
**Continuing Education
Material:**

MRSA
(Methicillin-resistant *Staphylococcus aureus*)
INFECTIONS

ABP LLC

ABP CONTINUING EDUCATION MATERIAL

MRSA INFECTIONS

OBJECTIVES

1. Explain MRSA and CA-MRSA infection.
2. Discuss how MRSA is spread.
3. Discuss diagnosis and treatment of MRSA infection.
4. Explain ways to prevent the spread of MRSA infection.

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This continuing education material, **MRSA INFECTIONS**, will earn the participant **2.0** contact hours. If you have any questions regarding this information or would like further information on other continuing education opportunities, please contact:

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WHAT IS MRSA?

MRSA is a type of *staphylococcus aureus* that is resistant to antibiotics called beta-lactams. Beta-lactam antibiotics include methicillin, oxacillin, penicillin and amoxicillin.

Staphylococcus aureus is a bacterium that lives completely harmlessly on the skin and in the nose of about one-third of normal healthy people. It can cause minor infections, such as pimples or boils, or it can cause more serious infections, such as abscesses, pneumonia, and bone or bloodstream infections when it gets the opportunity to enter the body, for example through wounds in the skin. Many MRSA infections are initially misdiagnosed as spider bites. Some people have MRSA on their body or in their nose but no symptoms of infection. This is called colonization. Approximately 25% to 30% of the population is colonized with staph, while about 1% is colonized with MRSA.

MRSA skin infections may present in a number of forms:

- Cellulitis – inflammation of the skin
- Impetigo – bulbous (blistered) lesions or abraded skin with honey-crusted crust
- Folliculitis – infection of the hair follicle (like a pimple)
- Furunculosis – deeper infection below hair line carbuncle – multiple adjacent hair follicles and substructures are affected
- Abscess – pus-filled mass below skin structures
- Infected laceration – pre-existing cut that has become infected

STATISTICS ASSOCIATED WITH MRSA – CDC 2007

- The estimated number of people developing an invasive MRSA infection in 2005 was about 94,360.
- Approximately 18,650 persons died during a hospital stay related to these serious MRSA infections.
- About 85% of all invasive MRSA infections were associated with healthcare, and of those, about two-thirds occurred outside of the hospital, while one-third occurred during hospitalization.
- About 14% of all the infections occurred in persons without obvious exposures to healthcare.

The rates of disease vary between geographically diverse sites, but overall the rates were consistently highest among older persons > 65 years, Blacks and males.

HOW IS MRSA SPREAD?

Staph, including MRSA, is almost always spread person to person by skin-to-skin contact, mostly by the hands. It can also be spread by objects, such as towels and clothes that have been contaminated with the bacteria and then are shared or used by someone else. It is not uncommon to have MRSA infections spread among household members, sports team members, or other people who have frequent close contact and/or share personal items. Patients who already have an MRSA infection or who carry the bacteria on their bodies but do not have symptoms (colonized) are the most common sources of transmission. The main mode of transmission to other patients is through human hands, especially healthcare workers' hands. Hands may become contaminated with MRSA bacteria by contact with

infected or colonized patients. If appropriate hand hygiene such as washing with soap and water or using an alcohol-based hand sanitizer is not performed, the bacteria can be spread when the healthcare worker touches other patients.

MRSA is among the infection-causing bacteria that are becoming resistant to the most commonly prescribed antimicrobial treatments. In some cases bacteria become so resistant that no available antibiotics are effective against them. At this time, there are still treatment options for healthcare-associated MRSA. People with antibiotic-resistant MRSA are more likely to have longer and more expensive hospital stays and may be more likely to die as a result of the infection. When the drug of choice does not work, a patient requires a second or third choice treatment that may be less effective, more toxic and more expensive.

WHO IS AT RISK FOR MRSA INFECTION?

