

GUIDELINES FOR SCHOOL HEALTH SERVICES IN NEBRASKA: METHICILLIN-RESISTANT STAPHYLOCOCCUS AUREUS (MRSA) IN SCHOOLS, ATHLETICS, AND CHILD CARE

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Introduction: Community-Acquired MRSA

Methicillin-resistant *Staphylococcus aureus* (MRSA) is a devastating infection caused by a strain of staph that has become resistant to antibiotics normally used to treat ordinary infections. Until the 1990s, MRSA generally afflicted individuals in hospitals and nursing homes, which comprised mainly of elderly and chronically ill patients, but it eventually found its way into the general community (1).

Community-acquired MRSA (CA-MRSA) now affects healthy members of local communities with no history of prior hospitalization. Once considered to be a solely nosocomial infection, MRSA is now a major medical concern for healthy populations.

The prevalence of MRSA peaked in 2005 causing an astonishing 94,000 life-threatening infections and nearly 19,000 deaths (2). However, due to educational and early prevention programs, MRSA rates are declining. The CDC recently reported (3):

- The estimated overall number of MRSA infections in the United States is 65,296 cases with 15,138 of those cases originating in the community.
- 1 in 3 people (33%) are colonized with MRSA in their nares while 2 in 100 people are carriers of MRSA within the community.
- Invasive MRSA infections that began in hospitals declined 54% between 2005 and 2011, with 30,800 fewer severe MRSA infections. In addition, there have been 9,000 fewer deaths in hospital patients in 2011 versus 2005 (4).

In the United States, CA-MRSA can be found within schools, childcare centers, and among youth athletics due to close contact with other individuals. Young age is a risk factor of disease because the “five Cs” of MRSA transmission are fulfilled (5, 6, 7):

- Crowding
- Contact (frequent skin-to-skin contact)
- Compromised skin integrity (cuts or abrasions)
- Contaminated items and surfaces
- Cleanliness (lack of cleanliness)

Locations where the 5 Cs are common include schools, dormitories, military barracks, households, correctional facilities, and daycare centers (8). The “five Cs” are present in school and sport environments making children a population of concern.

MRSA is usually spread by direct contact with the hands, skin, drainage from a wound, or secretions from the nose of a person who is infected or colonized. MRSA is transmitted most often by skin-to-skin contact, but may also be spread through contaminated objects or surfaces. Individuals who have draining infections are

January 2015

shedding more bacteria and are more infectious than persons who are colonized only (9).

Medical management recommendations for MRSA from Centers for Disease Control address the following (10):

- MRSA should be considered in the differential diagnosis of skin and soft tissue infections (SSTIs) compatible with *S. aureus* infection (abscesses, pustular lesions, boils, spider bites, cellulitis).
- Incision and drainage remains a primary therapy for purulent skin infections.
- Obtain material for culture.
- No data suggest molecular typing or toxin-testing should guide management. Clinical management of MRSA does not depend on categorization of the infection as healthcare-associated or community-associated or on strain typing. Treatment of an infection possibly caused by MRSA should be based on the clinical syndrome, severity of the infection, and local resistance patterns (11).
- Empiric antibiotic therapy may be needed.
- Alternative agents may be considered – more data is needed in order to develop evidence-based recommendations.
- Use local data for treatment considerations (Contact local public health and hospital surveillance system).
- Patient education on wound management is critical:
 - Frequent hand washing, especially before and after wound care
 - Dispose of soiled dressings, separately bagged, in trash
 - Keep wound securely covered
 - Launder clothes and bedding using hot water and hot dryer concurrent with treatment
 - Take all medications as prescribed
- Maintain adequate medical follow-up.
- Note that treatment of MRSA infection does not necessarily result in eradication of colonization. The patient can continue to be a carrier.

There is presently no good evidence-base for decolonization and decolonization efforts remain controversial (12, 13). However, decolonization may be an aspect of individual medical management (14, 15, 16):

- For persons with recurrent MRSA infections despite appropriate therapy.
- For persons with MRSA in a well-defined cohort with ongoing transmission and close contact (e.g. sports teams, day care).
- In cases of recurrent infection when other sources of transmission are not identified.

