

## Can a MRSA skin infection bench my team?

Annotated Bibliography: Methicillin-resistant *Staphylococcus aureus* (MRSA) Skin Infections in Athletes



Begier E.M., et al. (2004). A High-Morbidity Outbreak of Methicillin-Resistant *Staphylococcus aureus* among Players on a College Football Team, Facilitated by Cosmetic Body Shaving and Turf Burns. *Clinical Infectious Diseases* (2004) 39 (10): 1446–1453.

Ten out of 100 college football players on a Connecticut team were diagnosed with MRSA skin infections during a three-week period between August and September 2003. Two of the ten were hospitalized.

Cornerback defensive backs and wide receivers had the highest infection rates (50% and 33%, respectively) and accounted for eight of the ten cases. Players who sustained turf burns had a risk of infection that was seven times higher than for players without turf burns. Players who reported body shaving (other than the face) were 6.1 times more likely to develop MRSA infections. Shaving around the genitals or groin was associated with a higher risk rate (43%) than shaving other areas.

Possible risk factors also included (1) no soap available for use in showers; (2) water used to wash towels was 44.4°C instead of 71°C and chlorine bleach was not used; (3) in several case patients reported playing football with open wounds; and, (4) cases with turf burns reported using the cold whirlpool.

Benjamin HJ, Nikore V, Takagishi J. (2007) Practical Management: Community Associated Methicillin-Resistant *Staphylococcus Aureus* (CA-MRSA): The Latest Sports Epidemic. *Clinical Journal of Sports Medicine*. 17(5): 393-397, September 2007.

Skin-to-skin contact seems to be the primary mode of transmission among athletes. Good hygiene, prompt identification of infections, limited exposure to infected persons and contaminated objects, and proper treatment of athletes with close monitoring will help contain outbreaks. Benjamin believes that universal education is needed for all athletes and personnel who provide care to athletes to control the spread of MRSA.

Bowers AL, Huffman GR, Sennett BJ. Methicillin-resistant *Staphylococcus aureus* infections in collegiate football players. *Medicine and Science in Sports and Exercise* [2008, 40(8):1362-1367].

Data from three Division-1 collegiate football programs were consolidated and analyzed. Of the 491 collegiate football players, 33 (7.7% were diagnosed with MRSA infections. Skin infections included abscesses (70%), cellulitis (16%), folliculitis, impetigo, and necrotizing faciitis (4%). Extremity infections (30) greatly exceeded truncal infections (7). There were no differences in occurrence by player position. Infections occurred predominantly in the first third of the season.

Buss BF, et al. Population-Based Estimates of Methicillin-Resistant *Staphylococcus aureus* (MRSA) Infections Among High School Athletes—Nebraska, 2006–2008. *Journal of School Nursing* August 2009 25(4) 282-291.

To determine statewide incidence among high school athletes in Nebraska, Buss et al., survey all 312 all high schools with 271 (86.9%) responding. Schools were asked which sports programs were offered, how many participated in each program, number of athletes with physician-diagnosed MRSA infections and athlete's sport at infection onset. MRSA infections were reported by 4.4% (12/270) and 14.4% (39/271) during school years 2006–2007 and 2007–2008, respectively. From 2006/7 to 2007/8, MRSA incidence per 10,000 wrestlers increased from 5.0 to 25.1. Incidence among football players was also substantially higher in 2007/8 than in 2006/7.

Centers for Disease Control and Prevention (CDC) Methicillin-Resistant *Staphylococcus aureus* Infections Among Competitive Sports Participants---Colorado, Indiana, Pennsylvania, and Los Angeles County, 2000--2003. *MMWR*, August 22, 2003/52(33); 793–795.

Clusters of skin and soft tissue infections have been associated with MRSA among participants in competitive sports. Risk factors for infection include physical contact, skin damage, and sharing of equipment or clothing.

In February 2003, a cluster of MRSA infections was reported among members of a Colorado fencing club and their household contacts. Three confirmed (hospitalized) and two probable cases were identified in this fencing club with 70 members. Clothing, masks, and weapons may have been shared. Sensor wires (worn under clothing) were routinely shared and had no routine schedule for cleaning.

Clusters of skin infections were also reported in college and high school football and wrestling teams from 2000–2003 in Pennsylvania, Indiana, and Los Angeles County. The number of infected persons per team ranged from two to ten players. In Pennsylvania, seven out of ten infected players were hospitalized. CDC assisted in an investigation that identified several possible risk factors including skin trauma from turf burns, body shaving, and sharing unwashed bath towels. In the Los Angeles outbreak, which was among members of a college football team, health department staff identified shared balms and lubricants as possible risk factors.

The findings underscore:

- The potential for MRSA infections among sports participants.
- The need for health-care providers to be aware that skin and soft tissue infections occurring in these settings might be caused by MRSA.
- The importance of implementing prevention measures by players, coaches, parents, and school and team administrators.

