facility's reference laboratory. Trends in the incidence of target MDROs in the facility over time should be monitored to determine whether MDRO rates are changing and whether additional interventions are needed.

Use Standard and Transmission-Based Precautions as the situation warrants

Standard Precautions are a set of basic infection prevention practices that should be used, at a minimum, in the care of all residents. Hand hygiene is a primary component of Standard Precautions and is considered one of the most effective methods to prevent transmission of disease, including MDROs. The use of personal protective equipment (PPE) should be guided by risk assessment and the extent of anticipated contact with blood and body fluids, or pathogens. Transmission-Based Precautions are used when the route(s) of transmission is (are) not completely interrupted using Standard Precautions alone. There are three categories of

Transmission-Based Precautions: Contact Precautions, Droplet Precautions, and Airborne Precautions. In general, Contact Precautions, in addition to Standard Precautions, should be considered for preventing MDROs in long-term care facilities. Standard Precautions and Contact Precautions are discussed in more detail, below.

Hand hygiene

Proper hand hygiene is the best way to prevent the spread of MDROs. Healthcare personnel should wash their hands with soap and water for at least 15 seconds, covering all surfaces of hands and fingers, when hands are visibly soiled (Figure 3). Handwashing should also be used when caring for individuals infected with spore-forming bacteria (e.g. C. diff) or non-enveloped viruses (e.g. norovirus), as these pathogens are not inactivated by alcohol.

Figure 3. How to handwash. World Health Organization. Available from [WHO Guidelines on Hand Hygiene in Health Care](https://www.who.int/gpsc/5may/tools/9789241597906/en/) (https://www.who.int/gpsc/5may/tools/9789241597906/en/).

When hands are not visibly soiled, healthcare personnel should use an alcohol-based hand rub with a 60%-95% alcohol content. Healthcare personnel should apply the amount of product recommended by the manufacturer and rub hands together, covering all surfaces of hands and fingers, until hands are dry (about 20 seconds) (Figure 4).

Figure 4. How to use an alcohol-based hand rub. World Health Organization. Available from WHO Guidelines on Hand Hygiene in Health Care (https://www.who.int/gpsc/5may/tools/9789241597906/en/).

Perform hand hygiene:

- Before and after ALL contact with a resident
- Before clean/aseptic procedure
- If moving from a contaminated body site to a clean body site

- After contact with the resident's environment (includes medical equipment) and
- After removing gloves (Figure 5).

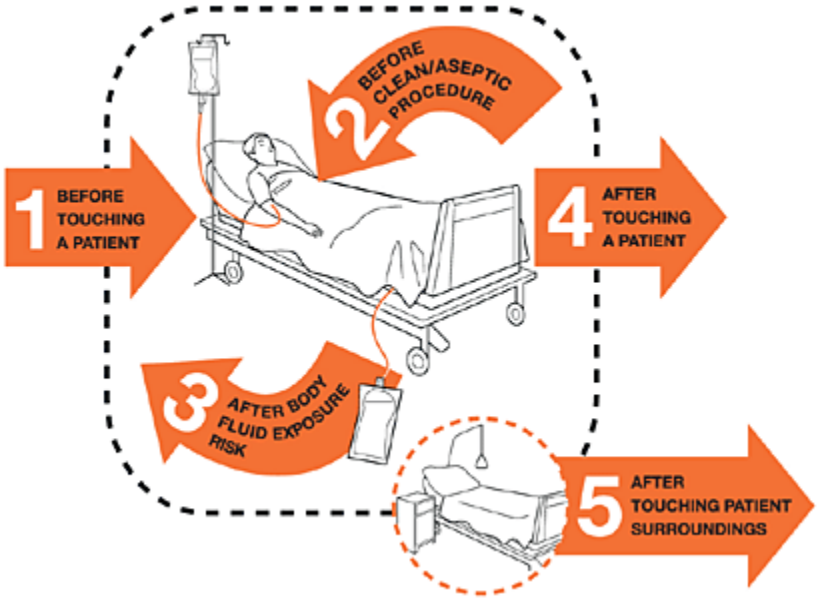

Figure 5. Five moments for hand hygiene. World Health Organization. Available from http://www.who.int/infection-prevention/campaigns/clean-hands/5moments/en/.

Environmental measures

Facilities should prioritize rooms of residents infected or colonized with a MDRO for frequent cleaning and disinfection (e.g. at least daily). Cleaning rooms of residents infected or colonized with a MDRO after rooms of residents not infected or colonized with a MDRO have been cleaned may be considered to prevent opportunities for transmission. Environmental services staff should frequently clean and disinfect surfaces and equipment that may be contaminated with MDROs, including those in close proximity to the resident (e.g. bed rails, over bed tables) and frequently-touched surfaces in the resident care environment (e.g. door knobs, surfaces in and surrounding toilets in residents' rooms).

