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CASE REPORT **OPEN ACCESS**

Management of Wrestling Team with Similar Cutaneous MRSA Infections: A Case Series

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Abstract:

Introduction/ Background: Wrestlers often present with cutaneous infections that are acquired through their sport. This case series outlines the dermatological management of several wrestlers from the same team who presented with infections similarly.

Case Presentation: In the Winter months of 2023, 4 wrestlers from the same northwest Ohio high school team were referred to the dermatologist by their coach because of infection. Through culture and sensitivity testing, it was determined that their infections were all from the same strain of Methicillin-resistant *Staphylococcus aureus* (MRSA), and all were treated with the same oral antibiotics successfully. The dermatologist soon after made an announcement to the state's dermatological association and the high school athletic association, describing the infections so that others could monitor for additional cases in the community.

Conclusion: Dermatologists should perform culture and sensitivity testing on wrestlers who present with suspected infections and notify local agencies in the event of outbreaks. Additionally, they should teach proper hygiene and mat-cleaning techniques to wrestlers and coaches.

Keywords: Case series , Skin to skin transmission, CA-MRSA, Wrestling, Culture and sensitivity testing.

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1. INTRODUCTION

Wrestling is a sport that causes a unique array of dermatologic diseases due to the skin-to-skin contact that is inherent in the sport. While most commonly transmitted infections, such as *tinea species* and herpes simplex virus, cause a simple nuisance and, at worst, disqualification from competition, cutaneous Methicillin Resistant *Staphylococcus Aureus* (MRSA) can cause significant morbidity and mortality in some individuals [1, 2].

MRSA (Methicillin-resistant *Staphylococcus aureus*) is defined as a strain with an oxacillin minimum inhibitory concentration of greater than or equal to 4 micrograms/mL. Infections are categorized as either Hospital-associated MRSA (HA-MRSA) or Community-associated MRSA (CA-MRSA).

CA-MRSA, which is the division of MRSA that is acquired *via* the sport of wrestling, is predominantly associated with cellulitis and necrotizing fasciitis, which often leads to hospitalization [2]. Wrestling teams work to limit the rates of CA-MRSA through consistent skin checks of wrestlers; however, this does not prevent cases that are subclinical. MRSA regularly colonizes wrestling rooms, as demonstrated in a study by Stanforth *et al.*, who collected samples from athletic training and wrestling rooms in nine Ohio high schools. They found that 100% of the sites had at least one sample test positive for MRSA [3]. With the bacteria present in the environment, open skin wounds

that are commonplace in the sport of wrestling allow for infection to take place, and it is not uncommon for MRSA infections to rapidly spread throughout wrestling teams and tournaments [4, 5, 6, 7]. In order to limit the spread, skin checks should be performed regularly by coaches and referees, and those athletes who show signs of any skin infections should be referred to a dermatologist. In cases of MRSA, antibiotic susceptibility can be determined through culture and sensitivity testing, which may be used to guide treatment [8]. We present a case series of an 'easily treatable' form of Methicillin-resistant Staphylococcus aureus (MRSA) in two wrestlers from the same school with open skin sores.

2. CASE PRESENTATION

In the winter months of 2023, during the high school wrestling season, a local wrestler presented to the dermatologist with a skin wound that revealed MRSA. After culture and sensitivity testing, the bacterial colony was shown to be resistant to cefazolin and oxacillin but sensitive to clindamycin, doxycycline, trimethoprim-sulfamethoxazole, and intravenous vancomycin. After 38 days, a wrestler from the same high school team as the first patient came to the same dermatologist with a skin wound.

This wound was diagnosed as MRSA, with identical antibiotic sensitivities to those of the first patient. Both patients were successfully treated with doxycycline 100 mg twice daily (bid), Bactrim DS bid for one week, and the application of Neosporin ointment. Since both MRSA colonies shared the same antibiotic sensitivities, it can be inferred that the bacteria were of the same strain.

Of note, one week after the second wrestler presented to the same dermatologist, two more wrestlers from the same team presented with superficial abrasions that were swabbed for bacterial culture. While waiting for the bacterial sensitivity test to return, the dermatologist opted to treat both patients in the same fashion as their two earlier teammates with a combination of oral antibiotics.