Cohen P.R. (2005) Community-Acquired Methicillin-Resistant *Staphylococcus aureus*: Skin Infection Presenting as an Axillary Abscess with Cellulites in a College Athlete. *SKINmed: Dermatology for the Clinician*, 4: 115-118.

The author presents a case study of a 19-year-old man who developed axillary boils (diagnosed by culture as MRSA) after beginning weight lifting at the university gym in Houston. The 19-year-old had no other risk factors for MRSA. The author briefly reviewed risk factors and treatment of MRSA; a picture of the abscess was included. He noted that community-acquired MRSA skin infections are being recognized with increasing frequency in people participating in athletics.

Como-Sabetti K. et al., (2006). Methicillin-resistant *Staphylococcus aureus* at canoe camp. *Emerging Infectious Diseases*, 12 (11).

Three campers who went on 21-day canoe trips from a Minnesota wilderness canoe camp between June and September 2004 developed MRSA skin infections. One required treatment in intensive care. Risk factors included crowded settings where adequate hygiene could not be maintained, and frequent skin injuries (reported by all campers). One camper, who was not a case, reported having had a positive blood culture for MRSA, and two camp counselors were treated for “spider bites” in the year prior to the outbreak.

Dominguez T.J. (2004). It's not a spider bite, it's community-acquired Methicillin-resistant *Staphylococcus aureus*. *Journal of the American Board of Family Practice*, 17(3), 220-226.

The author presents a case review of ten patients with MRSA who were seen at an indigent health clinic in Texas between 2002 and 2003. Many of these patients had already been diagnosed and treated for their skin infections, but the skin infections had been attributed to other causes such as spider bites, impetigo, and varicella zoster (chicken pox or shingles) and had not healed. A 16-year-old boy reported that his father had been treated for similar lesions while he was in prison. The boy also reported that he participated in high school football but was not aware of other infections in team members.

Howe W. B. (2003). Preventing infectious disease in sports. *The Physician and Sports Medicine*, 31(2), 23-31.

According to the author, preventing infectious disease is fundamental to maintaining an effective team and helping athletes avoid the adverse effects of illness. Howe relates examples of situations where communicable diseases have compromised team playing and adversely affected success. He then gives advice on when to exclude someone from sports, basic hygiene practices to follow, how to protect the immunity of players, and how to stop infection transmission from body fluid and skin lesions.

Frequent hand washing and showering before as well as after close contact sports are points of emphasis. Infectious skin disease must be recognized as soon as possible and infected athletes must be isolated from contact with others that may result in disease transmission. Wrestling rules prohibit participation while bandages cover *potentially* contagious lesions. Howe recommends that this rule become a model for all contact sports. He advises that clothing, personal equipment and towels not be shared and that equipment that directly touches skin, such as wrestling head gear, be sanitized daily; practice surfaces, such as mats, should also be cleaned and sanitized daily.

Kazakova S.V., Hageman J.C., Mataya M., Srinivasan A., Phelan L., et al. (2005). A clone of Methicillin-resistant *Staphylococcus aureus* among professional football players. *New England Journal of Medicine*, 352(5), 468-475.

During the 2003 football season, eight MRSA infections occurred among five of the 58 St Louis Rams players (9%); all of the infections developed at turf-abrasion sites. MRSA infection was found to be significantly associated with the lineman or linebacker position and a higher body-mass index.

Players reported that abrasions were more frequent and severe when competition took place on artificial turf instead of grass. Trainers did not have regular access to hand hygiene products or hand washing facilities when they provided wound care. Towels were frequently shared on the field during practice and games with as many as three players using the same towel. Players did not routinely shower before using whirlpools. Weight training and therapy equipment was not routinely cleaned.

According to the team pharmacy log for the 2002 football season, a team player received an average of 2.6 antibiotic prescriptions a year (greater than ten times the rate among people of same age and gender in the general population).

A retrospective cohort study and nasal swab survey were conducted on 84 St Louis Rams players and staff. No MRSA was found in nasal or environmental samples. (Note: All environmental sampling was performed after infection-control procedures were in place.) Methicillin-susceptible *Staphylococcus aureus* (MSSA), however, was recovered from whirlpools and taping gel and from 35 of the 84 nasal swabs from players and staff members (42 percent). MRSA strains from a competing football team and from other community clusters and sporadic cases were indistinguishable from the strains identified in the Rams' team samples. Additional cases within the team and subsequent cases in an opposing team suggest that competitive play may be increasing transmission.

Lindenmayer J.M., Schoenfeld S., O'Grady R., Carney J.K. (1998). Methicillin-resistant *Staphylococcus aureus* in a high school wrestling team and the surrounding community. *Archives of Internal Medicine*, 158(8), 895-899.

