

MRSA Superbugs: What Every BODY Needs To Know!

(Ron Jones, MS, ACSM Health/Fitness Instructor, Corporate Wellcoach)



There's a new bug in town—and not a good one. The antibiotic-resistant staph infection called MRSA has been increasing exponentially the last few years. While many times able to be treated on an outpatient basis, worst-case MRSA infections can *eat you alive* and even take your life...protect yourself and others at work, at home, and at the gym as much as possible with PREVENTION!



What is MRSA?

Definition & History: (methicillin-resistant *Staphylococcus aureus*) is a specific type of bacterial “staph” infection that is resistant to beta-lactam antibiotics like methicillin (one of the strongest antibiotics) and other less powerful antibiotics.

- **MRSA is NOT a disease; it is bacteria highly resistant to antibiotics.** MRSA first developed during the 1950s and has steadily been increasing in occurrence and especially the last few years. Since the mid 1990s, Driscoll Children's Hospital in Texas has seen child MRSA infections increase from a few per year to nearly 500 by 2003. About 90% of Driscoll's MRSA cases were in kids with no known risk factors; most of these infections appeared as simple localized boils that were treated on an outpatient basis; however, some needed hospitalization. Professional and collegiate sport teams have also experienced significant MRSA infections. MRSA can infect in “clusters” as with a sport team, family, or work population. MRSA has also infected domestic pets like cats and dogs along with horses. *Proper hygiene is essential for prevention of MRSA with ALL populations whether clinical, work, or at home!*
- **Staph Bacteria (*Staphylococcus aureus*):** Commonly carried bacteria found on skin or nose that can cause infection in skin, wounds, blood, and can cause pneumonia. Staph infections are one of the most common causes of skin infection in the United States. About 10-40% of the population carries staph *without* infection primarily in **nasal passages** (along with other mucous membrane sites), and about 1-5% carries MRSA. Most staph skin infections are minor and can be treated without antibiotics. People that carry Staph or MRSA but are not infecting their own bodies are “colonized.” The colonized person can transmit staph to another person.
- **Bacteria:** Single-cell microorganisms that help decay and decompose organic matter. Bacteria reproduction cycles can be measured in minutes compared to months and years with mammals. Bacteria are important to existence. Many forms of bacteria are “healthy” for our bodies; unfortunately, MRSA is NOT one of them! “Friendly” bacteria found in the gut and yogurt aid digestion (*bifidobacteria*). There are also friendly bacteria in cheese, wine, and many other foods, so not all bacteria are bad.

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Who is at-risk for MRSA?

- Generally, if you are weak, sick, and unhealthy, you are at a higher risk for MRSA and other health problems. MRSA issues were originally concentrated in clinical settings like hospitals and nursing homes. Nursing home seniors, dialysis patients, and people with immune-weakened conditions like diabetes, HIV-AIDS, and Hepatitis are all at higher risk for MRSA.
- While people are at increased risk with weakened immune systems, many “apparently healthy” people with no known risk factors have been infected with MRSA (including children), so do NOT become lax with your prevention measures!

Hospital-MRSA Risk Factors

- Recent Hospitalization (Within 1 Year)
- Recent Surgery (Within 1 Year)
- History of Recurrent Skin Infections (Self **or** Family Member)
- Lab-Confirmed MRSA With Close Contact
- Health-Care Facility Patient **or** Repeated Contact With Residents (Nursing Homes, Dialysis Centers)
- IV Drug Use or Catheter
- Weakened Immune System (Diseases, Organ Failure, etc.)

