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MRSA Guidelines for Long Term Care Facilities (LTCF)

1. Introduction

The term “methicillin-resistant *Staphylococcus aureus*” (MRSA) refers to those strains of *Staphylococcus aureus* bacteria that have acquired resistance to the antibiotics methicillin or oxacillin. The incidence of MRSA has increased in health care facilities in the United States since the mid-1970s and in the community since the mid 1980s. Approaches to the control of MRSA vary widely, primarily because studies establishing the efficacy of specific infection control measures are lacking.

This guideline recommends the most widely used approaches to the control of MRSA in long term care facilities, including nursing homes, chronic care and rehabilitation hospitals, extended care facilities, assisted living facilities, etc.

Once MRSA has become firmly established in a facility, it is rarely eliminated. A variety of control measures have been reported and many of these reports cite beneficial results. It should be emphasized, however, that the efficacy of most measures used for surveillance, prevention and control of MRSA has not been established in controlled studies. As a result, recommendations in this guideline are based on general infection control principles, on review of published articles dealing with the epidemiology and control of MRSA in hospitals and long term care facilities and on national guidelines (Guidelines for Isolation Precautions, Preventing transmission of infectious agents in health care settings - Centers for Disease Control and Prevention (CDC) 2007; Management of Multi-drug resistant organisms in health care settings, - CDC 2006).

2. Basic information on MRSA

2.1. Emergence of MRSA

In the past, staphylococcal infections were easily treated with a short course of penicillin with very few complications. Unfortunately, staphylococcal infections quickly became resistant to penicillin. Methicillin, along with other drugs, was developed in the 1950s to address the problem. However, by the 1960s, methicillin-resistant strains of staphylococcal began to appear. By the 1980s, *Staphylococcus aureus* infections resistant to methicillin and methicillin-related drugs were becoming highly prevalent. These resistant infections were labeled methicillin-resistant *Staphylococcus aureus* (MRSA). Historically, genetic analyses of MRSA isolated from patients in hospitals worldwide revealed that a relatively small number of MRSA strains have unique qualities that facilitate their transmission from pa-

tient to patient within healthcare facilities over wide geographic areas, explaining the dramatic increases in hospital acquired infections caused by MRSA in the 1980s and early 1990s. Fortunately, there are still different classes of antibiotics that can be used to control these infections, but resistance continues to spread to our newer drugs and threatens to exhaust our supply of effective treatments if practices are not put into place to stop irresponsible antibiotic use.

Starting in the late 1980s several studies have pointed to the emergence of new strains of community-associated MRSA (CA-MRSA in contrast to hospital-associated MRSA or HA-MRSA). The emergence of new epidemic strains of MRSA in the community, among patients without established MRSA risk factors, may present new challenges to MRSA control in healthcare settings. To date, most MRSA strains isolated from patients with CA-MRSA infections have been microbiologically distinct from those endemic in healthcare settings, suggesting that some of these strains may have arisen de novo in the community via acquisition of methicillin resistance genes by established methicillin-susceptible *S. aureus* (MSSA) strains. Two pulsed-field types, termed USA300 and USA400 according to a typing scheme established at CDC, have accounted for the majority of CA-MRSA infections characterized in the United States, whereas pulsed-field types USA100 and USA200 are the predominant genotypes endemic in healthcare settings. USA300 and USA400 genotypes almost always carry type IV of the staphylococcal chromosomal cassette (SCC) *mec*, the mobile genetic element that carries the *mecA* methicillin-resistance gene. This genetic cassette is smaller than types I through III, the types typically found in healthcare associated MRSA strains, and is hypothesized to be more easily transferable between *S. aureus* strains.

2.2. Virulence of MRSA

Many “older” hospital-associated MRSA strains tend to be simple colonizers, they are present on the skin or mucosa and cause no infection, no disease. Others have the same pathogenic potential than regular *S.aureus*. No difference was found in animal lethality, in production of extracellular enzymes or toxins, or in intraleukocyte survival in these hospital-associated strains.