Those people whose immune system is weak and unable to fight infections may be increased at risk for MRSA. Several factors may contribute to increased risk for MRSA infection. The most common factors are having frequent contact with the healthcare system, having a chronic illness such as diabetes, cancer, HIV, being very young or very old, frequent use of antibiotics, having an open wound, dermatitis or skin lesions, poor nutrition and poor hygiene. More and more frequently, healthy people have been getting MRSA in the community without contact with hospitals or healthcare facilities.

WHAT IS CA-MRSA?

CA-MRSA (community-acquired MRSA) is distinguished from hospital-acquired MRSA infections when the patient with MRSA meets the following criteria:

1. Diagnosis of MRSA was made in the outpatient setting or by a culture positive for MRSA within 48 hours after admission to the hospital.
2. The patient has no past medical history of MRSA infection or colonization.
3. The patient has no medical history in the past year of:
 - Hospitalization
 - Admission to a nursing home, skilled nursing facility, or hospice
 - Surgery
 - Permanent indwelling catheters or percutaneous medical devices
4. The patient has no permanent indwelling catheters or percutaneous medical devices.

Recent data suggests that 12% of clinical MRSA infections are community-acquired, but this can vary by geographic region and population. CA-MRSA is becoming more common and has reached near epidemic proportions in some parts of the country. CA-MRSA is a much more virulent infection than healthcare-acquired or nosocomial MRSA. The two common strains in the US are USA 400 and USA 300, with a mortality rate between 20 – 45%. Once infected with CA-MRSA, an individual is very likely to have subsequent infections to other body sites.

A recent study (2006) by the Association for Professionals in Infection Control and Epidemiology, indicates that at least 30,000 US hospital patients may have MRSA staph. The estimate is about 10 times the rate that had been previously estimated. Researchers concluded that at least 26 out of every 1000 patients have the MRSA staph. Most patients

were identified within 48 hours of hospital admission, leading researchers to believe that the staph was community- acquired.

Certain people are at increased risk for CA-acquired staph or MRSA infections. CDC (Centers for Disease Control) has investigated clusters of CA-MRSA skin infections among athletes who have regular skin-to-skin contact such as wrestlers, military recruits, daycare attendees, Pacific Islanders, Alaskan Natives, Native Americans, men who have sex with men, and prisoners.

Conditions that raise the risk of staph infections include the 5 C's:

- 1) Crowding
- 2) Contact (skin-to-skin)
- 3) Compromised skin such as someone with eczema
- 4) Contaminated surfaces
- 5) Cleanliness- that is a "lack of"

DIAGNOSIS AND TREATMENT OF MRSA

Culture of skin lesions is used to diagnose MRSA in recurrent or persistent cases of skin infection, in cases of antibiotic failure, and in cases that present with advanced or aggressive infections. Microbiologic culture should be used as a guide to appropriate antibiotic selection in order to avoid increased drug resistance. In the absence of symptomatic infection, screening for MRSA colonization by culture is generally not necessary unless for infection control or epidemiologic purposes.

Effective February 13, 2008, severe infections with *Staphylococcus aureus*, not just MRSA strains that result in death or intensive care unit admissions in a previously healthy person are reportable. Also, any clusters or outbreaks of staph, including MRSA, are reportable.

There are no formal treatment recommendations available for healthcare providers at this time. The following treatment suggestions are to serve as interim guidance:

1. The first line of treatment for soft tissue infections is incision, drainage and localized care.
2. Healthcare providers should continue prudent management of skin lesions and selective use of antibiotics, as inappropriate antibiotic use has been associated with the development of MRSA infection.
3. Empiric antibiotic treatment of skin and soft tissue infections is often initiated with antibiotics targeted against staph aureus, such as cephalexin or dicloxacillin. Resistance patterns must be considered in therapy of lesions not responding to conventional antimicrobial therapy and wound care. Culture of the lesion with susceptibility testing will help guide antibiotic therapy in these patients.
4. If the patient is found to have a MRSA skin infection and antibiotics are indicated, use culture results to select an antibiotic to which the organism is susceptible.
5. In patients with recurrent or serious MRSA infection, or in households of many affected members, some experts would consider attempting eradication of MRSA colonization. Mupirocin (Bactroban) and/or rifampin (in conjunction with another antibiotic effective against MRSA) may be helpful in eradicating MRSA colonization.