Community-MRSA Risk Factors

- Close-Contact Conditions (Prisons, Military, Athletes, Gym, Work Site, Manicures, Day Care, Sex, Shelters)
- Weakened Immune System (Diseases)
- Recent Surgery (Within 1 Year)
- IV Drug Use
- Body Art (Tattoo, Piercing, Teflon/Stainless Steel Implants)
- Race (Pacific Islander, Alaskan Native, Native American)
- Contact Sports (Football, Rugby, Wrestling, Martial Arts)
- Sport/Exercise Sites (Gym Mats, Whirlpool)
- Sharing Personal Items (Towels, Razors, Clothes, Athletic Equipment)
- Poor Personal Hygiene
- Food Contamination

Community MRSA

More recently, MRSA has evolved into *non-clinical settings* in the regular community. Community-associated MRSA is called **CA-MRSA**. Many CA-MRSA cases have been found in sport and athletic settings, prisons, day care, and military environments. *About 12% of MRSA cases that evolve into hospital MRSA started as CA-MRSA.* Initially, CA-MRSA is easier to treat than hospital MRSA, but **CA-MRSA can quickly escalate so IMMEDIATE attention is required!**

MRSA Transmission

Portal of Exit/Entry: MRSA will need a direct portal of exit (lesion or sore) out of the infected person and a portal of entry (break in skin) into the non-infected person.

In addition to surgical incisions and lacerations, portals of exit/entry can be caused by “turf burns” (such as in football) or by shaving with razors. **MRSA transmissions do NOT have to be through direct skin-to-skin contacts.** Many people have been infected with MRSA through casual sharing of towels and razors!

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MRSA's "5-C" Higher-Risk Settings

1. **Crowding**
2. **Contacts of Frequent Skin-to-Skin**
3. **Compromised Skin**
4. **Contamination of Surfaces**
5. **Cleanliness**

There are two primary modes of MRSA transmission:

1. **Airborne Droplets** (infected particles $>5\mu\text{m}$ projected ≤ 3 feet)
 - **Transmissions:** Occurs when infected person talks, coughs, or sneezes. Suction and bronchoscopy also cause droplet risks of transmission.
 - **Protection:** Personal Protective Equipment (PPE) is recommended when in close proximity to MRSA-pneumonia patients. Mucous membranes (mouth, eyes, nose) should be covered with face shield or surgical mask and safety glasses when closer than 3 feet to infected MRSA-pneumonia patient.
2. **Direct Contact*** (skin-to-skin or skin-to-contaminated surface)
 - **Skin:** Direct skin-to-skin contact with an MRSA-infected person poses the greatest risk of infection; ***transmission usually occurs through direct hand contact with the infected person***; however, even heterosexual sex has caused MRSA infections (note pubic area shaving and pimples). Universal precautions along with hand washing can greatly reduce or eliminate skin-to-skin mode of transmission.
 - **Sex:** MRSA can be spread through any portal of entry including those found in both heterosexual and homosexual sex. Gay populations are seeing rapid increases in MRSA infections surpassing those in other populations. Projections are that this new strain emerging in gays will spread among other groups causing a wider threat.
 - **Sports:** Certain sports with higher skin-to-skin contact are at higher risk for MRSA infection like wrestling, football, and martial arts. Some sport teams are now using pHisoHex soap in showers and special anti-MRSA towels along with other aggressive strategies to control MRSA.
 - **Environmental Surfaces:** Surfaces with frequent hand contact such as door knobs, exercise equipment, phones, computer mice, and certain medical equipment should also be suspect.
 - **Personal Items:** MRSA has often been transmitted through sharing personal items like towels, razors, and even contaminated clothing.
 - **Equipment:** Medical and body art equipment (piercing, tattoos) that has direct contact with body fluids can easily transmit MRSA if not cleaned properly. While strict guidelines and regulations for cleaning and sterilization of "medical" equipment, body art equipment sterilization is poorly regulated and monitored. ***Body piercing and tattooing equipment should be cleaned with an autoclave (medical sterilization machine that uses heat, steam, & pressure).*** Autoclaves MUST maintain 246 degrees for at least 30 minutes to fully sterilize equipment.

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- **Food:** MRSA can be spread through a food-borne outbreak. **Food handlers should be required to report ALL skin infections no matter how minor.** No special requirements are indicated for eating utensils—normal protocols for detergent use and decontamination of eating and cooking utensils are sufficient.