Management of MRSA At School

MRSA may come to the attention of the school when:

- A child with special medical needs attends with hospital-associated MRSA
- A student athlete or cluster of athletes is diagnosed with MRSA
- When a case of severe invasive infection arises in the approximately 1% of the population estimated to be colonized with MRSA. Preventing

transmission in the school community focuses on basic infection control considerations.

- Emphasize good hand hygiene for all, and ensure access to equipment, supplies, and opportunities for hand hygiene (5).
- Cover all skin lesions and wounds with clean dry bandages until healed.
- Maintain a clean environment by establishing cleaning procedures for frequently touched surfaces and surfaces that come into direct contact with people's skin (5).
- Routine housekeeping procedures (using a freshly prepared solution of commercially available cleaner such as detergent, disinfectant-detergent, or chemical germicide) are adequate for *clean up* of spills of blood, vomitus, urine, and feces. The Environmental Protection Agency provides a list of cleaning agents and disinfectants effective against MRSA (17). Be sure to read the label and instructions on disinfection products to ensure proper use.
- If cleanup involves fluid from wounds, blood, or fluids containing blood, the area should also be *disinfected* using a freshly prepared bleach solution. Solid and liquid materials should be cleaned from the surface prior to disinfection.
- A bleach solution made fresh from 1 part household bleach to 9 parts clean water is adequate for disinfection of clean (i.e. solid or other material removed) surfaces. Once a surface has been disinfected the old bleach solution should be discarded. Additional resources for making fresh bleach solution and using it safely for cleaning and disinfection purposes can be found at the following sites:
<http://emergency.cdc.gov/disasters/pdf/flyer-clean-with-bleach.pdf>
<http://emergency.cdc.gov/disasters/pdf/bleach.pdf>
<http://www.cdc.gov/healthyswimming/bodyfluidspill.htm>
- School health personnel should be alert to the types of wounds that may be considered suspicious for staph infection and possible MRSA. These include folliculitis, boils, furuncles, scalded skin syndrome, impetigo, toxic shock syndrome, and cellulitis. Infections of the skin are the most common symptom of CA-MRSA, and cause symptoms such as redness, warmth, pus, and a wound that does not heal (18). Fever may or may not be present. Physician evaluation is recommended (10). Keep all wounds and other draining lesions covered at school, by a dry, clean clothing or dressing held securely in place.

When a student is diagnosed with MRSA, the following considerations may be helpful in guiding enrollment and placement decisions:

- Children who are colonized with MRSA should not be excluded from the classroom (19). Since the prevalence of MRSA is increasing in the community, it is likely that there are colonized students in the classroom who are not aware they harbor the organism. Thus, excluding a child known to be colonized with MRSA would be relatively ineffective. The risk for acquisition of MRSA in the classroom is no greater than the risk of contracting a skin infection caused by other pathogens (20).

- Exclusion considerations will apply to the child who is symptomatically ill with infection or if a physician deems necessary (19).
- If attending school, students with active infections (e.g., draining wounds) should be excluded from specific activities where skin-to-skin contact is likely to occur (e.g., sports) until infections are healed (21).
- Exclusion from school may be applied for those with wound drainage that cannot be covered and contained with a clean, dry bandage and for those who cannot maintain good personal hygiene (22, 23).
- If wound care is provided at school, bandages are disposed of in a manner that does not expose others to contamination. Persons who provide wound care should wear gloves (and gowns as needed) and practice diligent hand washing (5).
- When the school receives notification that a child with MRSA will be present at school, the school nurse should perform an assessment:
 - Child's age
 - When the child was found to be infected or colonized
 - Whether the child currently has signs of infection
 - Site of infection
 - Child's underlying medical problems and current health status
 - Route of transmission of the bacteria
 - Specific needs and characteristics of the child, including mobility status and availability of dedicated personnel to care for the child
 - Susceptibility to infection of other persons who are likely to be exposed to the carrier
 - Precautions that need to be taken to minimize or eliminate the risk of transmission, and the ability of the program to implement these precautions (consider staff training/scope of practice issues).
 - Verify diagnosis and determine current colonization status
 - Monitor ongoing colonization status.
- Diligently follow standard infection control precautions (5).
- Report an outbreak of infection – more than one case - to the local public health department (19).

