



SPORTS AND ATHLETICS PREPARATION,
PERFORMANCE, AND PSYCHOLOGY



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SPORTS MEDICINE AND TRAINING TOOLS



BRENDA D. CARMICHAEL
ALAN B. MITCHELL
NOVA EDITORS

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PREFACE

Sports medicine is an area of health and special services that apply medical and scientific knowledge to prevent, recognize, manage, and rehabilitate injuries related to sport, exercise, or recreational activity. This book examines research in the study of sports medicine, as well as training tools used to increase endurance and improve performance in athletics. Topics discussed include wrestling with herpes; steroids in interscholastic athletics; the importance of parent physical activity levels in children's health; biomechanics of martial arts; bioenergetical assessment and training control in cyclic sports and the reasons why college athletes continue to play through pain during competition.

Chapter I - A recent outbreak of herpes gladiatorum took place in a northern Midwestern state that affected 24 high school athletes from ten different schools who were diagnosed as having herpes gladiatorum (HG). In an unprecedented move the state high school league imposed a statewide shutdown of the sport for eight days in the middle of the season. A previous study indicated that not only are medical personnel not fully trained to diagnose HG but national guidelines are too lax in checking for possible symptoms for it. Because this was not the first time that such an outbreak has occurred in wrestling in the state, it should have been a foreseeable issue. The concepts of foreseeability, likelihood and impact will be addressed and applied to the implementation of an effective risk management plan. Through the implementation of a risk management plan such episodes as cited in the case study may be prevented from happening.

Chapter II - Within the environment of sport, athletes must often overlook and ignore pain and injury to be successful. In light of this, the current study, using an open-ended question, explored reasons why collegiate athletes made the decision to play through pain during competition. Male ($n = 67$) and

female ($n = 60$) collegiate athletes from a variety of sports completed a demographic questionnaire and an open-ended question asking the reason why they played through pain during competition. Of the 127 participants, 77 (61%) reported that they had played through pain during competition. Data analysis included two researchers individually coding participants' answers. Five major labels –for the self, nature of sport, for others, pain, and self-presentation – explained why athletes' were determined to play through pain during competition. Participants' responses suggest they have internalized the norms of the sport ethic and the culture of risk.

Chapter III - Despite the notoriety that steroid use has attained, relatively little research has been conducted regarding interscholastic athletics. Miller and Wendt (2007) reported that more than twice the number of the state athletic directors perceived that steroid use was extensive throughout the United States than in their state. Additionally, the results indicated that while 40% were uncertain whether interscholastic athletes in their program had taken steroids, 25% of the athletic directors had suspected athletes in their program had done so. Moreover, nearly 30% had suspected athletes from other athletic programs had used steroids. However, a limitation of this study was that the ascertained information came from only one state. This study expanded this number to three states. The results indicated that 33% of the respondents suspected athletes in their programs of taking steroids while 65% had suspected had suspected interscholastic athletes in other programs of taking steroids

Chapter IV - Rates of childhood obesity are reaching epidemic levels. The purpose of this investigation was to determine if parent behavior and expectations are associated with estimates of their children's leisure time activities and their adult body size. Bandura's (1986) social cognitive theory guided the investigation. Participants were 121 parents of 65 kindergarten and 56 fifth grade students from a mid-sized rural school district. The majority of parents were minorities with a low percentage of parents having obtained degrees beyond a high school diploma. Parents completed measures to assess their physical activity level, their preferences for their children's leisure time activity, estimates of time spent in a variety of leisure time activities, and an estimate of their children's adult body size as an adult. Parents spent very little time in physical activity though their preference was for their children to be active. Path analysis was conducted on a model that described relationships between parents' activity levels and their preferences for their children's activity, parents' activity levels and that of their children, and parents' preferences for their children's physical activity and their children's time spent

in physical activity. An association was also posited between parents' preferences for their children's physical activity and their children's body size as an adult. Path analysis goodness of fit indices indicated a good fit (e.g., $SRMR = .02$, $CFI = 1.00$). All associations were in the hypothesized direction. In addition, the greater preference for children to be active was associated with a decrease in estimated body size as an adult by the parents. The percent of variance accounted for ($< 10\%$) in the significant paths do suggest that several important variables were missing in our model. Future research longitudinal research that incorporates more extensive measures of both parents and their children are discussed.

Chapter V - Training control and evaluation of athletes are currently fundamental tools to increase the efficiency of the training process. Thus, coaches and their collaborators often implement a set of tasks that allow evaluating the level of development of the athletes' performance determinant factors as well as the result and adequacy of the training exercises and programs.

