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Recommendations for Prevention and Control of Methicillin-resistant *Staphylococcus aureus* in Long-term-care Facilities

Developed by the Colorado Medical Directors Association and
the Colorado Department of Public Health and Environment
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INTRODUCTION

Methicillin-resistant *Staphylococcus aureus* (MRSA) are bacteria resistant to the penicillin and cephalosporin classes of antibiotics and are often resistant to various other classes of antibiotics. MRSA was first identified in the United States in the 1960s and until more recently has primarily been seen in association with hospitals, long-term care facilities (LTCFs), dialysis units, and other healthcare facilities. Risk factors for MRSA colonization and infection in LTCF residents include dependence on healthcare personnel for activities of daily living (4), limited functional status, presence of foreign devices (such as nasogastric tubes, intravenous catheters, and urinary catheters), wounds, antibiotic therapy, and prior MRSA colonization (8). Reports of LTCF resident MRSA colonization rates vary depending on the site of colonization and unit or facility type. MRSA nasal and wound colonization rates among residents of LTCFs have been reported with wide ranges: 8-53% and 30-82% of residents, respectively (8,10,21,22). However, individual LTCFs are likely affected unequally, and MRSA colonization rates vary between resident populations and facilities.

Many of the guidelines developed for the management and control of MRSA address the needs of acute care facilities. However, LTCFs have a unique resident population; residents tend to be older with multiple medical problems and increased numbers of risk factors for infection, with diminished immune systems and host defense problems. The need for infection prevention methods including resident isolation must be balanced with the psychosocial needs of the residents. Additionally, transmission of MRSA among LTCF residents might be different than among patients in acute care facilities. Therefore, control measures that might be appropriate in the acute care setting might not be indicated in the LTCF setting.

This document provides guidance on the prevention and control of MRSA colonization and infection in Colorado LTCFs. Although these recommendations are written for MRSA, the principles can also serve as a guide for other multidrug-resistant organisms (MDROs).

COLONIZATION VS INFECTION (1,2)

The distinction between Staph (including MRSA) colonization and infection is important.

Colonization is the presence of the bacteria found on a culture of skin, urine, pressure sores, sputum, etc., without signs of infection or illness.

Infection requires that there be clinical signs of illness or inflammation (e.g., localized pain / tenderness, redness, warmth, swelling, pus, fever). These are due to tissue damage caused by invasion by the bacteria.

Routine swab cultures of skin or pressure sores in the absence of signs of acute infection (see "Cellulitis and Soft Tissue Infections", page 3) are discouraged, as the probability of identifying colonizing bacteria is high. Biopsy of the base of the pressure sore is more accurate. In the elderly, sputum samples are frequently contaminated by oral cavity flora that may contain MRSA in colonized individuals.

Urinary Tract Infections in Patients without Indwelling Catheters

The patient must have **at least three (3)** of the following documented:

- Temperature >99^{o} F or Chills or Rigors
- New or increased urinary frequency, dysuria or urgency
- New flank or suprapubic pain or tenderness
- Worsening mental and/or functional status
- One of the following 3 lab findings:
    - Pyuria (>5 WBCs per high-power field of unspun urine)
    - Organisms on gram stain of unspun urine
    - Urine culture with >100,000 colonies per ml of urine of a single uropathogen
- Blood in the urine as a new finding
- (*If a culture was obtained*) A positive urine culture [colony counts of >100,000 organisms/ml] with known pathogens of the urinary tract (i.e., Lactobacillus would not constitute a positive culture)

Urinary Tract Infections in Patients with Indwelling Catheters

The patient must have at least **two (2)** of the following documented:

- Fever (≥99^{o} F) or Chills or Rigors
- New flank or suprapubic pain or tenderness
- New bloody urine or microscopic hematuria
- New pyuria or new positive test for nitrite or leukocyte esterase
- Increased WBC Count (leukocytosis) or a significant left shift on CBC
- Worsening mental and/or functional status (without another probable medical or infectious cause)
- (*If a culture was obtained*) A positive urine culture [colony counts of >100,000 organisms/ml] with known pathogens of the urinary tract (i.e., Lactobacillus would not constitute a positive culture)

Pneumonia

- Presence of **both** of the following:
    - CXR showing pneumonia, probable pneumonia, or a NEW infiltrate

      AND

    - Presence of at least 2 of the clinical manifestations noted for bronchitis / tracheobronchitis
        - New or increased cough
        - New or increased sputum production
        - Temperature of 99^{o} F or higher
        - Pleuritic chest pain
        - New or increased rales, rhonchi, wheezes, or bronchial breathing on physical exam
        - Indication of a change in status or breathing difficulty:
            - New or increased dyspnea OR
            - Respiratory Rate > 25/min OR
            - Worsening mental status / function