CA-MRSA strains may be more virulent: In 1999 CDC reported 4 cases of lethal MRSA infections among children (12 months to 13 years from Minnesota and N. Dakota) who clearly had community acquired infections (hepatic abscess, brain abscess and necrotizing pneumonia). Unlike HA-MRSA strains, CA-MRSA stains produce superantigens (SEB and SEC, but not TSST-1). Superantigen production is a recently described virulence factor of both staphylococci and streptococci and is important because superantigen production by these microbes in immunologically naïve persons can cause toxic shock syndrome.

2.3. Reservoirs of MRSA

In Louisiana, it is estimated that:

- 30% of the general population are carriers of Staphylococci
- 1% of the low risk population are carriers of MRSA
- 5%-20% of high risk populations are carriers of MRSA (patients with multiple hospitalizations, residents of long term facilities, chronically ill patients, inmates in detention facilities, etc.)

This means that out of a 4,500,000 population, 1,500,000 are carriers of *S. aureus* and 45,000 are carriers of MRSA.

Colonized and infected residents serve as the major reservoir of MRSA in long term care facilities. Contaminated environmental surfaces have not been shown to play a significant role during outbreaks in long term care facilities. Asymptomatic colonization of residents' noses with MRSA is common in long term care facilities. In the few prevalence surveys performed in freestanding long term care facilities located in areas where MRSA is common, about 10% of residents were colonized.

MRSA colonization may disappear with treatment and reappear weeks or months later. Several studies have shown that in one year follow up, approximately 50% of colonized individuals do clear colonization; the median time to clearance was 6 months and 25% have negative intermittent test results.

2.4. Transmission of MRSA

The main mode of transmission of MRSA is person to person via **hands**, usually of healthcare workers or residents. Colonization of hands of personnel may be either transient, such as a single day, or of longer duration, such as several weeks. Colonization of the HCW may occur if proper handwashing and barriers (such as gowns and gloves) are not used appropriately.

MRSA may be aerosolized in the droplets from a coughing or sneezing resident or from a ventilator exhaust port of an intubated resident who has MRSA in his or her sputum. The organism may also be aerosolized during the irrigation of a wound containing MRSA. **However, the role of aerosolization in the transmission of MRSA is not known.**

Although MRSA has been isolated from environmental surfaces, transmission to residents is thought to be minimal, except in burn units.

2.5. Risk Factors for MRSA

The following factors have been identified as increasing the risk that a resident will have an MRSA infection:

- Prior prolonged hospitalization
- Preceding antimicrobial therapy
- Close proximity to a resident colonized or infected with MRSA
- Presence of open wounds and/or pressure ulcers
- Presence of invasive devices, such as gastrostomy tubes, tracheostomy tubes, intravascular lines, indwelling urinary catheters, etc.

2.6. Colonization and Infection

Colonization is the presence, growth and multiplication of the organism in one or more body sites without observable clinical symptoms or immune reaction. A 'carrier' refers to an individual who is colonized with MRSA. MRSA colonization can occur on the skin surface, wound or pressure ulcer surface, in the sputum, or in the urine. One of the most common sites of colonization in both HCWs and residents is the anterior nares (nostrils). While personnel may become colonized with MRSA, **they rarely develop infections with the organism.**

MRSA infection is a condition whereby the bacteria has invaded a body site, is multiplying in tissue and is causing clinical manifestations of disease, such as fever, suppurative (pus-producing) wound, pneumonia or other respiratory illness or symptoms, or other signs of inflammation (warmth, redness,

swelling). Infection is confirmed by positive cultures from sites such as blood, urine, sputum, or wound.

3. Epidemiology and Surveillance

3.1. Epidemiologic support

In healthcare facilities without expertise for analyzing epidemiologic data, recognizing MRSA problems, or devising effective control strategies (rehabilitation centers, long-term care facilities, etc.), identify experts who can provide consultation as needed. Contact the Office of Public Health (OPH) Section of Infectious Disease Epidemiology if necessary.

3.2. Reporting

Do not report all cases of MRSA colonization or infection, do not report subcutaneous infections or abscesses. Reporting to OPH is limited to invasive MRSA infections (MRSA isolated in sterile sites such as blood, spinal fluid and other internal fluids). Also, cases of MRSA pneumonias should be reported.