A community outbreak of methicillin-resistant *Staphylococcus aureus* (MRSA) is described and risk factors are identified for MRSA transmission and infection in a high school wrestling team in southern Vermont from 1993 to 1994.

Seven of 32 team members were MRSA-positive (six infected, one colonized). All lesion-positive wrestlers were found to be infected with the same MRSA strain, as were six non-wrestlers who were connected to the high school. Twelve other wrestlers reported having at least one boil during the wrestling season; six of them were documented in medical records. It was not possible to determine to what extent the environment, compared with direct contact with MRSA-infected wrestlers, played a role in this outbreak. Environmental cultures for MRSA after the end of the wrestling season were negative. Heightened personal and environmental hygiene following the outbreak may be responsible for this finding.

Matava M.J., Geier C.D. (2005). Methicillin-resistant *Staphylococcus aureus* skin infections in athletes. *Sports Medicine Update*, January/February, 6-7.

Previously identified risk factors for contact sports participants are summarized. They include (1) abrasions and skin trauma that may facilitate entry of bacteria, (2) frequent physical contact where areas of the skin are exposed, (3) use of shared sports equipment and clothing as well as shared towels and water bottles. Treatment of MRSA infections is discussed, as is prevention. The authors emphasized the importance of familiarizing all persons who are involved with competitive sports teams (players, coaches, parents, team administrators) with the signs and symptoms of MRSA as well as preventative measures. (Preventive measures are outlined in a table.)

Nguyen D.M., Mascola L., Bancroft E. (2005). Recurring methicillin-resistant *Staphylococcus aureus* infections in a football team. *Emerging Infectious Diseases*, 11(4), 526-532.

An outbreak of community-associated methicillin-resistant *Staphylococcus aureus* (CA-MRSA) skin and soft tissue infection (SSTI) occurred in a college football team in Los Angeles County from August to September 2003. Eleven case-players were identified; boils were the most common sign of infection. Linemen had the highest infection rate (18%). Among 99 (93% of team) players with cultured specimens, eight (8%) had positive MRSA nasal cultures. A case-control study found that sharing bars of soap and having preexisting cuts or abrasions were associated with infection. A carrier-control study found that having a locker near a teammate with an SSTI, sharing towels, and living on campus were associated with nasal carriage. Successful outbreak control measures included daily hexachlorophene showers and hygiene education.

Rihn J.A., Posfay-Barbe K., Harner C.D., Macurak A (2005) Community-acquired methicillin-resistant *Staphylococcus aureus* in a local high school football team unsuccessful interventions. *Pediatric Infectious Disease Journal*, 24(9), 841-843.

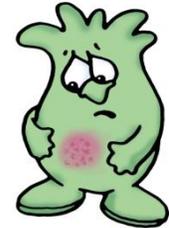
A retrospective study of an outbreak of MRSA in a high school football team during the 2003 season was conducted. Thirteen players (out of a total of ninety) had twenty infections during this time period. No staff members developed infections. When infected and uninfected players were compared, only two risk factors for developing a MRSA infection were found: (1) playing a lineman position and (2) having junior class status. Only one player had a co-infected family member or significant other.

Rihn J.A., Michaels M.G., Harner, C.D. (2005). Community-acquired Methicillin-resistant *Staphylococcus aureus*: An emerging problem in the athletic population. *American Journal of Sports Medicine*, 33, 1924-1929.

The article was designed to review the epidemiology of MRSA skin and soft tissue infections and to give sports medicine physicians an understanding of the diagnosis, treatment and control of MRSA among athletes. The authors summarize reported MRSA outbreaks among various types of sports teams: rugby, football, wrestling and fencing and give advice on preventing the transmission of MRSA.

Sanders JC. (2009) Reducing MRSA infections in college athletes: implementation of a prevention program. *Journal of Community Health Nursing*. October 26(4) 161-72.

An interventional prevention program was implemented with 98 college football players in a Midwestern NCAA Division II college during the 2008 football season. The goal was a 50% reduction in MRSA cases (compared with the previous three seasons' average number of cases (12.6). Results showed a greater than 75% reduction in MRSA for the 2008 season (only 3 cases). The article describes their program.



Turbeville S.D., Cowan L.D., Greenfield R.A. (2006). Infectious disease outbreaks in competitive sports: A review of the literature. *American Journal of Sports Medicine*, 34(11), 1860-1865.

Various infectious disease outbreaks are discussed in this article, including MRSA outbreaks. The authors recommend several ways to prevent bacterial infections: proper immunization, adherence to standard precautions, diligent hand washing and access to hand disinfectants, proper disinfecting of portable water containers, proper laundering of towels and uniforms, and proper disinfection of athletic equipment, training tables, and exercise equipment.