Due to their characteristics (individual, cyclic, closed and combined), several sport modalities, including running, swimming, cycling and rowing, are more prone to be evaluated. From the several determinants of the specific performance of these athletes, the bioenergetical and biomechanical factors are recognizably important and, therefore, focus of attention.

The purpose of the present chapter is to present recent data regarding bioenergetical assessment of performance in cyclic sports, giving more emphasis to running and swimming. The bioenergetical studies presented focus on the characterization of the capacity and power of the two larger body energy systems (the aerobic and the anaerobic ones) through the assessment of well-known physiological parameters like the anaerobic threshold, the maximal oxygen uptake (and the corresponding velocities) and the maximal blood lactate concentrations. Complementarily, recently proposed tests are also presented (e.g. critical velocity).

The authors hope that the presented results could be well accepted and usefull to athletes, coaches and scientists in their training control programs, helping them to increase the training efficiency and even contributing to predict performance

Chapter VI - The pioneer studies on the biomechanics of martial arts were published in the nineteen sixties and seventies. After these articles were published, several other biomechanical studies have been conducted about martial arts and other related punching sports using a variety of different measures and methods, especially in the last decade. In general, these studies

were concerned with the enhancement of performance and extending the understanding of injury risk. This paper presents a comprehensive review on this subject. It is divided in two major topics: the first topic covers articles about the kinetics, kinematics and electromyography of specific hand strikes, kicks, throws and fall techniques; the second topic focus on some aspects of motor behaviors and perceptual abilities fundamental for efficient and successful performances in martial arts and combative sports (i.e. repeatability of movement, reaction time

Versions of these chapters were also published in *Journal of Contemporary Athletics* Volume 3, Numbers 1-2 and Volume 4, Number 1, edited by Dr. Dan Drane, published by Nova Science Publishers, Inc. They were submitted for appropriate modifications in an effort to encourage wider dissemination of research.

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Chapter I

WRESTLING WITH HERPES: A CASE STUDY

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ABSTRACT

A recent outbreak of herpes gladiatorum took place in a northern Midwestern state that affected 24 high school athletes from ten different schools who were diagnosed as having herpes gladiatorum (HG). In an unprecedented move the state high school league imposed a statewide shutdown of the sport for eight days in the middle of the season. A previous study indicated that not only are medical personnel not fully trained to diagnose HG but national guidelines are too lax in checking for possible symptoms for it. Because this was not the first time that such an outbreak has occurred in wrestling in the state, it should have been a foreseeable issue. The concepts of foreseeability, likelihood and impact will be addressed and applied to the implementation of an effective risk management plan.

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Through the implementation of a risk management plan such episodes as cited in the case study may be prevented from happening.

It has been acknowledged that between 60%–95% of the global population is infected by one or more viruses of the herpes family (World Health Organization, 1985). Within that family is herpes gladiatorum (HG) that was first described in the mid-1960s as a skin infection caused by the herpes simplex virus. Interscholastic athletes particularly at risk of contracting HG are often wrestlers who utilize the lock-up position, which puts the face, neck, and arms of the opposing wrestler in close contact (American College of Sport Medicine, 2003). Herpes gladiatorum causes a rash that commonly appears on the face, neck, shoulder, and arms and usually occurs when an infected wrestler passes the infection to an uninfected wrestler by skin contact (Anderson, 1999; Becker, Kodsi, Lee, Levandowski, and Nahmias 1988; Whitley, Kimberlin, Roizman, 1998).

While herpes gladiatorum it is not a fatal disease, once it is contracted it becomes a permanent condition, and left untreated the infection can lead to serious consequences (Holland, Mahanti, Belongia, et al., 1992; White and Grant-Kels, 1984; Whitley, Kimberlin, Roizman, 1998). These consequences include extreme fatigue, weight loss, permanent visual impairment and conjunctivitis. Young wrestlers exhibiting symptoms such as extreme fatigue or severe weight loss could put themselves in a highly vulnerable position to incur significant injury. Moreover, some cases have been reported in which the athlete required hospitalization as a result of contracting HG (Becker, et al., 1988; Holland, Mahanti, Belongia, et al., 1992; Selling and Kibrick, 1964).

Because of the extreme potential for recurrent episodes and the ease with which infection can be transmitted, the lives of students and coaches can be significantly disrupted (Maine, 2000). A disruption took place in 2007 at a northern Midwestern state as 24 high school athletes from ten different schools were diagnosed as having herpes gladiatorum. In an unprecedented move the State High School League (SHSL) declared a statewide shutdown of the sport for eight days in the middle of the season. The SHSL took the position that the shutdown was necessary for the protection of the student-athletes. The director of information for the SHSL explained,

The safety of the states student athletes is of paramount concern; while the eight-day suspension of all wrestling competition may be considered disruptive by some, it is hoped that controlling the spread of the disease now will minimize the risk of athletes being disqualified during the upcoming section and state tournaments. The suspension period will also allow affected wrestlers to continue

their treatment as well as allow school personnel to monitor athletes that may have been exposed but who have not yet shown any symptoms (MSHSL transcript, 2007, p. 8).