Effective prevention of transmission of MRSA among school-aged populations occurs at the individual and community levels (10, 24):

- Persons with skin infections should
 - keep wounds covered
 - Wash hands frequently (always after touching infected skin or changing dressings)
 - Dispose of used bandages in trash
 - Avoid sharing personal items
- Uninfected persons can minimize risk of infection by:
 - Keeping cuts and scrapes clean and covered
 - Avoiding contact with other persons' infected skin
 - Washing hands frequently
 - Avoiding sharing personal items (towels, razors) that come in contact with bare skin

- Using a personal barrier (clothing or a towel) between skin and shared equipment such as weight training benches or mats
- Exclusion of patients from school, work, sports activities, etc., should be reserved for those who are unable to keep the infected skin covered with a clean, dry bandage and maintain good personal hygiene.
- In ambulatory care settings, use standard precautions for all patients (hand hygiene before and after contact, barriers such as gloves, gowns as appropriate for contact with wound drainage and other body fluids).
- Schools, childcare providers, and athletics programs should develop a plan for responding to MRSA concerns (21). The plan should include:
 - Input from administrators, coaches, school health personnel, staff
 - Reporting procedures for skin infections (e.g., who, what, when, how) and wounds (e.g., turf burns, scrapes)
 - Education plan for participants/attendees
 - Schedule for cleaning equipment and environmental surfaces
 - Criteria for excluding a person from activities (e.g., competition)
- In general, it is not necessary to close schools for special disinfection events when MRSA infections occur. More important are the daily cleaning and decontamination practices at the school, personal hand washing behaviors of students and staff, and policies/procedures related to individuals with skin infections.
- Strategies focusing on increased awareness, early detection and appropriate management, enhanced hygiene, and maintenance of a clean environment have been successful in controlling clusters/outbreaks of infection.
- Communication and collaboration with local and state level public health are encouraged when local entities such as schools face disease reports or possible outbreaks.

Management of MRSA in Athletic Settings

Close physical contact, a break in the skin, and sharing equipment and clothing place student athletes at additional risk of MRSA transmission (24, 8). The risks for transmission of MRSA are much greater among sports participants than among students in a classroom.

Basic infection control practices for athletics settings include implementing environmental sanitation measures and personal behaviors (25). All must be consistently practiced and enforced in order to be effective:

- All environmental hard surfaces that may come in contact with body fluids should be cleaned daily and sanitized with disinfectant approved by the Environmental Protection Agency, including benches, weights, workout machines, etc. Find more information about the EPA approved list: <http://epa.gov/oppad001/chemregindex.htm>
- Ensure that athletic areas, locker rooms and restrooms all have separate cleaning mops and buckets. Clean all mops and buckets regularly.

- Locker rooms, including shower areas, should be washed daily, if used.
- All floors/wall padding in athletic settings should be washed daily, if used.
 - Clean and sanitize wrestling mats before and after practice and matches.
 - Use dedicated mop heads to clean mat surfaces.
- Place wall dispensers with 60% or greater alcohol-based hand sanitizer at entrances/exits inside weight room. Staff must be role models for use.
- Review condition of equipment:
 - Remove tape from weight bars and grips. Replace with solid material grip that can be regularly and thoroughly wiped down and disinfected.
 - Wipe down grips on weights and lifting belts at least daily.
 - Replace torn and worn out padding and covers.
- After each use, clean and sanitize sports equipment that comes in direct contact with the skin of players, such as wrestling headgear, football helmets and fencing equipment (including wires) (24, 25).
- If soap is furnished for athlete use, it should not be bar soap and should be accessible from a wall dispenser.

Adolescents may need education, supervision, and support in order to learn and consistently practice the personal behaviors, which contribute significantly to reduced disease transmission:

- Do not share towels.
- Do not share water bottles.
- Wash or sanitize hands frequently.
- Shower thoroughly with soap and water after every practice or match.
- Avoid common water tubs. If used, assure procedures are in place to enforce showering before use and frequent routine cleaning of the tub.
- Report skin infections to parent and/or coach.