3.3. Identifying MRSA

MRSA is identified by a bacterial culture and antibiotic sensitivity of the suspected site of infection or colonization (e.g., blood, sputum, urine, wound, exudate, pressure ulcer material). Two criteria are necessary for the organism to be identified as MRSA. First, the organism is identified as *Staphylococcus aureus* or coagulase-positive Staphylococcus species. Second, the antibiotic sensitivity test will show that the organism is resistant to oxacillin or methicillin.

3.4. Procedures for Obtaining Cultures to Identify MRSA

3.4.1. Surface cultures of broken skin or weeping lesions

If a culture is needed from broken skin, a pressure ulcer, etc., gently wipe area with a sterile gauze pad moistened with saline. The site should then be swabbed with the culture swab, using a rolling motion. If a Gram stain is indicated, an additional swab should be taken from the site for the Gram stain. If the site is suppurative or shows tissue destruction, culture the area most heavily involved. Indicate the anatomical location of the site that was cultured on the culture requisition form. Gloves must be worn while obtaining cultures. Gloves should then be removed, placed in the appropriate waste disposal unit and hands should be thoroughly washed with soap and water.

3.4.2. Cultures of residents with confirmed or suspected deep tissue infections, urinary tract infections and respiratory infections

Follow facility protocols for obtaining sterile specimens for culture from these sites.

3.4.3. Routine nares cultures of asymptomatic residents or HCWs are not indicated. DO NOT culture nares when obtaining cultures for MRSA at other body sites unless the resident or HCW is epidemiologically implicated in an MRSA outbreak.

For questions as to whether or not a resident or HCW might be linked to an outbreak and thus warrant nares cultures for MRSA, contact the Louisiana Department of Health Infectious Disease Section at 504-219-4563 or 800-256-2748.

3.4.4. Nares

If a culture of the nares is warranted, the culture should be taken with a sterile swab moistened with sterile saline or culture tube transport medium. The swab should be placed gently in one nostril and allowed to remain 2 to 3 seconds. The same swab can be used for each nostril. The culture swab is then placed in the transport medium and labeled appropriately. The laboratory should be instructed to screen only for MRSA.

3.4.5. Lab results

Establish systems to ensure that clinical microbiology laboratories (out-sourced usually) promptly notify infection control staff or the management of the long-term care facility (LTCF).

Specify by contract that the laboratory provide either facility-specific susceptibility data or local or regional aggregate susceptibility data in order to identify prevalent MRSA and trends in the geographic area served.

3.5. Surveillance

The LTCF should maintain a line listing of the names and other appropriate information of residents and admissions that are found to be colonized or infected with MRSA. Do not include on the line listing residents who are colonized with MRSA in the nares ONLY. These colonized patients should be tracked separately.

Facilities should regularly monitor and record endemic MRSA case rates using incidence or incidence density ratio (e.g., percent cases or cases per 1,000 resident-days).

3.6. Outbreak

An outbreak of MRSA in the facility represents an increase in the incidence of MRSA cases in the facility above the baseline level, or a clustering of new MRSA cases that are epidemiologically linked. For the purposes of this guideline, an outbreak consists of either:

- 1) an increase in the average monthly incidence of MRSA of 25% above the baseline, or
- 2) three or more new MRSA cases within a two month period on any ward or unit.

If an outbreak has been identified, notify OPH. Management of the outbreak should be conducted in consultation with OPH.

4. Infection Control Measures

4.1. Admission

Long term care facilities may NOT arbitrarily refuse to accept a resident with MRSA coloniza-

tion or infection, as long as the facility is able to address the medical needs of the patient.

Long term care facilities should have some system in place for alerting HCWs and visitors that a resident is on contact precautions, such as labeling the chart or the door of the room, without compromising that resident's privacy.