Cellulitis and Soft tissue Infections

- Presence of one of the following:
    - Purulence present at the wound or skin or soft tissue site

      OR

    - Presence of $\geq$ 4 of:
        - **temperature $\geq$ 99 F** OR **worsening of mental/functional status**
        - New / increasing **heat** at site
        - New / increasing **redness** at site
        - New / increasing **swelling**
        - New / increasing **tenderness**
        - New /increasing **serous drainage**

RECOMMENDATIONS FOR THE PREVENTION OF TRANSMISSION

Admission

Residents found to be colonized or infected with MRSA should not be denied placement in LTCFs based on the presence of MRSA. The Society for Healthcare Epidemiology of America (SHEA) (5), the American Hospital Association (AHA) (18), and the Veterans' Affairs (VA) Consensus Panel (19), as well as guidelines published by other states (16,20) all oppose restricting placement of residents in LTCFs based on the presence of MRSA or other MDROs. There is no evidence that these strategies are effective and they could result in the overuse of acute-care resources (5).

- Transfer of a resident between a LTCF and an acute-care facility should be based solely on the resident's clinical status and the ability of the accepting facility to provide care, not on the presence of an MDRO, including MRSA.
- Surveillance cultures and/or decolonization therapy should not be required for admission to a LTCF (5).
- Communication between facilities regarding the colonization or infection with a resident with MRSA prior to transfer is strongly recommended (5).

Placement of residents and group activities

Under certain conditions, single rooms are preferred for some patients. However, single rooms are often unavailable for the placement of residents, and other options can be considered. **Recommendations for single room use include the following:**

- Use a single room for residents infected or colonized with MRSA when possible (3,4,14).
- Single rooms are preferred for residents placed on contact isolation (4).
- Prioritize single rooms for residents who have MRSA and conditions that facilitate transmission to other residents (such as draining wounds, stool incontinence, and uncontained secretions) and for those residents without MRSA but with an increased risk of acquisition and adverse outcomes (such as immunosuppression, open wounds, indwelling catheters, and low functional status) (4).

When single rooms are not available, residents with MRSA can be placed with an appropriate roommate.

- The preferred roommate for a patient colonized or infected with MRSA is another resident colonized or infected with MRSA (3,14).
- If this is not possible, place the resident with MRSA in a room with another resident who is at low risk for acquisition of MRSA and at low risk for adverse outcomes from MRSA infection (3,14). This includes residents who:
  - Have intact skin with no significant open wounds or skin breaks **and**
  - Who have no invasive devices **and**
  - Are not significantly immunocompromised **and**
  - Are not colonized or infected with a different MDRO (20) **and**, if possible,
  - Are likely to have short lengths of stay.

Residents with MRSA may use common living areas, recreational areas, and group dining facilities. They should not routinely be excluded from participating in group activities. However, the following factors should be considered:

- Residents should perform hand hygiene prior to leaving their rooms, if their hands become soiled (20), and before and after eating meals, at a minimum.
- Wounds should be covered with dry intact dressings that contain drainage (20).
- If a resident with MRSA infection or colonization has a wound that cannot be contained by dressings, has a tracheostomy and frequent coughing, or has other uncontained secretions/excretions, consideration can be given to restricting their activities until the secretions/excretions can be contained (5). However, in most cases strategies can be devised that will address infection control issues and the resident's need for movement and socialization. In rare cases, restriction of movement might be needed (20).

Infection control measures

Standard precautions:

- **Follow standard precautions for all residents (3). Standard precautions combined with hand hygiene are sufficient for residents in LTCFs who are colonized or infected with MRSA and have contained secretions/excretions (including wound drainage, stool, and urine).**
- Standard precautions should include the following:
  - **Gloves and gowns** should be worn when contact with body fluids such as uncontrolled secretions, draining wounds, or stool or ostomy bags is expected (3).
  - **Masks, gloves, gowns, and eye protection** should be worn when performing splash-generating procedures (such as wound irrigation, suctioning, and intubation) (3).
  - Gloves and gowns should be removed immediately after resident contact, and hand hygiene should be performed.
  - **Proper hand hygiene for all employees and visitors:**
    - When hands are visibly dirty or contaminated with proteinaceous material or are visibly soiled with blood or other body fluids, wash hands with soap and water (4,17).
    - If hands are not visibly soiled, wash hands with soap and water or use an alcohol-based hand rub in the following situations (4,17):
      - Before having direct contact with residents.
      - Before performing any procedure on a resident, including inserting indwelling urinary catheters, peripheral vascular catheters, or other invasive devices.
      - After contact with a resident's intact skin (e.g., when taking a pulse or blood pressure, lifting a resident).
      - After contact with body fluids or excretions, mucous membranes, nonintact skin, and wound dressings.
      - If moving from a contaminated-body site to a clean-body site during resident care.
      - After contact with inanimate objects (including medical equipment) in the immediate vicinity of the resident.
      - After removing gloves.
      - Before eating and after using a restroom, wash hands with soap and water.