Facilities should dedicate noncritical medical items (i.e. items that come in contact with intact skin but not mucous membranes) to use on individual residents known to be infected or colonized with MDROs. Disposable medical items may also be considered. All non-disposable items that must be shared should be cleaned and disinfected according to manufacturer's recommendations prior to the equipment being used with another resident.

Antibiotic stewardship

Developing an antibiotic stewardship program within the facility is another way to prevent the spread of MDROs. Antibiotic stewardship is a set of commitments and actions designed to optimize the treatment of infections while reducing the adverse events associated with antibiotic

use. This includes improving antibiotic prescribing practices and reducing inappropriate use. To develop an antibiotic stewardship program, long-term care facilities can use resources from the Core Elements of Antibiotic Stewardship for Nursing Homes from CDC (https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html). A summary of core elements of antibiotic stewardship in nursing homes is provided in Appendix A. As of November 2017, long-term care facilities regulated by the Centers for Medicare and Medicaid Services (CMS) are required to have an antibiotic stewardship program in place that includes antibiotic use protocols and a system to monitor antibiotic use (42 CFR §483.80(a)(3)).

How do I know if a resident is infected or colonized with a MDRO?

When a resident is discharged or transferred from another healthcare facility to a long-term care facility, the discharging or transferring facility should notify the long-term care facility if the resident is infected or colonized with a MDRO. The long-term care facility can also inquire if the resident is infected or colonized with a MDRO to prepare for the resident's care. As of November 2017, long-term care facilities regulated by CMS must communicate isolation precaution information due to current or previous infection/colonization (among other information) to receiving providers during resident transfer and discharge (42 CFR §483.15 (c)(2)). The NC SHARPPS Program developed, piloted, and disseminated an interfacility transfer form that contains the information necessary for long-term care facilities to be in compliance with the revised requirements for participation. The form and instructions are available from the NC SHARPPS Program webpage (http://epi.publichealth.nc.gov/cd/hai/providers.html). Other examples of infection control transfer forms are available from CDC (https://www.cdc.gov/hai/prevent/prevention_tools.html).

Another way a long-term care facility may be notified of a resident infected or colonized with a MDRO is through laboratory results. Long-term care facilities should have systems in place to receive results of laboratory tests in a timely manner and act on results as necessary. Laboratory evidence for several MDROs is provided in Table 1.

What precautions should I consider to prevent MDRO transmission?

Infection prevention practices known as Standard and Transmission-Based Precautions are used to prevent the transmission of infectious agents, including MDROs, in healthcare settings. Transmission-Based Precautions include Contact Precautions, Droplet Precautions, and Airborne Precautions. For most MDROs, Contact Precautions should be considered in addition to Standard Precautions. Decisions regarding use of Contact Precautions should be based on guidance provided in this toolkit and described in detail in the 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings and Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006, published by CDC. Policies and procedures that explain how Standard and Transmission-Based Precautions are applied, including systems used to identify and communicate information about residents with potentially

transmissible infectious agents, are essential to ensure the success of these measures and may include display of appropriate signage to identify individuals for whom Transmission-Based Precautions should be used. An example sign that can be displayed outside of Contact Precaution resident rooms is included in Appendix B.

What are Standard Precautions?

Standard Precautions are a set of basic infection prevention practices that should be used, at a minimum, in the care of all residents. Hand hygiene is a primary component of Standard Precautions and is considered one of the most effective methods to prevent transmission of disease, including MDROs. The use of personal protective equipment (PPE) should be guided by risk assessment and the extent of anticipated contact with blood and body fluids or pathogens. Components of Standard Precautions are described in the 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings and summarized in Table 2.

Table 2. Standard Precautions for the care of all patients in all healthcare settings.

Component	Recommendations
Hand hygiene	Perform hand hygiene: Before direct contact with residents; before clean/aseptic procedures; after touching the resident, blood, body fluids, secretions, excretions, contaminated items, objects in the resident environment; immediately after removing gloves; between resident contacts.
Personal protective equipment (PPE) Gloves	Wear gloves when it can be reasonably anticipated that contact with blood or other potentially infectious materials, mucous membranes, nonintact skin, or potentially contaminated intact skin could occur (e.g. of a resident incontinent of stool or urine)
Personal protective equipment (PPE) Gown	Wear a gown during procedures and resident care activities when contact of clothing/exposed skin with blood/body fluids, secretions, or excretions is anticipated.
Personal protective equipment (PPE) Mask, eye protection (goggles), face shield	Wear PPE during procedures and resident care activities likely to generate splashes or sprays of blood, body fluids, secretions, and excretions (e.g. suctioning, endotracheal intubation). During aerosol-generating procedures on residents with suspected or proven infections transmitted by respiratory aerosols wear a fit-tested N95 or higher respirator in addition to gloves, gown and face/eye protection.
Resident-care equipment	Handle in a manner that prevents transmission of potentially infectious material to others and to the environment. Wear PPE according to the level of anticipated contamination.
Environmental control	Establish policies and procedures for routine and targeted cleaning and disinfection of environmental surfaces. Frequently clean and disinfect surfaces and equipment that may be contaminated with infectious material, including those in close proximity to the resident (e.g. bed rails, over bed tables) and frequently-touched surfaces in the resident care environment (e.g. door knobs, surfaces in and surrounding toilets in residents' rooms). Use EPA-registered disinfectants according to manufacturer's instructions.