Pathology: CA-MRSA's Process of Destruction

At least “one” major factor contributing to the survival and spread of CA-MRSA is its ability to literally “explode” immune cells. Upon infection, CA-MRSA secretes a peptide compound called *phenol-soluble modulins* (PSM) that produces inflammation. The inflammation attracts immune system cells called *neutrophils*. The peptide compound destroys the *neutrophil* cell wall through a process called *lysis*. The destruction of *neutrophils* renders the body incapable of efficiently fighting off infection which allows CA-MRSA to spread rapidly with very little resistance.

What does MRSA look like?

Staph bacteria including MRSA can cause painful skin infections resembling a pimple, insect bite, furuncle, or boil. These infections can be red, swollen, and have pus or drainage.

- *Many initial MRSA infections are mistaken for spider bites.* Pus is formed by white blood cells that rush in to kill bacteria and enlarge blood vessels—a way for the body to purify infection. Note that all MRSA infections do not advance to the point of needing clinical hospitalization or medical drainage; however, MRSA can very well progress to “surgical wound” infections, bloodstream infections, and can even cause pneumonia.
- **Flesh-Eating Bacteria (*necrotizing fasciitis*):** The worst-case scenario for MRSA is the rare, but horrific, flesh-eating bacteria that can consume up to a foot of flesh in 1-2 hours! This condition **MUST HAVE IMMEDIATE** medical attention! *Note: Most *necrotizing fasciitis* cases are caused by “strep” infections rather than “staph” infections like MRSA. Emergency room professionals have cited that flesh-eating bacteria consumes flesh practically fast enough to see with the naked eye as the patient is literally being “eaten alive” by bacteria! ☹

MRSA Assessment, Diagnosis, & Surveillance

MRSA is a type of staph bacteria, and many skin infections are caused by “staph” bacteria; however, not all staph skin infections are MRSA. The only way to know for sure if you have MRSA is to have a laboratory culture performed. The first step is to assess the probability for MRSA then follow the guidelines below.

1. **Assess Lesion:** Physically examine lesion. Many MRSA infections are mistaken as “spider or insect bites” and many will become very sore with a pus-filled center.
2. **Identify Risk Factors:** See Table above
3. **Lab Culture Review & Diagnosis:** Infection verification requires a positive MRSA lab confirmation **at site of infection** and not just in the nasal mucous membranes. The specific results of a positive MRSA lab culture will determine antibiotic protocol. *Note: Colonized people “carry” MRSA in nasal passages but are not actually infected.
 - **Rapid Test:** A new “Quick Test” has been approved and is in use that produces results in a couple of hours instead of a couple of days. The quick diagnosis of infection by common staph vs. the super bug staph (MRSA) greatly speeds treatment. With MRSA, the difference between hours and days can be life or death!
4. **Post-Diagnosis Surveillance:** Following a single MRSA infection, index case should be interviewed to identify: potential sources of infection, close contacts, recent hospitalizations, work assignments, sharing of personal hygiene items, IV drug use, body art (tattooing, piercing, etc.), participation in close-contact sports, and exposure to other persons through

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draining wounds or skin infections. *Identified contacts determined to be at risk should be examined for MRSA.* A person infected with MRSA increases the risk for their family members at home to become colonized with MRSA.

MRSA Treatment

Most MRSA cases can be treated without antibiotics through the use of antimicrobials or antibacterials. Many MRSA infection patients are treated as outpatients and do not need hospitalization. Once *MRSA has been confirmed*, these procedures must be addressed:

1. **Remove Foreign Bodies & Devices:** Refers to IV/Medical devices. Removal is under the direction of physician.
2. **Incision & Drainage:** MRSA infections can emerge in boils and abscesses filled with pus that needs incision and draining (I&D). DO NOT attempt to cut and drain your own infections! These types of infections must be attended by professional healthcare providers in clinically-sterile environments! Drainage sites must be reevaluated within 24-48 hours to determine if more drainage is needed. ***Note: Aggressive drainage in combination with heat packs are “first-line therapies” for MRSA skin infections.** Some research has indicated that I&D “was the only measure proven effective in resolving MRSA infections.”
3. **Antibiotics:** The results of a positive MRSA lab culture will determine species and antibiotic sensitivities which are used to guide the specific antibiotic therapy.
 - Because of time required for lab confirmations, MRSA antibiotic treatment occurs in different phases. **1)** Empirical treatment with 1st generation antibiotic; ***2)** 24-48 hour assessment of wound and lab culture *(unless Quick Test is used then it is ≈2 hours); **3)** Change antibiotic based on lab culture results that identify MRSA species and antibiotic sensitivities. “Serious” MRSA cases require ≈ 10-day course of intravenous (IV) *Vancomycin*.
 - If you are treated with antibiotics, watch for signs of *treatment failure* such as new sores. New sores after medication, or infections that don’t improve after 3-4 days, require immediate notification of physician. Make sure to finish ALL medications as prescribed even if you feel better. ***Note! Even after MRSA is “cured,” it is possible for it to come back.** MRSA infections are not to be taken lightly and delayed in treatment—take them seriously and act swiftly.

MRSA Containment

Direct Contact: Cover wounds and contain drainage.

Airborne Droplets: MRSA pneumonia is contagious. It is recommended that mucous membranes are covered with a surgical mask and face shield when *closer than 3 feet to a confirmed MRSA pneumonia patient*. Larger droplets (>5µm) projected with sneezing and coughing will settle within the 3 foot contact zone—protection must be taken to prevent droplets from settling on mouth, nose, and eyes. ***Note! A cough can travel up to 60 MPH and a sneeze can exceed 100 MPH, so cover up!**

MRSA Outbreak Management

A MRSA “outbreak” is generally defined as *>5% of a given population infected or two or more epidemiologically-related infections*. A *confirmed MRSA outbreak* requires a different protocol for the infected population such as below:

- Consider use of antiseptic wash like *Hibiclens®* for ALL members of population group (both infected and asymptomatic). ***Protocol:** Use minimum amount with luke-warm water; rinse thoroughly; continue twice daily for five days.
- Reinforce hygiene education and hygiene procedures in showers and bathrooms along with other frequent close-contact areas.
- Consider weekly whole-body screenings to check for infections.
- Clean medical spaces, bathrooms, and common areas with 1:10 bleach solution.
- Maintain high suspicion for MRSA infections.

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- Collect demographic information with MRSA-positive patients (date, location, etc.) and forward weekly to proper medical personnel.

Outbreak Management Issues: There has been recent discussion and criticism of complete sterilization and evacuation following a MRSA outbreak at a school or athletic setting. Critics argue that there is little benefit to completely sterilizing a school, locker room, or artificial field playing surface because as soon as the human element is reintroduced, the carriers of MRSA bring new infection into the setting. Others argue that the first step is to rid all infection then before reopening a facility process improvements need to be implemented regarding improved hygiene and management. At this time, it appears that the more accepted protocol is to sterilize after an outbreak and “possibly” evacuate if this is in fact appropriate.

Exclusion Criteria for School Sports

1. Physician ordered
2. Drainage cannot be covered or contained
3. Refusal to maintain proper hygiene

MRSA PREVENTION & HYGIENE TIPS

Get Fit and Be Strong with “Proactive Wellness” to strengthen your immune system then follow the hygiene guidelines below!

#1 **EDUCATION!** Proactive education on the importance of prevention and control measures for MRSA is critical—*preventing MRSA is much easier than managing MRSA!*

#2 **HAND WASHING!** The most effective infection control measure for preventing and containing MRSA is good hand hygiene. Thoroughly wash hands with anti-bacterial soap and small amount of water by *pressing and scrubbing soap into all areas of hands and fingers* for ≈15-20 seconds before meals and after toileting—a minimum of 5 times per day is recommended.

Hand Sanitizer & Wipes: Use “alcohol-based” (60%+ alcohol) hand rub such as *Purell®* or equivalent (like *triclosan*-containing sanitizer). Thoroughly press sanitizer into *all areas* of hands and fingers. Antibacterial wipes can also be used when washing and sanitizer gels are not available. Single-wipe packages for pocket or purse and pop-up canisters of wipes are also available, but some are NOT able to kill MRSA Super Bugs. (For pocket or purse, I recommend [Water’Jel® Unit Dose Sanitizer](#)). Make sure the wipes are approved for “human skin” and personal hygiene because some pop-up wipes are bleached based and intended for hard surfaces only which can be damaging to skin.