- Hand hygiene technique (17):
  - When decontaminating hands with an alcohol-based hand rub, apply product to palm of one hand and rub hands together, covering all surfaces of hands and fingers, until hands are dry. Follow the manufacturer's recommendations regarding the volume of product to use.
  - When washing hands with soap and water, wet hands first with water, apply an amount of product recommended by the manufacturer to hands, and rub hands together vigorously for at least 15 seconds, covering all surfaces of the hands and fingers. Rinse hands with water and dry thoroughly with a disposable towel. Use towel to turn off the faucet.

<u>Contact precautions:</u>

- Deciding when to institute contact precautions for residents colonized or infected with MRSA in the LTCF can be challenging. Consider the individual resident's clinical situation in relation to the prevalence and incidence of MRSA in the facility when deciding to implement contact precautions. Ambulation, socialization, and use of common areas should be based on the risk to other residents and on the resident's ability to maintain proper hand hygiene and control of body fluids. **Standard precautions and hand hygiene practices should be followed for all residents. Indications for contact precautions in addition to standard precautions include the following:**
  - Residents colonized or infected with MRSA who have a wound that cannot be covered fully with dressings or who have wound drainage that cannot be contained with dressings (4).
  - Residents colonized or infected with MRSA who have fecal or urinary incontinence that cannot be contained with incontinence products, urine bags or ostomy bags (14).
  - Residents colonized or infected with MRSA who have a tracheostomy and large amounts of uncontained respiratory secretions.
  - Residents who have been epidemiologically linked to MRSA infections in other residents or during an outbreak.
- **Contact precautions consist of:**
  - **Wearing gloves and gowns when providing direct resident care and when touching surfaces and equipment in the resident's room,** particularly those that are in close proximity to the resident (such as bed rails and bed tables) or are frequently touched (such as door knob and surfaces around toilet).
  - Gloves should be changed and hand hygiene performed between contact with residents, prior to leaving a resident's room, and after coming in contact with material that could contain high concentrations of microorganisms, such as respiratory secretions or wound drainage.
  - Gowns should be removed before coming in contact with another resident and prior to leaving a resident's room.
- The Centers for Disease Control and Prevention do not provide clear recommendations regarding the discontinuation of contact precautions (3). However, if a resident no longer meets the above criteria for being placed into contact precautions, they can be cared for using standard precautions alone (20). **Culturing residents for purposes of removing them from contact precautions is not routinely recommended.** Consider the following factors when deciding when to discontinue contact precautions:
  - Active infection vs. treated and resolved infection or colonization.
  - Functional status of the resident.
  - Control of body fluids. The presence of a draining wound, incontinence of stool or urine, and presence of a cough with heavy secretions are conditions that might preclude discontinuation of contact precautions.
  - Prevalence and incidence of MRSA in the facility.

Other infection control measures to consider include the following:

- Adequate sinks, adequate supplies, and incentives to ensure good hand hygiene should be provided (5). Consider monitoring hand hygiene compliance (6,13), and if compliance is low, develop a plan to improve hand hygiene practices (15).
- Minimize the use of invasive devices (such as catheters, feeding tubes, tracheostomies, etc.) (5).

Education

Staff:

Education of LTCF staff including administrative, clinical, and environmental staff on infection control measures is an essential component of the prevention of transmission of MRSA and is strongly encouraged.

- Education of staff on the risks and prevention of MRSA transmission should occur upon hire with periodic educational updates (3,4,12).
- Specific topics to address include hand hygiene, isolation precautions, basic microbiology, and modes of transmission of MRSA (16).
- Provide staff with periodic updates on MRSA incidence and prevalence within the institution (15).
- If staffing allows, periodically observe healthcare worker infection control practices and correct deficiencies (16).
- Educate staff that there are no special precautions for pregnant staff (20).