Open communication with parents/guardians about precautionary measures is vital for consistent implementation of preventive measures.

- Inform parents/guardians of precautionary measures.
 - Describe precautions for athlete health and safety.
 - Describe signs of skin infections.
 - Identify reporting procedures to primary care providers, coaches, or the school nurse.
 - Describe exclusion from play/return to play decisions.
- Educate parents and athletes about appropriate use of antibiotics:
 - Follow the label instructions.
 - Take all prescribed doses, unless told by your doctor to discontinue, even if the infection is better (5).
 - Never share medicine with others.
 - Never save unused medicine to use at another time.

Considerations for athletes with skin infections, including MRSA:

- Exclude from play the athlete with mild-to-moderate draining skin infections. The athlete may return to play 72 hours after initiation of therapy, given clinical improvement and no new skin lesions for 48 hours (26), or when infection is resolved.
- Return to play decisions for the athlete with severe skin infection or wound must involve the licensed medical provider who will provide documentation of medical clearance, as well as significant visual evidence, that infection is resolved and the wound is healed.
- If athletes are cleared to participate, all wounds should be completely covered with an occlusive dressing before and during sports participation. Multiple wound checks should be performed to assure an intact dressing that has not shifted in position during competition (26).
- If leakage of the dressing occurs, or the dressing cannot be maintained intact during play (26), the athlete should be removed from competition. The athlete may return when the wound has been cleansed with soap and water and a new dressing applied.
- An athlete with a healing wound may also return to participation with a lesion that has developed a firm intact crust and no signs of infection remain.
- Provide continuity of management of skin infections of athletes. The athlete who receives intermittent, sporadic care from a variety of ambulatory care or urgent care sources, without a medical home, is at particular risk for development of severe or resistant infection (27).

CDC recommends the following measures for preventing MRSA transmission among sports participants (10):

- Schools, child care providers, and athletics programs should develop a plan for responding to MRSA concerns. The plan should include:
 - Input from administrators, coaches, school health personnel, staff
 - Reporting procedures for skin infections (e.g., who, what, when, how) and wounds (e.g., turf burns, scrapes)
 - Education plan for participants/attendees
 - Schedule for cleaning equipment and environmental surfaces
 - Criteria for excluding a person from activities (e.g., competition).
- A coach or athletic trainer should check athletes for skin infections before practice or games/matches, and refer the athlete with a potential skin infection to their medical provider (26).
- Cover all wounds. If a wound cannot be covered adequately, consider excluding players with potentially infectious skin lesions from practice or competitions until the lesions are healed or can be covered adequately.
- Encourage good hygiene, including showering and washing with soap, after all practices and competitions.
- Frequent hand washing should be encouraged and expected.

January 2015

- Ensure availability of adequate liquid soap (not shared bar) and hot water.
- Discourage sharing of towels and other personal items such as clothing or equipment.
- Discourage cosmetic shaving (24)
- Provide adequate supervision to enforce policies and procedures designed to impact disease transmission: showering, keeping wounds covered (21).
- Establish routine cleaning schedules for shared equipment, including mats.
- Train athletes and coaches in first aid for wounds and recognition of wounds that are potentially infected.
- Encourage athletes to report skin lesions to coaches and encourage coaches to assess athletes regularly for skin lesions.

Management of MRSA in Child Care

MRSA infections among healthy young children are becoming more and more common. Children at highest risk of MRSA are those who:

- ✓ have been hospitalized recently have been in with contact with someone colonized with MRSA
- ✓ have an active MRSA infection.

Children in child care also are at risk of transmission because of the close contact with other children and caregivers (8, 28).

Basic infection control considerations for those working in child care environments include:

- Hand washing is the most effective method of preventing the spread of MRSA and other infections (8).
- Keep cuts and scrapes covered until healed. Keep infected wounds covered with clean dry bandages.
- Don't share personal items such as towels and bedding.
- First clean and then disinfect surfaces and items that may be soiled with body fluids or secretions (25).
- A bleach solution made fresh from 1 part household bleach to 9 parts clean water is adequate for disinfection of clean (i.e. solid or other material removed) surfaces. Once a surface has been disinfected the old bleach solution should be discarded. Additional resources for making fresh bleach solution and using it safely for cleaning and disinfection purposes can be found at the following sites:

<http://emergency.cdc.gov/disasters/pdf/flyer-clean-with-bleach.pdf>

<http://emergency.cdc.gov/disasters/pdf/bleach.pdf>

<http://www.cdc.gov/healthyswimming/bodyfluidspill.htm>

Consideration for the child with MRSA in child care (19, 29):

- Children known to be colonized with MRSA in the nose or skin do not need to be excluded from the child care.