Although no active surveillance screening was initiated, PCR testing for MRSA or cultures of the nares, oropharynx, and perineum could have been performed. Soon after the encounters, the dermatologist notified the Ohio State High School Athletic Association and the Ohio Dermatological Association about the infections, specifying the regions affected and the successful treatment methods. We adhered to HIPAA guidelines throughout the process.

3. DISCUSSION

Due to the high prevalence of this specific MRSA strain, it is likely part of the normal flora for many wrestlers in the region. The goal of notifying local dermatologists and the athletic association was to raise awareness about the sensitivities of potential CA-MRSA infections.

Of note, skin checks are routinely performed by both coaches and referees during wrestling practices and tournaments. These checks are generally the first line of defense for stopping the spread of disease, even though most of those who are performing the checks have no formal medical background. Because of this, dermatologists can play a crucial role in their community through education and relationships with local athletic programs to prevent the massive spread of infection. The dermatologist in the case described above sees wrestlers in their office within 24 hours of being contacted. Through community outreach, local coaches know to reach out to this specific dermatologist when their wrestlers present with signs of skin infections. This should be the goal for all dermatologists, where possible.

This case brings about a discussion of dermatological care for athletes, in which disease can rapidly spread. Wrestling uniquely causes a higher rate of skin infections compared to other sports. In a study of 20,858,781 high school athletes, it was shown that 73.6% of the skin infections reported were from the sport of wrestling [9]. Additionally, wrestlers may have colonies of MRSA present on their skin more often than the average athlete, as shown in a study by Champion *et al.*, in which 76% of colligate wrestlers sampled were colonized by MRSA compared to 35% of all colligate athletes sampled [10].

The skin-to-skin contact that is inherent in the sport of wrestling is likely to be blamed for this high rate, as surfaces are not considered a significant source of bacterial growth [11, 12]. Due to this, encouraging athletes to maintain proper hygiene becomes essential in the preventative treatment of athletes.

Providers of all backgrounds can use this case as an example of the importance of considering patient history when drawing conclusions. These wrestlers were all referred to the dermatologist by their coach after routine skin checks. Without knowing that the patients were from the same team, it is unlikely the dermatologist would have concluded that their infections shared the same antibiotic sensitivities. Dermatologists should specifically ask patients whether they participate in sports, particularly wrestling, during the history portion of a patient encounter.

Culture and sensitivity testing is an invaluable tool for dermatologists when managing wrestling team infections. By utilizing this test, dermatologists can determine the antibiotic sensitivity of the bacteria, which can guide treatment decisions for future athletes who are likely to have come into close contact with the same bacterial strain [13].

To limit the spread, skin checks should be performed regularly by coaches and referees, and those athletes who show signs of MRSA infection, among other skin infections, should be referred to a dermatologist. Coaches and dermatologists should work as a team, as both parties can provide helpful information to limit infection. Coaches can provide an important history of the athletes, and their role in screening through regular skin checks is essential to patient care.

Dermatologists can act as the “coach” for the coach, by providing evidence-based information as to what the

best practices are for preventing disease and guiding them on how to keep wrestlers safe. Additionally, seeing wrestlers promptly after they are called in allows them to spend less time away from competition and practice.

Preventing the spread of infectious agents in wrestling is crucial to protecting wrestlers from infections. Several practices are in place to reduce transmission. Wrestling mats are known to harbor infectious agents, particularly MRSA, which can be transmitted to wrestlers who come into contact with them [3]. To minimize bacterial load, it is recommended to mop mats in a backward motion before competitions and practices using a residual disinfectant, ensuring the mats are properly air-dried before use. This method has been shown to reduce the bacterial load on mats by 63% compared to nonresidual disinfectants [14].

It is our opinion that wrestlers should take a soap-and-water shower as soon as possible after any practice or competition to eliminate many common pathogens, including MRSA [2]. In recent years, antimicrobial wipes, often containing tea tree oil, have become commonplace in many wrestling rooms. However, there is limited evidence in the literature supporting the antimicrobial properties of tea tree oil.

Tea tree oil has demonstrated a relevant spectrum of activity against scabies mites [15]. However, none of the patients in this study exhibited the typical clinical signs of *Sarcoptes scabiei* infestation, such as itching or erythematous papules at their lesions, on presentation [16]. It is important to note that skin scraping was not performed. Wrestlers are particularly susceptible to scabies infestations due to skin-to-skin contact [1], and complement inhibitors produced by scabies mites create favorable conditions for *Staphylococcus* infections [17].