Cover Draining Wounds: An open and draining wound, or one covered with pus, is not only a portal of “exit” for transmitting MRSA to another person, but also a portal of “entry” for becoming infected with MRSA. Keep open and draining wounds covered and away from others!

Skin-to-Skin Contact: Avoid skin-to-skin contact with others that have open wounds. This is not always possible in sport settings such as football, wrestling, martial arts, and

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other combative activity which is even more reason to thoroughly wash your body as soon as possible after the skin-to-skin contact activities.

Cleaning & Irrigation of Skin: Beyond generous flushing with clean water and washing with antibacterial soap, topical antiseptics such as *Hibiclens*® (4% Chlorhexidine gluconate) can be used to fight MRSA. *Chlorhexidine topicals* kill germs on skin and are used before surgeries with healthcare providers to reduce the risk of infections; however, *Hibiclens is TOXIC and must be kept away from face and head to prevent permanent eye and ear injury!*

Sharing Personal Items: *Never share towels and razors!* MRSA infections have been caused in sport settings by sharing these personal items. Avoid sharing washcloths, clothing, or uniforms that have not been properly cleaned. Many athletes shave body parts like legs and chest even if they aren't body builders. Shaving can create small openings in the skin leaving the person at-risk for infections when sharing a towel with a MRSA-infected teammate.

Clothing & Laundry: Wash clothes in question with detergent and HOT water (>140 degrees) then dry on HOT to further kill bacteria. Bleach can also be added as an extra precaution. It is recommended after visiting a clinical setting such as a hospital or nursing home, to immediately change clothes. Doctors are again being encouraged to begin wearing lab coats again as a protective skin barrier to MRSA and other infections.

Gyms & Exercise Equipment: Some gyms now have special antibacterial solutions available for members in the form of sprays or towelettes. *Clini-Tech Spray*® is an EPA-registered and hospital-grade disinfectant (www.medtrol.com) that kills MRSA, HIV-1, Hepatitis C, and many other forms of infection. *Gym Wipes*® (www.gymwipes.com) are EPA-registered antibacterial disinfectant towelettes that kill 99.9% of germs. These are products I'm using for corporate clients, and both will decrease the risk of infection and cross contamination in your exercise setting. ***Make sure your gym has a hygiene process in place for dealing with MRSA infections and blood-borne pathogens.*** Many commercial gyms today still do not know what MRSA is or how to deal with it! *Make sure to do YOUR part—wear a shirt and wipe sweat off equipment with your own clean towel when finished. Insist that others do the same!*

Other Hard Surfaces: For close-quarters like barracks along with bathrooms, an EPA-registered detergent disinfectant or a **1:10 bleach solution** is recommended. For countertops, exam tables, and other treatable surfaces, a diluted bleach solution of **1 tablespoon bleach to 1 quart water** is recommended. **Human contact environmental surfaces like doors, handles, knobs, and other frequent hand-contact equipment phones and computer mice require more intensive cleaning and sterilization.*

Primary References: U.S. Navy Environmental Health Center (www.nehc.med.navy.mil); National Institute of Corrections (nicic.org); Centers For Disease Control (cdc.gov); wikipedia.org; webmd.com; drugs.com; foogle.biz; pets-mrsa.com; nnff.org.

Product Resources: *Clini-Tech*® Spray (medtrol.com); *GymWipes*® Towelettes (gymwipes.com); *Purell*® Hand Sanitizer (phizerch.com); *WaterJel*® Hand Sanitizer (waterjel.com); **WetOnes*® Antibacterial Wipes (wetones.com).
*Does NOT kill MRSA—only regular staph, e-coli, & strep!

References: To view all Ron Jones MRSA Education & References, go to: www.ronjones.org/Weblinks/MRSA.html

* Ron Jones (1.18.08)