6. Reviewing good hygiene practices with patients including diligent hand washing, washing of contaminated items with warm soap and water, and proper disposal of contaminated bandages and wound coverings is essential in prevention of transmission of MRSA among contacts.

Patients with MRSA who are in the hospital may have to be isolated, especially if the infection is in a wound that is draining or in the lungs and they are coughing. These patients should be separated from other patients who are very ill in order to avoid spreading the infection. Sometimes they may be placed in a room with another patient who also has MRSA.

Many European countries use a “search-and-destroy” tactic whereby patients are screened on admission and immediately decolonized and placed on contact isolation if MRSA is present. Many US hospitals regard this as overkill, but the incidence of MRSA, including CA-MRSA, is much less than in the US largely due to this tactic.

Decolonization, removal of MRSA from asymptomatic carriers, appears to be a promising method of reducing the incidence of MRSA infection both in and out of healthcare institutions. The suggested protocol is the screening high-risk patients for possible decolonization. This screening can be tricky and can be very subjective. Generally the nares are the preferred site for screening, but in CA-MRSA, the reservoir sites could just as easily be the throat, underarm, vagina or rectum. Any colonized patient yielding a positive culture may be treated with regimens like a topical antibiotic cream, such as mupirocin and Hibiclens soap.

WAYS TO REDUCE YOUR RISK OF ACQUIRING HOSPITAL INFECTIONS

There are no universal standards of reporting hospital infection rates at this time. Many states have some form of reporting and others have study bills or pending legislation. Until there is a reliable national standard, healthcare consumers must take steps to protect themselves when entering a healthcare facility.

1. Ask about your surgeon and hospital's infection rate; if you cannot get that information, consider another option or another facility.
2. Get yourself tested for *Staph aureus* one week prior to surgery.
3. Shower with chlorhexidine soap for 3 to 5 days prior to admission.
4. Ask all hospital staff and visitors to clean their hands and stethoscopes.
5. If hair must be removed, use clippers not a razor.
6. Avoid the use of a urinary catheter.
7. Mandate that healthcare professionals follow established infection control procedures.
8. Get information from other hospitals on their success with infection control procedures.
9. Pressure healthcare facilities to develop intervention programs.

MRSA PREVENTION

CDC conducts MRSA surveillance, prevention, epidemiologic and laboratory research and outbreak and laboratory support.

Surveillance (Data Collection & Statistical Analysis)

- National Healthcare Safety Network monitors healthcare-associated infections including those caused by MRSA.
- Active Bacterial Core surveillance system conducts population based surveillance for MRSA.

Prevention

- Through the Prevention Epicenter Program, CDC provides funding and works directly with academic partners to address important scientific questions regarding the prevention of MRSA and other resistant organisms.
- CDC provides direct support and assistance to external partners involved in MRSA prevention initiatives.
- CDC in collaboration with the Healthcare Practices Advisory committee develops and promotes evidence-based infection control strategies to reduce transmission of MRSA and other pathogens in healthcare facilities.
- CDC launched a national evidence-based educational Campaign to Prevent Antimicrobial Resistance in Healthcare Settings that targets healthcare providers.
- CDC developed and published guidance for the management and prevention of MRSA in the community based on review of available information and input from clinical and public health experts.
- CDC collaborates with state and local health departments to develop physician and patient guidance and education materials for MRSA.
- CDC performs needs and knowledge assessments with public health partners, at-risk groups and the general public to target the development of guidance and education.

Epidemiologic and Laboratory Research

- CDC collaborates with public health authorities and academic partners on studies to characterize epidemiology and microbiology of MRSA to guide the development of prevention and control efforts.
- CDC works with partners such as Clinical and Laboratory Standards Institute to evaluate, develop and standardize methods for antimicrobial susceptibility testing for bacterial pathogens including antimicrobial –resistant *S. aureus*.
- CDC is building a national library of MRSA strains to identify genetic patterns or relationships among different types MRSA that could be used to inform prevention and control strategies.

