

# ***Recognizing and Preventing Methicillin Resistant Staphylococcus Aureus (MRSA)***

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## Introduction

By now, most of the general population has heard about the “Super Bug” or Methicillin-Resistant Staphylococcus Aureus (MRSA). MRSA is a particular strain of staphylococcus aureus that is resistant to many antibiotics. It is found on the body’s skin and in the nasal passageways and does not cause the body any problems (9). MRSA infections can be found on many common surfaces including all types of weight-training and fitness equipment. This bacterium becomes a threat once it enters the bloodstream, most often through a cut or abrasion. If these cuts or abrasions are unrecognized, or are improperly cared for from lack of good hygiene or continual wound openings, the staphylococcal bacteria can cause a MRSA infection in the body.

Settings where people are close to each other, have repeated direct contact, participate in activities that may cause a break in the skin’s surface, share personal items, or have bad hygiene are situations where MRSA infections are likely to occur (8). Personal trainers and strength coaches should be aware of wounds their clientele receive to ensure the wounds are properly cared for and monitored. Taking proper measures and precautions will help prevent the spread of MRSA within the various health and fitness settings. The remainder of this article will provide relevant information regarding the epidemiology, prevalence, signs/symptoms, and prevention of MRSA.

## Epidemiology and Prevalence of MRSA

Staphylococcus aureus was first identified in the 1880s and was treated with penicillin, an antibiotic discovered in 1941. Overuse of this antibiotic led to a resistance of penicillin by the 1960s (1). The antibiotic methicillin, a semi-synthetic penicillin, was then developed and used for the treatment of staphylococcus aureus infections (10). Once again, MRSA mutated and developed a particular strain of staphylococcus aureus that is resistant to many other antibiotics.

The first reported case of MRSA occurred in 1961. This case was documented in a hospital in the United Kingdom. The United States saw its first case of MRSA in 1968, also occurring in a hospital setting (12). The presence of this strain of staphylococcus aureus was named Hospital-Acquired MRSA (HA-MRSA). This infection became prevalent in hospitals all over the world, usually showing resistance to multiple antibiotics (13). Up until 1980, MRSA was only found in health care facilities, hence the name HA-MRSA. In 1980, however, a MRSA case was reported outside of the hospital setting in the United States. Throughout the 1990s, and still today, MRSA has developed into a widespread problem in communities throughout the country. The name Community-Acquired MRSA (CA-MRSA) is given to cases that are not obtained in hospitals (12). Infections caused by CA-MRSA have been reported in multiple states across the US and throughout many countries (5). The most common sites of infection for both HA-MRSA and CA-MRSA are the skin and soft tissues. Risk factors for HA-MRSA infections are not usually present in CA-MRSA infections. The average age of people who acquire HA-MRSA is 68 years, compared to 23 years for the CA-MRSA strain (13).

When a person is said to be a carrier of MRSA, it simply means that he/she has the bacteria of MRSA or *S. aureus* on his skin, or more commonly his nasal cavity, and maintains no appearance of symptoms for infection (6). Those who are at risk of being a carrier are those who work in the medical field, have had a MRSA or *S. aureus* infection previously, live in close quarters, and share personal items.

The MRSA infections that are the most severe and are the leading cause of death from an infection include, but are not limited to, invasive necrotizing pneumonia, necrotizing fasciitis and osteomyelitis. These infections affect the lungs, fascia and bones and can all be prevented if an infection is diagnosed and properly treated in the early stages. These life-threatening cases develop over time and are rare among patients who know the signs and symptoms of MRSA and seek medical attention.

## Signs and Symptoms of MRSA

Active people are placed in susceptible settings every day, allowing for an increased risk of acquiring MRSA. Because of this, personal trainers and strength coaches should have knowledge about MRSA and how to recognize the infection. Common signs of an infection may include warmth, redness, swelling, and pain in the infected area. Staphylococcal infections are grape-like clusters that may appear anywhere on the skin (7, 10). Some well-known staphylococcal infections are boils and carbuncles. Cutaneous MRSA infections may initially look like an ingrown hair, pimple, or spider bite but will eventually develop into a puss-filled abscess, lesion, or boil if left untreated. It is possible for MRSA infections to become open wounds or ulcers. Many times there will be only one abscess; however, it is possible for multiple lesions to be present (5). These abscesses may also be surrounded by cellulitis, a generalized infection of the cells in the area of the abscess. It is not as commonly seen, but MRSA may also appear as impetigo or folliculitis (5). A key symptom of a MRSA infection is pain. This pain is experienced over the area that surrounds the abscesses (13, 18). This pain is due to the beginning of tissue necrosis (18).