Interscholastic wrestling is a major high school competition in the state as more than 7,500 interscholastic athletes from more than 250 schools annually compete (Millea, 2007).

APPLICATION OF RISK MANAGEMENT

The concept of risk management has been assigned various definitions, however, the one constant in all of these descriptions has been to prevent harm. In the context of this case study, risk management will refer to identifying foreseeable risks of contracting herpes gladiatorum through wrestling, the likelihood of occurrences, and the impact that contracting such an infectious disease may have on an individual. It is hoped that through the understanding of these ideas, effective risk management plans may be developed, implemented and enforced to avoid other interscholastic wrestlers from contracting herpes gladiatorum in the future.

Foreseeability of Risks

According to Stahl, Lichtenstein, and Mangan (2004) risks are caused by the actions of others by which a danger develops that could have been avoided. Additionally, Makropoulos (1997) promoted the idea that risks are the result of actions that are not necessary (1997). The concept of foreseeability does not address whether a harmful incident could have been averted, but whether a reasonable person could have foreseen the risks that created the incident (*Anderson v. Pine Knob Hill*, 2003).

The herpes simplex virus (HSV) infection, from which herpes gladiatorum stems, appears to be widespread among wrestlers and rugby players although no specific strain has been identified as being blamed for the outbreaks (Anderson, 2003; Dworkin, et al., 1999). According to reports from the National Federation of State High School Associations and National Collegiate Athletic Association more than 7 million athletes annually participate in interscholastic and intercollegiate athletics. As a result it is foreseeable that greater opportunities for infectious diseases to spread exist. Turbeville, Cowan, Greenfield (2006)

indicated that football and wrestling were ranked first and second concerning the frequencies of sport specific outbreaks of infectious diseases. The report also revealed that contact athletics such as wrestling and rugby present tremendous environments for the transmission of communicable diseases due to the close physical contact and trauma to the skin that occurs in these sports.

Within this case study, risk was indeed a foreseeable issue as the action of an infected high school wrestler giving another competitor herpes gladiatorum. It was also unnecessary in that with proper pre-tournament inspection the infected wrestler would have been identified. Because of the prevalence of HG transmission in wrestling a pre-inspection may be considered more the norm than not, especially when the impact on the young person's life is added. Further explanation of the concepts of likelihood and impact as essential components of an effective risk management plan will be addressed in the following sections.

Likelihood

A recent report indicated that the occurrence of herpes gladiatorum escalates as the experience level of a wrestler increases, as 2.6% of all high school wrestlers, 8-13% of all in college, and 20-40% of those in Division I wrestlers have HG (StarTribune.com, 2007). While the previously described incident recently took place, it is not without a history in the state as 19 high schools sponsoring wrestling in the state's major city were caught up in a HG outbreak in 1999. The apparent genesis for the outbreak was due to a team entering a wrestling tournament, completely unaware that some of the members were infected. As a result participants on seven other teams initially contracted HG due to wrestling the infected individuals during the tournament. Additionally, it was determined that as those who were unknowingly infected as well those who became infected at the tournament continued to practice and compete afterwards. As a result the number of others who became infected increased dramatically as 61 wrestlers and three coaches were recognized as having contracted HG over a 42-day period (Anderson, 2003).

Other cases of HG outbreaks have been cited in the same state in 2000 and 2001 at summer wrestling camps (Anderson, 2003). Of the 300 wrestlers, ranging in age between 13-18 who participated in the 2000 camp, 33 or 9% of the entire camp contracted the HG infection by its completion. The origination of this outbreak stemmed from a wrestler who had a history of herpes labialis but chose not to receive suppressive therapy. In 2001, an HG outbreak took place at the same camp, however, this time 330 wrestlers between the ages of 13-18 had

signed up. The wrestlers were divided into five groups of 66. Within five days of the start of the camp, three of the groups had an HG outbreak that eventually spread to members of the other groups. Eventually, 57 or 17% of the participants had contracted the HG infection by the end of camp.

The HG outbreaks that occurred in 2000 and 2001, while unfortunate, represent the foreseeability of the occurrence of herpes gladiatorum for interscholastically aged participants. As such it is the responsibility of an institution, coach or sponsoring organization to initiate procedures to protect the participants against becoming infected with HG.