4.2. Standard Precautions

These precautions must be used for **ALL** residents, regardless of diagnosis or presumed infection status, when contact is anticipated with blood; all body fluids, secretions, excretions, including feces and urine but excluding sweat; non-intact skin; mucous membranes. Standard precautions consist of the following components:

4.2.1. Hands

Hands should be cleansed with an alcohol-based waterless hand cleaner (containing at least 60% alcohol) between patient contacts. Handwashing using soap, running water and friction is necessary if hands are visibly soiled or after performing “dirty” procedures (handling bedpans, changing dressings...)

4.2.2. Gloves

Gloves (single use, disposable) must be used when touching blood and all body fluids, non-intact skin, and mucous membranes. Those employees who are sensitive to latex may use latex-free gloves. The gloves may be sterile or non-sterile, depending upon the task to be performed.

4.2.3. Masks, Eye Protection, or Face Shields

These must be worn when it is anticipated that splashing with body fluids might occur, such as during intubation, suctioning of the respiratory tract, irrigation of a wound, caring for open tracheostomies and any condition with the potential for projectile secretions.

4.2.4. Gowns

These must be worn when soiling of the health care worker's clothes is possible during care, such as giving a resident a bath.

4.2.5. Routine cleaning of resident care equipment must be performed according to facility protocol.

4.2.6. Routine cleaning of environmental surfaces must be performed according to facility protocol.

4.2.7. Linen

Linen must not be separated on the nursing unit. **ALL** linen, regardless of the diagnosis of the resident, should be collected and bagged at the bedside. If linen is wet, or saturated with urine or feces, it should be collected in a plastic or fluid impervious bag. **The concept of “isolation linen,” in which linen is collected and handled separately according to the diagnosis of the resident, is no longer practiced. All linen is treated in the same manner, i.e., as if it were potentially infectious.**

4.2.8. Safe disposal of sharps, including needles, must be accomplished according to facility protocol, the Occupational Safety and Health Administration (OSHA) Bloodborne Pathogen Standard.

4.3. Contact Precautions

Consider the individual patient's clinical situation and prevalence or incidence of multi-drug resistant organisms (MDRO) in the facility when deciding whether to implement or modify Contact Precautions in addition to Standard Precautions for a patient infected or colonized with MRSA. Consult with OPH if in doubt.

4.3.1. Indications for contact precautions

4.3.1.1. For relatively healthy residents (e.g., mainly independent)

Follow 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.

4.3.1.2. For ill residents (e.g., those totally dependent upon healthcare personnel for healthcare and activities of daily living, ventilatordependent) and for those residents whose infected secretions or drainage cannot be contained, use Contact Precautions in addition to Standard Precautions.

4.3.1.3. For MRSA colonized or infected patients without draining wounds, diarrhea, or uncontrolled secretions, establish ranges of permitted ambulation, socialization and use of common areas based on their risk to other patients and on the ability of the colonized or infected patients to observe proper hand hygiene and other recommended precautions to contain secretions and excretions.

4.3.2. Components of contact precautions

4.3.2.1. Room Placement and Activities

A resident who is colonized or infected with MRSA at any body site other than the nares should be placed according to the following scheme:

- **Most Desirable:** A private room or cohorting with another resident who is colonized/infected with MRSA.

- **Less Desirable:** A room with another resident who has intact skin and no "tubes" (invasive feeding tubes, tracheotomy tubes, any type of intravascular line, any type of indwelling urinary drainage tube, or any other tube or device that breaks the skin or enters into a normal body orifice).

- A resident with MRSA should not be placed with another resident who has another antibiotic resistant organism, e.g., vancomycin-resistant enterococcus (VRE).

- A resident may attend activities as long as any colonized or infected body site, other than the nares, can be securely covered and the resident observes acceptable hygiene and washes his/her hands.

- A resident who is unable to control secretions should not attend group activities.

- A resident with nasal colonization of MRSA does not need to wear a mask outside of the room and

may attend all activities. If the resident has a "cold" with significant nasal discharge, they do not need a mask if they can control their secretions and cover their nose and mouth when coughing and sneezing.

Special emphasis should be placed on handwashing for these residents. If the resident's cognition is less than normal, the nursing personnel caring for them should be responsible for ensuring that the resident washes his/her hands regularly and especially after coughing and sneezing.