MRSA infections develop rapidly, so early recognition is vital. Marking the area of infection and watching it for growth or changes may help to determine if MRSA is present, due to its rapid growth. Mild infections are classified as a small lesion or abscess, less than five centimeters in diameter. With moderate infections, the abscess or lesion will grow larger than five centimeters in diameter and a fever may be present. Severe infections will have large or multiple abscesses which may include cellulitis and a related systemic disease may also be present (1). Personal trainers or strength coaches should refer the client to a physician if uncertain about a suspicious area.

Even though 75 percent of CA-MRSA infections occur on the skin or soft tissue, they may also develop in the bloodstream, respiratory tract, bones, joints, or urinary tract resulting in a more severe infection that may require hospitalization to control (13). Fever, chills, night sweats, and general malaise may occur when these infections become systemic. Without prompt treatment, critical illnesses and even death can occur as a result of MRSA. Bacteremia (bacteria in the blood) can occur in severe cases of MRSA, leading to endocarditis, (an inflammation of the heart's cavities), or Sepsis Syndrome. Sepsis Syndrome is shock caused by an abundance of toxins present throughout the body, and if not treated, can result in failure of many organs, or even death (1, 2). MRSA can also contribute to necrotizing fasciitis, a toxic disease that shows signs of tissue edema and tissue death that typically develops in the limbs, but can rapidly progress and affect all areas of the body (19). Necrotizing pneumonia is another severe illness that may develop in advanced cases of MRSA. It is characterized by influenza-like symptoms that eventually lead to respiratory failure (2). All of these serious illnesses occur when MRSA infections are not properly managed in a timely manner.

## Treatment of MRSA

The growth of MRSA happens quickly, progressing from what looks like a pimple or spider bite to an abscess and cellulitis within days, so early recognition and proper treatment are important. When early signs of infection are present and treated with topical antibiotics and no improvement is seen, a more serious infection may be present. If MRSA is suspected, an individual should be referred to a doctor to receive proper treatment, which typically involves incision and drainage of the abscess and a bacterial culture to determine if MRSA is present (14). Some small abscesses may be treated effectively with surgical incision and drainage alone, and may not require antibiotic treatment. Antibiotics are usually needed with large abscesses, especially if they have surrounding cellulitis or cannot be drained (16). It is very important to have the infected area cultured and antibiotic susceptibility tests performed for the evaluation, treatment, and control of MRSA (5, 17). After determining the type of existing infection, antibiotics may be prescribed to treat the infection. Appropriate antibiotics (i.e., vancomycin, clindamycin, or trimethoprim with sulfamethoxazole) must be selected to effectively treat MRSA infections (7). If the infection does not respond to the antibiotic being used, the infection will worsen. Therefore, knowing what antibiotics will treat MRSA is especially important for treatment.

Doctors will treat infections with antibiotics if there is rapid growth with possible cellulitis, if the abscess is in an area that is difficult to drain, if there is no response to initial treatment, or if there are symptoms of a systemic infection (10). Both topical and oral antibiotics are used in the treatment of MRSA with the possibility of intravenous antibiotics if needed. It is important to properly follow the doctor's instructions and take the entire dose of medicine prescribed to help treat the infection. Oral antibiotics are commonly given for a period of 10 – 14 days, however, duration of treatment depends on the severity of the infection and how the individual responds to the medication. If the infection is severe and patients respond slowly, a 2 – 3 week treatment may be necessary (5). If the MRSA infection does not improve after completing the prescribed antibiotics, or it worsens, hospitalization and even surgery may be necessary to eliminate the infection (3).