Visitors and residents:

Residents and visitors should be instructed in the basics of MRSA transmission and infection control measures in order to decrease transmission (12) as well as to alleviate their anxiety.

- **Instruct visitors to wash their hands prior to and after resident contact, following contact with blood or body fluids, before and after assisting the resident with eating, and following contact with another resident (16).**
- Provide visitors with information regarding MRSA including modes of transmission and information regarding basic hand hygiene.
- **Visitors of residents on contact precautions should be informed of infection prevention and control practices related to contact precautions (15).**
    - Visitors should perform hand hygiene before entering and after leaving a resident's room.
    - Visitors should wear gloves and gowns if providing direct care to the resident. (Goggles and masks should be worn if splash-generating procedures will be performed as per standard precautions.) Hand hygiene should be performed immediately after removing gloves and/or gowns.
- In general, it is acceptable for visitors, including children, to have casual contact, such as kissing, hugging, and touching (14).

Antimicrobial use

Overuse of antibiotics contributes to the emerging resistance of MDROs, including MRSA. The goal of any healthcare facility should be appropriate antimicrobial use.

- **Antibiotics should be used to treat documented clinical infections, not colonization (16).** It is important to consider the resident's clinical signs and symptoms in conjunction with culture results when determining if antibiotics are needed (20).
- If staffing allows, use a multidisciplinary approach (including input from infection control staff if available, medical director, physicians, nursing staff, and pharmacy staff) to review antimicrobial utilization, local susceptibility patterns (antibiograms), and formulary agents. Distribute findings to providers, who can then use the information to guide antibiotic choices (3,7).
- Other potential strategies that can be considered to prevent antibiotic overuse, particularly if a high rate of inappropriate use is identified, include (3,7):
    - Education
    - Formulary restriction and restriction of broad-spectrum antibiotics
    - Prior-approval programs
    - Automatic stop orders
    - Antimicrobial cycling
    - Computer-assisted management programs
    - Removal of redundant antimicrobial combinations
    - Antibiotic prescribing guidelines
    - Mandatory infectious disease consultation.
- Minimize the use of invasive devices (5).
- Avoid widespread and prolonged use of antimicrobial therapy (topicals and/or systemic) for MRSA decolonization (8,13). **Routine decolonization of residents colonized with MRSA is not recommended (20).**

Surveillance

Active surveillance cultures are <u>not</u> routinely recommended in the LTCF setting in the absence of an outbreak. The following activities are routinely recommended:

- When available, LTCFs should obtain and communicate information on colonization and infection with antibiotic-resistant pathogens including MRSA prior to receiving new admissions or upon transfer to another facility. However, **surveillance cultures should not be performed routinely prior to transfer to LTCFs and should not be required prior to transfer (5,12).**
- Review of susceptibility and microbiologic data should be performed on a regular basis (3,5,6).
- Monitor trends in the incidence of MRSA infection over time using collected data. This should include (3,4,5,12):
    - Establishing a baseline
    - Maintaining a line list of infected and known colonized residents
    - Tracking involved units (where applicable)
    - Distinguishing between colonization and infection
    - Calculation of infection (i.e., "attack") rates: [number of new cases with infection divided by number of persons at risk (e.g., specific unit or entire facility)] x 100
    - Identification of threshold infection (attack) rates that would prompt additional actions, such as consultation with experts.

Environment

Standard facility procedures should be used to guide resident room and common area cleaning as follows (20):

- Surfaces should first be cleaned by removing any gross soiling. Surfaces should then be disinfected.
- Disinfection should be performed with an Environmental Protection Agency [EPA]-registered agent with a label claim for *Staphylococcus aureus* (4) according to the manufacturer's instructions for disinfection of environmental surfaces including medical equipment. A list of selected EPA-registered disinfectants can be found at: http://www.epa.gov/oppad001/chemregindex.htm
- Surfaces and equipment that are in close proximity to the resident (such as bed rails and bed tables) or are frequently touched (such as door knob and surfaces around toilet) should be cleaned and disinfected on a more frequent schedule than minimally touched surfaces (3,4).
- Use disposable noncritical resident-care equipment items (such as blood pressure cuffs), or implement resident-dedicated equipment, for residents infected/colonized with MRSA whenever possible. If this is not possible, clean and disinfect equipment between each resident use (3,4,13).
- Prioritize room cleaning for residents on contact precautions (3,4).
- Separate clean and dirty utility areas (6).
- Institute routine environmental cleaning schedules with monitoring of cleaning procedures and frequency and corrections of any deficiencies (3,6).