Textiles and laundry	Handle in a manner that prevents contamination of others and the environment
Safe injection practices	Use aseptic technique to avoid contamination of sterile injection equipment. Needles, cannulae, and syringes are sterile, single-use items and should not be reused. Do not use single-dose vials for multiple residents or save for later use. Do not recap, bend, break, or hand-manipulate used needles; if recapping is required, use a one-handed scoop technique only and use safety features when available. Place used sharps in puncture-resistant container for disposal.
Resident resuscitation	Use mouthpiece, resuscitation bag, other ventilation devices to prevent contact with mouth and oral secretions.
Resident placement	Prioritize residents for a single-resident room if resident poses a risk of transmission to others (see 5 C's guidance), is likely to contaminate the environment, or is at increased risk of acquiring infection or developing adverse outcomes following infection.
Respiratory hygiene/cough etiquette (source containment of infectious respiratory secretions in symptomatic residents and accompanying individuals, beginning at initial point of encounter)	Instruct symptomatic persons to cover mouth/nose when sneezing/coughing; use tissues and dispose in no-touch receptacle; perform hand hygiene after contact with respiratory secretions; provide supplies, resources, and instructions for hand hygiene; offer mask to symptomatic persons and encourage them to maintain spatial separation of at least 3 feet if possible.

Adapted from 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, CDC.

What are Contact Precautions?

Contact Precautions are implemented in addition to Standard Precautions, the basic level of infection prevention practices used in resident care. Adhering to Contact Precautions prevents the transmission of MDROs to other residents and healthcare personnel. Components of Contact Precautions are described in the 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings and summarized in Table 3.

Table 3. Components of Contact Precautions.

Component	Recommendations
Personal protective equipment (PPE) Gloves	○ Don gloves upon entering a resident's room. ○ Remove gloves and perform hand hygiene before leaving a resident's room.
Personal protective equipment (PPE) Gowns	○ Don a gown upon entering a resident's room ○ Remove gown and perform hand hygiene before leaving a resident's room.
Resident transport	○ Ensure that infected or colonized areas of the resident's body are contained and covered. ○ Remove and dispose of contaminated PPE and perform hand hygiene prior to transporting residents on Contact Precautions. ○ Don clean PPE to handle the resident at the transport destination.
Environmental measures	○ Prioritize rooms of residents on Contact Precautions for frequent cleaning and disinfection (e.g. at least daily) with a focus on frequently-touched surfaces (e.g. bed rails, overbed table, bedside commode, lavatory surfaces in resident bathrooms, doorknobs) and equipment in the immediate vicinity of the resident; consider cleaning rooms of residents on Contact Precautions after rooms of residents not on Contact Precautions have been cleaned

Adapted from 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings, CDC.

When should residents be placed on Contact Precautions?
Contact Precautions should be considered for residents when there is laboratory-confirmed evidence or suspicion of MDRO infection or colonization.

In outbreak situations, Contact Precautions should be used when caring for residents infected or colonized with a MDRO. Depending on the type of MDRO, one case in a facility may constitute an outbreak. Check with your local health department about what constitutes an outbreak.

In non-outbreak situations, healthcare personnel should consider the individual resident's clinical situation and prevalence or incidence of the MDRO in the facility when deciding whether to implement or modify Contact Precautions in addition to Standard Precautions for a resident infected or colonized with a MDRO. For relatively healthy residents (e.g. mainly independent) follow "enhanced" Standard Precautions, making sure that gloves and gowns are used for contact with uncontrolled secretions, pressure ulcers, draining wounds, stool incontinence, and ostomy tubes/bags. For ill residents (e.g. those totally dependent upon healthcare personnel for healthcare and activities of daily living, ventilator-dependent) and for those residents whose infected secretions or drainage cannot be contained, use Contact Precautions in addition to Standard Precautions. For residents infected or colonized with a MDRO without draining wounds, diarrhea, or uncontrolled secretions, establish ranges of permitted ambulation, socialization, and use of common areas based on their risk to other residents and on the ability of the colonized or infected residents to observe proper hand hygiene and other recommended precautions to contain secretions and excretions.

Regardless of whether or not a resident infected or colonized with a MDRO is placed on Contact Precautions, decisions about resident participation in social activities and other activities in common areas need to balance the risk of transmission with the potential adverse psychological impact of non-participation. Guidance is provided below.