Thus, dermatologists may consider the promotion of these antimicrobial wipes to coaches and wrestlers alike for the prevention of scabies infestation and should contemplate scabies infections as a potential driver for MRSA infection. While such products may prove useful in combating antibiotic resistance, their exclusive use requires more extensive research [18, 19].

In addition, more aggressive antimicrobial wipes may reduce the natural skin microbiota, which would allow for pathogens to colonize. Therefore, showers with soap and water should still be the first-line prevention technique, while wipes may be used in conjunction. This is an area with significant gaps in the literature that warrants further exploration.

The application of alcohol-based hand gel directly before matches is another way to combat the spread of infection. Young *et al*., in their study of 231 collegiate wrestlers, discovered that the use of alcohol-based hand sanitizers reduced bacterial load by an average of 78% [14]. Encouraging athletic organizations to provide alcohol-based hand gel at the check-in table right before a match begins can be a simple yet effective way to reduce the bacterial spread between wrestlers.

Although it was not performed in this patient group, nare swabbing for wrestlers with chronic, recurring *S. aureus* infections could be a useful method for detecting colonization of specific strains. However, a study of collegiate athletes over the course of a season suggested that MRSA colonization alone may not be sufficient to trigger an outbreak [20]. Prophylactic treatment for *Tinea gladiatorum* in wrestlers has been shown to be an effective preventive measure [21], but no studies have investigated the prophylactic use of antibiotics in this susceptible group. This represents a gap in the research that holds significant potential for dermatologists who regularly treat wrestlers.

One therapy utilized for patients with recurrent *S. aureus* infections is bleach baths, which have shown to be an affordable method to eliminate colonization [22]. While there are no standard guidelines associated with bleach bath use for wrestlers, it has been proposed for use in other sports like ice skating [23]. Due to the evidence supporting its effectiveness, bleach bath may be considered an adjunctive chronic therapy for wrestlers who exhibit recurrent bouts of *S. aureus* infection.

While we have mainly outlined the prevention of skin infections, the close contact of wrestlers makes them susceptible to many other communicable diseases. The sport of wrestling forces athletes to be inches away from competitors, creating an ideal environment for infectious agents to be easily transmitted. Because of this, it is also recommended that wrestlers receive the annual influenza vaccine [14].

CONCLUSION

Dermatologists, coaches, and referees play a crucial role in maintaining the health of wrestlers by promoting proper hygiene and effective treatment of infections. To summarize, it is recommended that coaches and referees conduct skin checks before every practice and match, and that dermatologists see wrestlers as soon as possible. This team-based approach is an effective way to treat infections and prevent their spread. In the event of a widespread infection, athletic dermatologic associations should be notified to raise awareness of the outbreak. Culture and sensitivity testing can be a valuable tool for isolating bacteria and determining antibiotic sensitivities, which can then be used to guide treatment for future patients in the event of an outbreak. Mats should be sanitized with residual agents and dried before use, and wrestlers should use soap and water to clean their skin after wrestling. Additionally, tea-tree oil-based wipes may be considered for scabies prevention.

Additionally, wrestlers should use alcohol-based hand gel before matches, receive the annual influenza vaccine, and consider bleach baths during the season. By following these guidelines, we hope that infectious outbreaks related to the sport of wrestling can be limited. Moreover, we have identified a gap in the research regarding the prophylactic use of antibiotics for wresters susceptible to *S. aureus* infections, and call for further investigation into this area.

AUTHORS' CONTRIBUTIONS

It is hereby acknowledged that all authors have accepted responsibility for the manuscript's content and consented to its submission. They have meticulously reviewed all results and unanimously approved the final version of the manuscript.

LIST OF ABBREVIATIONS

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ETHICS APPROVAL AND CONSENT TO PARTICIPATE

Not applicable.

HUMAN AND ANIMAL RIGHTS

Not applicable.

CONSENT FOR PUBLICATION

No consent was required as all protected health information has been excluded from this report, and patients are completely de-identified.

STANDARDS OF REPORTING

CARE guidelines were followed.

AVAILABILITY OF DATA AND MATERIALS

The data and supportive information are available within the article.

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CONFLICT OF INTEREST

The authors declare no conflict of interest, financial or otherwise.

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