- Children known to be colonized with MRSA who have draining wounds or skin sores should be excluded from child care if the wounds cannot be covered, contained, or dressing maintained intact and dry.
- The decision to exclude an individual child with MRSA from child care should involve the child's primary health care provider. Factors to consider include:
 - Does the child have draining wounds?
 - Does the child have draining wounds that cannot be covered?
 - If dressings are needed to contain the drainage and keep wound covered, can the dressings be kept dry and intact, or are special strategies needed? If needed, can they be implemented by the child care staff reliably?
 - In addition to the child with MRSA in a classroom, are there other children who are immune-suppressed? Children known to be colonized with MRSA should not be placed in classrooms with children who have severe immune system suppression.
 - Does the child with MRSA have other special needs?
- Toys receive additional consideration. If a child colonized with MRSA is of an age to mouth toys or is teething, can adequate strategies be implemented to sequester this child's toys for cleaning and otherwise contain saliva?
- Notify the parents or guardians of children in your program that you are caring for a child with MRSA, and all at the center will be practicing excellent infection control practices. MRSA can be a problem for immune suppressed individuals in families in ways the child care provider may not be aware of.

Preventing transmission of MRSA in child care settings involves a high level of active involvement by personnel:

- Frequent hand washing with soap and running water for at least 20 seconds.
- Regularly clean and sanitize toys and surfaces.
- No sharing of washcloths and towels.
- Good hygiene practices with bandage care and disposal. Wear gloves.
- Teach children: hand hygiene; not to share personal items such as towels and bedding; not to touch other people's wounds or bandages.
- Teach parents:
 - To seek medical attention if a child has a boil, red or inflamed skin, or has a sore that does not go away or that does not respond to antibiotics.
 - To share information about the child's medical treatment with caregivers
 - To keep draining wounds covered with clean dry dressings.
 - To place soiled dressings in a separate bag and close the bag before disposing of them.
 - Wash sheets, towels, and clothes when soiled with drainage in hot water and dry in hot dryer (21).
 - To use antibiotics correctly (5):
 - Follow the label instructions.

January 2015

- Take all the prescribed doses, unless told by your doctor to discontinue, even if the infection is better.
- Never share medicine with others.
- Never save unused medicine to use at another time.
- Schools, child care providers, and athletics programs should develop a plan for responding to MRSA concerns (10). The plan should include:
 - Input from administrators, staff, and parents
 - Communication procedures for skin infections (e.g., who, what, when, how) and wounds (e.g., bites, scrapes)
 - Education plan for parents and children Schedule for cleaning equipment and environmental surfaces
 - Criteria for excluding a person from activities.
- Report outbreaks (e.g., more than one case) of infection to the local public health department (10).

RECOMMENDED RESOURCES:

Centers for Disease Control and Prevention:

<http://www.cdc.gov/mrsa>

Nebraska Department of Health and Human Services:

<http://www.dhhs.ne.gov>

Other state health departments:

<http://www.tpchd.org/health-wellness-1/mrsa-methicillin-resistant-staphylococcus-aureus/>

<http://www.health.state.mn.us/divs/idepc/dtopics/athlete>

http://www.health.ny.gov/diseases/communicable/staphylococcus_aureus/methicillin_resistant/

Athletics Guidelines:

National Federation State High School Associations (NFHS)

<http://www.nfhs.org/>

Nebraska School Activities Association, Sports Medicine page:

<http://nsaahome.org/sports-medicine/>

National Collegiate Athletics Association <http://www.ncaa.com/search/MRSA>

Child Care and Education Organizations:

<http://www.healthychildcare.org/>

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January 2015

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