What are other recommendations for managing MDROs in the long-term care setting?

Additional recommendations for managing MDROs are described in Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006 and summarized in Appendix C.

Can residents infected or colonized with a MDRO participate in group activities?
Unlike acute care hospitals, it is not expected or reasonable for residents infected or colonized with a MDRO to be confined to their room for an extended period of time. Decisions about participation in social activities and other activities in common areas need to balance the risk of transmission with the potential adverse psychological impact of non-participation. In general, infected or colonized residents may use common areas if their secretions/excretions can be controlled. To reduce opportunities for transmission, facilities and healthcare personnel should consider the "5 C's":

- **Continent**: Is the resident continent, or is the incontinence able to be contained?

- **Contained**: Are the resident's wounds contained (clean, dry dressing)?
- **Cognizant**: Is the resident aware of their MDRO status and how to prevent transmission to others?
- **Compliant**: Is the resident compliant with recommendations to prevent transmission (such as hand hygiene)?
- **Clean**: Is the resident clean (bathed, with clean clothing)?

The 5 C's can also be used as a risk assessment for transmission when determining what precautions are appropriate for direct resident care and determining resident placement. Additional guidance is included in Management of Multidrug-Resistant Organisms In Healthcare Settings, 2006.

For additional questions, contact the NC SHARPPS Program at nchai@dhhs.nc.gov, or the NC Communicable Disease Branch epidemiologist on call at 919-733-3419. Additional MDRO resources are provided in Appendix D.

APPENDICES

Appendix A. CDC Core Elements of Antibiotic Stewardship for Nursing Homes.

Available from https://www.cdc.gov/longtermcare/prevention/antibiotic-stewardship.html.

Appendix B. Contact Precautions sign for display outside resident rooms.

Available from http://spice.unc.edu/wp-content/uploads/2016/12/ContactPrecautions1final.pdf.

CMS interpretative guidelines related to ensuring resident respect and dignity, as set forth in 42 CFR section 483.10, provide that signage restrictions do not apply to "the CDC isolation

precaution transmission based signage for reasons of public health protection, *as long as the sign does not reveal the type of infection*" (CMS State Operations Manual, Appendix PP [emphasis added]). Further, under the Health Insurance Portability and Accountability Act of 1996 (HIPAA) and its accompanying regulations, protected health information may be disclosed for the purpose of health care operations, such as carrying out infection prevention programs designed to prevent the development and transmission of diseases—as long as such disclosure is the minimum necessary to prevent disease transmission (45 CFR. sections 164.501; 164.502[a][1][ii], [b]).

Appendix C. Additional recommendations for management of multidrug-resistant organisms in long-term care facilities.

Adapted from the 2006 Guideline for Management of Multidrug-Resistant Organisms In Healthcare Settings, CDC.

Component	Recommendations
Resident placement	○ Residents with confirmed or suspected MDRO colonization or infection should be placed in a private, single-person room. ○ When private rooms are not available or not feasible, residents with the same MDRO should be cohorted together in the same room or resident care area. ○ When cohorting residents with the same MDRO is not possible, MDRO residents should be placed with roommates at lowest risk for MDRO acquisition and associated adverse outcomes from infection and are likely to have short lengths of stay. This includes residents who are continent of stool and urine, do not have wounds, are able to perform hand hygiene, and are generally more independent for activities of daily living.
Resident transport	○ When transport or movement in any healthcare setting is necessary, ensure that infected or colonized areas of the resident's body are contained and covered. ○ Implement systems to designate residents known to be colonized or infected with a MDRO and notify receiving healthcare facilities and personnel prior to transfer of such residents within or between facilities.

Appendix D. Additional MDRO resources.

1. 2007 Guideline for Isolation Precautions: Preventing Transmission of Infectious Agents in Healthcare Settings. CDC. Available from https://www.cdc.gov/infectioncontrol/guidelines/isolation/index.html.
2. Antibiotic Resistance Threats in the United States, 2013. CDC. Available from https://www.cdc.gov/drugresistance/biggest_threats.html.
3. Interim Guidance for a Public Health Response to Contain Novel or Targeted Multidrug-resistant Organisms (MDROs). CDC. Available from https://www.cdc.gov/hai/containment/guidelines.html.
4. Management of Multidrug-Resistant Organisms in Healthcare Settings, 2006. CDC. Available from https://www.cdc.gov/infectioncontrol/guidelines/mdro/index.html.
5. MDRO Definitions. Oregon Department of Health. Available from https://www.oregon.gov/oha/ph/DiseasesConditions/CommunicableDisease/HAI/Documents/mdrobox.pdf.
6. North Carolina Statewide Program for Infection Control and Epidemiology (NC SPICE). https://spice.unc.edu/ltc/.