Other environmental cleaning procedures include:

- Dishes, glasses, cups, and eating utensils: hot water and detergents used in institutional dishwashers are sufficient to sanitize these items, and therefore no special precautions or cleaning procedures are necessary (20).
- Laundry: no special laundering procedure is required. However, persons handling laundry that might be contaminated with body fluids should take precautions to minimize contamination, such as wearing gloves and long-sleeved gowns when handling linens (20).

Administrative measures

Administration should provide financial and staff support to prevent and control MRSA transmission within the LCTF (15).

RECOMMENDATIONS DURING AN OUTBREAK

NOTE: Please report all suspected outbreaks of MRSA to CDPHE (*group outbreaks are reportable conditions in Colorado*) by phone (303-692-2700 during business hours; 303-370-9395 after hours) OR to the local health department.

Definition

The definition of an MRSA outbreak in a LTCF might vary between institutions depending on the resident population and prevalence and incidence rates of MRSA in the facility, and developing a precise definition is difficult. **An outbreak of MRSA is likely occurring if there is an increase in the rate of new MRSA infections from the institutional baseline rate of MRSA infections, or if a clustering of new cases of MRSA infection is seen.** A general guideline proposed by a consensus panel in 1998 suggested possible MRSA outbreak definitions of (9):

- 3 or more new healthcare associated cases of MRSA infection per month in any unit or facility.

However, an outbreak might be occurring with only one or two new cases in a facility in certain circumstances where the baseline frequency of MRSA cases is very low or zero. It is recommended that as prevalence or incidence rates of MRSA increase, efforts to halt transmission are intensified.

Management of a suspected outbreak

The interventions listed below have been used in various combinations to reduce transmission of MRSA. However, the effectiveness of each measure individually or in combination has not been assessed in randomized controlled trials. Nevertheless, combinations of these control elements have repeatedly reduced MRSA transmission within healthcare facilities (3,15). Intensification efforts should be done in collaboration with infection control staff. Measures listed in the previous section of this document "Recommendations for the prevention of transmission" should be implemented if not done previously. **Additional prevention methods to consider during an outbreak include:**

Infection control measures:

- Monitor hand hygiene practices with increased frequency.
- Institution of contact precautions if not already in place. However, residents whose site of colonization/infection can be contained and who can observe good hand hygiene should still be allowed to enter common areas and participate in group activities (3).
- Decolonization of residents with MRSA should be considered only in consultation with the medical director who might consult with state or local public health officials.
- Decolonization of healthcare workers should be considered only when a healthcare worker has been epidemiologically linked to transmission, and only in consultation with the medical director who might consult with state or local public health officials.
- When transmission continues despite other interventions, consider the following measures (3):
    - When available, assign dedicated nursing and ancillary service staff to residents with MRSA colonization/infections.
    - Stop new admissions to the affected hallway or unit; if transmission continues, the medical director may need to consider stopping all admissions to the facility.

Education:

- Intensify the frequency of education for staff and visitors (3). This might include education on hand hygiene, contact precautions, modes of transmission of MRSA, methods of environmental cleaning, and appropriate antibiotic use.

Antimicrobial use:

- Control and improve antimicrobial use using strategies described previously within this document (3).

Surveillance:

- If not previously performed, compose a line list of residents infected and known colonized with MRSA (9). Include information such as name, location within the facility, date and site of cultures, and other pertinent information. Distinguish between colonization and infection (3).
- Calculate and tabulate prevalence and incidence rates of MRSA (include only one isolate per resident, not multiple isolates from the same resident, when calculating rates) (3).
- Increase the frequency of compiling and monitoring antibiotic susceptibility reports (3).
- If indicated, state or local public health officials may recommend additional surveillance measures.

Environment:

- Continue or implement single-use disposable or resident-dedicated noncritical medical equipment (3).
- Intensify and reinforce training of environmental staff. Dedicated environmental staff can be considered (3).
- Monitor cleaning performance of environmental staff (3).
- **Consider environmental cultures only when there is epidemiologic evidence of an environmental source of transmission (3) and only after consultation with state or local public health officials.**

Administrative:

- Identify persons with experience in infection control, either in house or through outside consultation (3). The Colorado Department of Public Health and Environment, Communicable Disease Epidemiology Program is available for consultation at 303-692-2700.
- Increase the frequency of updates and continue to maintain communication between infection control, administration, and staff (3).

Questions can be addressed to the Colorado Department of Public Health and Environment, Communicable Disease Epidemiology Program at 303-692-2700 or your local health department.

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