Impact

The timing was critical in this case as the ban on competition extended to one week prior to sectional championships that served as the qualifying rounds to the state tournament. In other words, wrestlers were not allowed to participate in essential contact practice or competition until the week immediately preceding the qualifying rounds and championships. By preventing them from honing their skills, some young athletes may have been deprived of participating in the state tournament. For example, a coach from a team that has finished very well in recent state wrestling championships did not perceive the situation to be fair, predominately because his team did not have a recorded case of herpes (Millea, 2007). The coach continued to express concern regarding that the lack of preparation could prevent his team from doing as well as he had planned, increase the potential for injuries due to the lack of conditioning, and how this situation may affect individual's chances of obtaining an intercollegiate wrestling scholarship. Thus, the impact of HG may significantly affect the lives of young interscholastic wrestlers in potentially losing a scholarship or experiencing the thrill of participating or winning a state championship.

Another type of impact that may develop in the near future concerns potential litigation. At least one court has recognized a new tort of negligent transmission of herpes gladiatorum – that a wrestler owed another wrestler a duty based on the defendant's knowledge of his herpes blister and the degree of the skin-to-skin contact inherent in wrestling. In *Silver v. Levittown* (1999) though the court was "...loathe to create new causes of action in tort, the law must nevertheless adapt to the society in which it exists." This case was settled out of court with the defendant receiving \$190,000. While not precedent setting, the Silver case may provide an insight into the potential future litigation that may occur if schools

sponsoring wrestling and wrestling coaches continue to overlook infectious diseases such as herpes gladiatorum.

Implementing Procedures

The primary objective of risk management is to allow individuals and organizations to distinguish the risks into discrete categories and to identify possible alternatives to alleviate the impact of the risk. However, some of these risks may be inherent to the sport of wrestling. Risk of injury is inherent at all levels of participation in sport. Inherent risk relates to the conduct of the game and the activities that the athletes are required to do. For example, football players are expected to collide into each other to tackle and block, thus creating a potential for injury. However, to take away blocking and tackling would take away the essence of the sport. Thus, injuries due to blocking and tackling cannot be taken out of the sport of football even though they may create situations of injury.

In wrestling there are many risks that need to be attended to, such as concussions, strains, and sprains due to collisions. These risks are considered inherent to the sport of interscholastic wrestling and it is understood that they may occur through a season. However, the risk of contracting an infectious disease such as herpes gladiatorum is not one that may be considered as inherent since it is not a required activity within the sport. Yet, as explained earlier it can be a significant risk to an athlete, especially a wrestler.

During the traditional wrestling season teams often compete in dual or quadrangular meets during the week as well as weekend tournaments. As a result checks for skin lesions or abrasions that may indicate the presence of HG are sometimes not conducted prior to performed competition. In fact the National Federation for High School Sports (NFHS) guidelines do not require skin checks prior to each contest, although wrestlers found to have obvious lesions are suspended from participation supports this (NFHS, 2000).

Additionally, it is enough for a wrestler's personal physician to provide a statement that the lesion is not transmissible to allow the wrestler to compete (Anderson, 2003). However, Anderson (2003) indicated that certain factors have been shown to increase the likelihood of HG outbreaks. The primary factor cited was the dependence on the physicians of individual wrestlers to diagnose the presence of HG. Yet, many of these physicians do not understand how HG develops and spreads to others (Anderson, 2003).

The NATA has recommended that wrestling participants should shower prior and after workouts, wash workout clothes everyday, dry their skin well, avoid

wearing street shoes on wrestling mats or wrestling shoes outside and conduct total body skin inspections each day. The NCAA standards also differ from the NFHS in that skin checks are recommended at all wrestling contest. Moreover, a compendium of symptoms is at hand at each contest as a criterion for withdrawal if an individual is suspected of being infected (NCAA, 2003).

Finally, NCAA guidelines recommend that only certified athletic trainers or physicians experienced in recognizing the symptoms conduct skin checks.

CONCLUSION

As stated earlier, the likelihood of an interscholastic wrestler contracting herpes gladiatorum is relatively high when compared to other high school sports. This is obvious within this case study as three outbreaks of HG have been cited occurring in one specific state. As a result it becomes a foreseeable risk that wrestlers, coaches, and organizations should attempt to better manage, especially since current high school guidelines seem somewhat ineffective in controlling potential HG outbreaks.

To better address such outbreaks the recommendations established by the NATA and the NCAA are excellent sources from which to develop an effective risk management plan. Secondly, increased education regarding HG and diagnosis of it of sport medicine personnel affiliated with wrestling programs is strongly encouraged. Finally, the authors encourage those involved in interscholastic wrestling to enforce a risk management plan once it has been developed. To do so may prevent a young athlete from unnecessarily contracting a disease that may affect him for the rest of his life.

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