Methicillin-Resistant Staphylococcus Aureus in Athletic Settings

Bernadette D. Buckley, PhD, LAT, ATC and Joel W. Beam, EdD, LAT, ATC • University of North Florida

M ETHICILIN-RESISTANT Staphylococcus aureus (MRSA) continue to be reported, and there is heightened awareness of this infectious disease among those associated with athletic and recreational activities. Although MRSA has primarily been linked to hospitals and other health care facilities, it has recently emerged as a growing concern among high school, college, professional, and recreational athletes. Those involved in athletic and recreational activities, such as athletes, coaches, parents, athletic trainers, and physicians, should become aware of the potential for MRSA infections. The purpose of this report is to present guidelines and recommendations for the prevention, detection, and treatment of MRSA in athletic and recreational settings.

Staphylococcus Aureus

Staphylococcus aureus (S. aureus) is one of the most common causes of skin and soft tissue infection (SSTI). Approximately 30% of healthy, asymptomatic individuals and 65% of patients with staphylococcal skin infections carry S. aureus in their anterior nares. Methicillin-sensitive S. aureus (MSSA) is a strain of S. aureus that is sensitive to synthetic penicillins (i.e., methicillin). Bartlett et al. reported an outbreak of S. aureus furuncles (boils) among 26 players on a high school football team, who had a total of 55 lesions. Cultures obtained from the lesions of two players indicated the presence of MSSA. Strains of S. aureus that have acquired the methicillin-resistant gene (mecA) are referred to as MRSA. The strains of MRSA that have been identified in the health care setting are different from those found in the community. In general, the community isolates, referred to as community-acquired (CA-MRSA), are resistant to fewer antibiotics than those isolates identified in the hospital setting. CA-MRSA typically infects individuals who are healthy and who have no risk factors linked to MRSA infections associated with health care facilities.

CA-MRSA Outbreaks in Athletics

The prevalence of CA-MRSA SSTI reported among athletes has been increasing. The earliest studies identifying the presence of MRSA in athletics were published in 1998. Lindenmayer et al. reported a CA-MRSA outbreak among a high school wrestling team and the surrounding community. Seven of 32 members of the wrestling team tested positive for MRSA. Eleven nonwrestling members of the community also presented with MRSA infections, six of whom had a connection to the high school. The remaining five individuals did not have a known connection to the team or high school, but each had a risk factor associated with MRSA (i.e., recent treatment in a health care facility). Stacey et al. reported an outbreak of MRSA among five members of a rugby football team. Seven of the other 15 members of the rugby team were found to carry MSSA.

More recently, reports identifying MRSA infections among high school, college, professional, and recreational athletes have been published. In 2003, there were reported clusters of MRSA infection among fencers and wrestlers. In Colorado, a fencing
club reported five cases of infection, with three confirmed MRSA cases and two probable MRSA cases. In Indiana, two high school wrestlers on the same team were diagnosed with MRSA SSTI. At the University of Houston, there were seven student athletes (four women and three men) who presented with MRSA SSTI. Three students were weight lifters, two were volleyball players, one was a basketball player and one was a football player.

According to the literature, MRSA outbreaks appear to be most prevalent among football players. Reports have identified MRSA outbreaks among college and professional football teams. During the 2003 football season, Kazakova et al. reported that eight MRSA infections occurred among five of the 58 players of the St. Louis Rams. The infections developed on the elbows, forearms, and knees at sites of skin abrasions (turf burns). In Pennsylvania, 10 college football team members presented with positive MRSA SSTI cultures. A college football team in Connecticut experienced an outbreak of MRSA that affected 10 players among 100 members of the team. Romano et al. presented a three-year (2002-2004) retrospective study of an outbreak of CA-MRSA SSTI in a collegiate football team. During the three-season period, they identified 14 confirmed cases of CA-MRSA.

**Risk Factors**

Salgado et al. conducted a meta-analysis of research pertaining to risk factors associated with CA-MRSA. They reported that the most common risk factors among patients with CA-MRSA included recent hospitalization and chronic illness requiring visits to a health care facility. The most commonly reported risk factors for acquisition of CA-MRSA infection in athletes are injury to the skin and direct contact with a colonized or infected individual.

In football, the incidence of skin trauma due to chafing, shaving, or turf abrasions is naturally high, and MRSA outbreaks associated with skin trauma have been reported. Players with turf abrasions were 7 times more likely to develop CA-MRSA than those without such skin lesions. Athletes who reported body shaving were 6.1 times more likely to develop MRSA infection. Certain player positions have also been associated with the increased likelihood of developing CA-MRSA. Some researchers have reported that playing an interior line or linebacker position and high body mass index are significant risk factors. Begier et al. reported that players at cornerback and wide receiver positions had the highest infection risk, however. The likelihood of MRSA outbreak is increased by direct physical contact, as the bacteria from the skin of the infected player is transmitted to the skin of other players.

A number of other risk factors have been suggested to play a role in the transmission of CA-MRSA, including sharing of personal items, towels, whirlpools, and equipment. Equipment that was not routinely cleaned and that was shared among members of the fencing club was identified as a possible source of MRSA transmission. Begier et al. reported that athletes who frequently shared a cold whirlpool in the athletic training room were 12 times more likely to have a MRSA infection on covered skin trauma sites than those who never shared a whirlpool.

The role that environmental factors, such as sharing of equipment, play in the transmission of MRSA among athletes is inconclusive. According to Begier et al., the sharing of personal items among affected athletes was infrequent and did not appear to contribute to MRSA infection. Most authors agree that direct contact and skin trauma are the most common risk factors for development of MRSA SSTI in athletic and recreational settings. The outbreaks of MRSA among wrestlers, rugby players, and football players may have been the result of direct person-to-person contact with SSTI during drills, scrimmages, and games.

**Prevention**

The dissemination of prevention guidelines to address risk factors is essential for control of CA-MRSA transmission and avoidance of outbreaks. In 2003, the Centers for Disease Control and Prevention developed guidelines for preventing skin infections, including MRSA, among sport team participants. Additional guidelines to address possible risk factors have been proposed. Table 1 presents recommended measures for the control of CA-MRSA.

**Detection**

Confirmation of CA-MRSA is required to guide appropriate treatment, and its existence should be established or excluded for all suspicious wounds. The most prevalent form of CA-MRSA is SSTI, which accounts