- A resident who is colonized with MRSA in the sputum does not need to wear a mask outside of the room if he/she can cover his/her mouth and nose with a tissue when coughing. If they have a chronic, uncontrollable cough, they should wear a mask when outside of the room. If they have a tracheostomy tube, the tube can be covered with a "trach collar." Again, special emphasis on handwashing should be maintained on these residents. Placement of these residents should follow the guidelines previously stated.

- A resident who is infected (not colonized) with MRSA in the respiratory tract, such as pneumonia or bronchitis, should wear a mask when leaving the room.

4.3.2.2. Handwashing

Hands must be washed with an antimicrobial soap or alcohol-based waterless hand cleanser after removing gloves and before leaving the room. Care should be taken not to touch environmental surfaces in the room before leaving, unless a disposable paper towel is used to touch the surfaces.

4.3.2.3. Gloves

Nonsterile exam gloves (latex or latex-free) must be worn when physical contact with the resident is anticipated and discarded when soiled, before touching a clean surface and before leaving the room.

4.3.2.4. Gowns

Gowns must be worn if physical contact with the resident will occur and changed between residents. Dispose of according to facility protocol.

4.3.2.5. Masks

HCWs must wear a mask when the possibility of splashing in the worker's face is present, such as when suctioning respiratory secretions or irrigation of large wounds. Residents who are infected (not colonized) with MRSA in the respiratory tract, e.g. pneumonia or bronchitis, should wear a mask when leaving the room. Those residents who are colonized with MRSA in their sputum and who have a chronic, uncontrollable cough should wear a mask when leaving the room.

4.3.2.6. Equipment

Where possible, dedicate the use of personal, noncritical medical equipment, such as thermometers and blood pressure apparatus, to the resident with MRSA.

4.3.2.7. Cleaning

Clean and disinfect surfaces and equipment that may be contaminated with pathogens, including those that are in close proximity to the patient (e.g., bed rails, over-bed tables), and frequently-touched surfaces in the patient care environment (e.g., door knobs, surfaces in and surrounding toilets in patients' rooms) on a more frequent schedule compared to that for minimal touch surfaces (e.g., horizontal surfaces in waiting rooms).

Prioritize room cleaning of patients on Contact Precautions. Focus on cleaning and disinfecting frequently touched surfaces (e.g., bedrails, bedside commodes, bathroom fixtures in the patient's room, doorknobs) and equipment in the immediate vicinity of the patient.

4.4. Termination of Precautions

A resident may be considered free of MRSA after two cultures of the colonized or infected body site is negative. The first culture should be taken 72 hours or more after antibiotic treatment has been discontinued. The second culture should be taken one week after the first. If the first or second of these cultures remains positive for MRSA, cultures should continue to be taken one week apart until two consecutive negative cultures have been documented.

If a sputum specimen cannot be obtained from a resident who has been colonized/infected with MRSA in the sputum, the resident's throat may be cultured as a surrogate for sputum.

If a wound site is healed, the healed site itself may be cultured with a moist swab, according to procedures stated elsewhere in this guideline.

When two consecutive negative cultures have been obtained, contact precautions may be discontinued and standard precautions should be followed for the resident.

4.4. Decolonization

Because colonized or infected residents represent the major reservoir of MRSA, eradicating the organism from all such residents should theoretically reduce the reservoir of MRSA in the facility. Eradication of MRSA colonization may be desired by the physician and the resident in special situations where isolation may interfere with the resident's well being. Eradication may also be used during MRSA outbreaks to help control the spread of the organism. Since the use of single antimicrobial agents to eradicate MRSA may be unsuccessful and may result in the emergence of resistance, MRSA eradication should only be attempted in consultation with an infectious disease physician.

Decolonization generally involves the use of topical and/or systemic antibiotic treatment to eliminating MRSA carriage in an individual. While this approach has been used in a number of hospitals and long term care facilities in special circumstances, it has resulted in emergence of antibiotic resistance and therefore is not systematically recommended.