Outbreak and Laboratory Support

- CDC serves as a national leader for investigating and controlling outbreaks of staphylococcal disease in collaboration with state and local health departments.
- As the national reference lab for staphylococci, CDC performs confirmatory antimicrobial susceptibility testing of antimicrobial resistant bacteria including MRSA.
- CDC conducts proficiency testing to assist public health laboratories nationally and internationally in determining their ability to perform antimicrobial resistant pathogens

including MRSA.

- CDC provides *S. aureus* isolates to the Network on Antimicrobial Resistance in *S. aureus* to support and facilitate critical research efforts among clinical and basic Scientists from the academic, industrial, and public health sectors regarding staphylococcal infections including understanding antimicrobial resistance and other medically relevant genetic and physiological characteristics among staphylococci.

Extramural Funding

- CDC provides funding to academic and public health partners to conduct epidemiologic research and surveillance, and develop educational materials for MRSA.

Ways to help prevent the spread of a MRSA in a healthcare setting includes:

1. Between patients, wash hands regularly with antimicrobial soap and warm water. When hands are not visibly soiled, alcohol-based hand sanitizer use is effective.
2. Wear gloves when managing wounds. After removing gloves, wash hands with soap and warm water or use alcohol-based hand sanitizer.
3. Keep cuts and scrapes clean and covered with a bandage until healed.
4. Carefully dispose of dressings and other materials that come into contact with blood, nasal discharge, urine, or pus from patients infected with MRSA.
5. Clean surfaces in exam rooms with a commercial disinfectant or a 1:100 solution of diluted bleach.
6. Launder any linens that come into patient contact in hot water, > 160 degrees F, and bleach. The heat of commercial dryers improves bacterial killing.

References

- MRSA fact sheet available for download: www.ochealthinfo.com/epi/mrsa.
- www.cdc.gov/ncidod/hip/ARESIST/mrsa.htm.

MRSA INFECTIONS – Self-Assessment Quiz

**Please place all answers on the Continuing Education Registration Form.
Mail form to ABP LLC to be graded so that you can get your P.A.C.E. certificate.**

- 1...Which of the following is NOT a form of a MRSA infection?
a. abscess b. cellulitis c. acne d. folliculitis
- 2...What percent of invasive MRSA infections are associated with healthcare?
a. 14 b. 25 c. 30 d. 85
- 3...The main mode of transmission of MRSA infection is:
a. objects contaminated with bacteria
b. hand-to-hand contact
c. coughing or sneezing
d. airborne
- 4...Which of the following is NOT a risk factor for a MRSA infection?
a. frequent contact with healthcare workers
b. frequent use of antibiotics
c. frequent use of vitamins
d. frequent skin lesions
- 5...What percent of MRSA infections are community acquired?
a...10 b. 12 c. 20 d. 25
- 6...To be diagnosed as a CA-MRSA infection, all of the following criteria must be met EXCEPT:
a...A positive culture within 48 hrs after admission to the hospital
b. No past history of MRSA infection
c. Patient has no medical history in the past year of surgery or hospitalization
d. The patient has a permanent indwelling catheter.
- 7...A patient with a MRSA infection must always be isolated.
a...True b. False
- 8...The preferred collection site for screening an asymptomatic patient for a MRSA is:
a...throat b. vagina c. nares d. rectum
- 9...Which of the following will NOT reduce your risk of a acquiring a hospital infection?
a...Shower with chlorhexidine soap for 3 to 5 days prior to admission.
b. Get yourself tested for *Staph. aureus* one week prior to surgery.
c. Use a razor for hair removal.
d. Make sure to ask hospital staff to wash their hands before performing procedures on you.
- 10...Which of the following will NOT help prevent the spread of MRSA in a healthcare setting.
a...Wash hands with soap and water or hand sanitizer after removing gloves.
b. Keep cuts open to the air to promote healing.
c. Clean work surfaces with a commercial disinfectant.
d. Launder patient linens in hot water and dry in a hot dryer to kill bacteria.