## Prevention Plan for MRSA

Prevention of MRSA is the most vital step in controlling the spread of infections. Each health and fitness facility should have an established prevention plan that is shared with all employees. Contraction and transmission of MRSA infections have been associated with many risk factors. One risk factor includes direct skin to skin contact/transmission. This occurs when there is contact between an infected individual and another person, whether intentional or unintentional. Another risk factor is the damage to the skin's tissue surface, which can facilitate the entry of the bacteria into the body. Sharing contaminated personal items, such as towels, razors, clothing, and sporting equipment can lead to the transmission of MRSA from one person to another. Humid environments also facilitate transmission (4, 5). Procedures and policies that are established to eliminate the causes of transmission, may be effective in preventing the spread of MRSA and its cutaneous infections (4).

Effective procedures for eliminating the MRSA bacteria in health and fitness settings include basic hygiene practices, frequent hand washing and showering, limiting exposure, protecting the skin, safeguarding water sources, wearing clothing and equipment that are clean, cleaning equipment and surfaces, maintaining proper use of antibiotics, and reporting any potential infection symptoms. Discussing these precautions in further detail is necessary before implementing them into any preventive plan.

Practicing basic hygiene is fairly easy to incorporate into one's lifestyle. Basic hygiene includes showering after all practices and games and washing hands with soap and water regularly (18). Hand washing should include brisk scrubbing for at least

15 – 20 seconds, rinsing in warm water and full drying. If washing the hands with soap and water is unavailable, a hand sanitizer containing at least 60 percent alcohol should be used (4, 11). Additionally, cuts and abrasions should be cleaned and covered with sterile, dry bandages until healed. Follow a healthcare provider's instructions for when and how often to change bandages and dressings, as well as, how to properly clean infected areas (4, 15).

Limiting exposure to those unaffected or affected by an infection involves minimizing contact between those who are infected with those who are not infected (11). This also includes individuals not sharing personal items with others. Towels, razors, clothing, and exercise equipment are easily contaminated and can transmit bacteria from one item to another. These items should not be shared among individuals (4, 15, 18).

Protecting the skin from exposure and possible infection involves wearing protective clothing or gear that is designed to prevent skin abrasions or cuts is useful in preventing wounds, which are susceptible to infection (4). Other preventive steps include frequently changing socks and undergarments, and drying shoes between uses (11). In addition, protecting water sources from possible contamination is essential in preventing MRSA from spreading. Water bottles should not be shared and water fountains should be sanitary and properly disinfected (11).

Since exposure to contaminated towels and protective equipment is a main cause of infection disinfection and cleaning of these items is important in preventing infections (15). Linens and clothing should be washed in hot water, with bleach if possible. Equipment should be cleaned after every use and not shared among individuals who do not own or normally use them (10, 15).

Cleaning practice surfaces and commonly touched surfaces is also a necessity. These items include mats, crash pads, and other equipment such as counters, table tops and door knobs. Disinfectants that advertise the ability to kill the MRSA bacteria should be used after every use and on a daily basis to prevent cross-contamination and further transmission of the bacteria (4, 10, 15).

When prescribed an antibiotic for any reason or sickness, it is essential to complete the full allotment of the prescription. Inappropriate use of antibiotics can contribute to drug resistance and mutations of bacteria. Do not share antibiotics for any reason and consult a primary physician if the situation does not improve after a few days of treatment (15).

Lastly, report an infection immediately if one is detected. If an infection is suspected, refer the client to a doctor or tell a parent, coach, athletic trainer, school nurse, team doctor or other healthcare provider. Early detection and treatment of an infected area will decrease the chance of spreading the infection to others. The sooner an individual can start treatment for an infection, the less likely it will become severe and the less likely the individual may have to be hospitalized (4, 15).

**Summary**

Infections can develop frequently and need to be properly treated. In health and fitness settings it is critical to recognize the signs and symptoms of an infection and know how to manage the condition. Without early recognition, infections can grow and are likely to spread to others. Basic treatment of infections includes cleaning, applying antibiotic ointment, and covering the wound. When the wound continues to deteriorate, MRSA could be present. Treatment requires sending the client to a physician for a proper diagnosis. Until MRSA is completely eliminated, the infected site should remain covered and protected. Prevention is the key to stopping the spread of MRSA. Sharing personal items should be discouraged. However, maintaining good hygiene and sanitizing equipment are critical. Following proper precautions and treatment methods will help reduce the risk and keep clientele safe from the spread of MRSA.

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