When decolonization for MRSA is used, perform susceptibility testing for the decolonizing agent against MRSA in the individual being treated. Monitor susceptibility to detect emergence of resistance to the decolonizing agent. Consult with a microbiologist for appropriate testing for mupirocin resistance, since standards have not been established. Because mupirocin-resistant strains may emerge and because it is unusual to eradicate MRSA when multiple body sites are colonized, do not use topical mupirocin routinely for MRSA decolonization of patients as a component of MRSA control programs in any healthcare setting.

Limit decolonization of HCW found to be colonized with MRSA to persons who have been epidemiologically linked as a likely source of ongoing transmission to patients. Consider reassignment of HCW if decolonization is not successful and ongoing transmission to patients persists.

5. Communication and Education

5.1. Communication

Long term care facilities should inform hospitals or other nursing facilities if they transfer a resident who is known to be colonized or infected with MRSA. Hospitals and other nursing facilities that transfer a resident known to be colonized or infected with MRSA to a long term care facility should inform that facility that the resident has MRSA. The transferring facility should also note, if it can be determined, that the resident was infected or colonized with MRSA during the hospitalization.

An MRSA patient in a hospital or other nursing facility who transfers to a long term care facility does NOT need to have two negative MRSA cultures before transfer can occur. Negative cultures serve as criteria for discontinuing contact precautions only.

5.2. Training and Education

LTCF medical personnel in the facility should receive basic instruction in risks of MRSA infections, infection control procedures and other MRSA prevention and control measures during orientation and periodic educational updates. Each facility must also periodically present continuing education on handwashing, standard and transmission-based precautions and the OSHA Bloodborne Pathogen Standard.

Judicious use of antimicrobial agents. Ensure that systems are in place to promote optimal treatment of infections and appropriate antimicrobial use.

When a resident acquires MRSA, appropriate infection control procedures should be reviewed with all HCWs who will have contact with the resident.

6. Employee Health

Surveillance cultures of HCWs for MRSA carriage is not recommended as a general control measure. Such cultures should be done only if employees are epidemiologically implicated as the source of an outbreak, as directed by OPH.

Personnel who have staphylococcal infection should be treated with antibiotics. Personnel with skin lesions or dermatitis should be removed from direct resident care until the lesions are healed. Personnel with respiratory infections and cough should not be assigned to direct resident care.

Attachment 1: Definition of Terms

- **Carrier:** An individual who has been found to be colonized (culture growing MRSA) at one or more body sites but who has no signs or symptoms of infection.
- **Cohort:** A cohort consists of two or more residents sharing the same room in a facility and/or physically separated from other residents by their location.
- **Cohort staffing:** The practice of assigning specified personnel to care only for residents known to be colonized or infected with MRSA. Such personnel should not participate in the care of residents whose cultures do not grow (or who have not had cultures obtained for) MRSA.
- **Contact isolation:** A method of isolation recommended by the CDC that requires barrier precautions such as gloves and gowns for direct contact with substances and residents known to contain MRSA or another pathogen. This method includes handwashing after removal of barrier precautions.
- **Decolonization:** Topical and/or systemic antibiotic treatment administered for the purpose of eliminating MRSA carriage in an individual.
- **Endemic:** A baseline rate or an ongoing frequency at which MRSA infection or colonization occurs in a facility.
- **Incidence:** The number of cases of MRSA colonization or infection identified in a specific population during a given time period.
- **Infection:** The condition of a resident when MRSA has entered a body site, is multiplying in tissue, is causing the clinical manifestations of disease, such as fever, suppurative wound, or pneumonia and is documented by positive cultures, such as from blood, sputum, wound, or urine cultures.
- **Outbreak:** An increase in the incidence of MRSA cases in the facility above the baseline level, or a clustering of new MRSA cases that are epidemiologically linked. For the purposes of this guideline, an outbreak consists of either: 1) an increase in the average monthly incidence of MRSA of 25% above the baseline, or 2) three or more new MRSA cases within a two month period on any ward or unit.
- **Standard Precautions:** A system of precautions to be applied to all residents, regardless of the known or perceived diagnosis. These precautions synthesize the elements of universal blood and body fluid precautions and body substance isolation. They are designed to reduce the risk of transmission of microorganisms from both recognized and unrecognized sources of infections in facilities.