

active  
living for  
all ages

# In Motion

A PUBLICATION OF THE AMERICAN ORTHOPAEDIC SOCIETY FOR SPORTS MEDICINE

WINTER 2017



## Don't Let an Avalanche of Injuries Curtail Your Cross Country Skiing

By Amber Parker, BS and Arun J. Ramappa, MD



**D**uring the winter, many outdoor enthusiasts look to skiing as a way to maintain physical activity and explore the outdoors. While most people are familiar with

downhill (Alpine) skiing, fewer are familiar with its cousin, cross-country or Nordic skiing.

While Alpine skiing is characterized by the carving technique in which skiers move side-to-side creating an “S” shaped figure on the mountain, Nordic techniques follow a linear path.<sup>1</sup> The two common Nordic skiing styles are classic and skate. Classic skiing follows the natural human movement in which the arms and legs swing parallel in opposition, making it an easy activity to learn for beginners.<sup>2</sup> The skating technique is advanced and allows the skier to travel at faster speeds. During the motion, the skier pushes off the rear ski in a continuous motion from side-to-side, a movement similar to rollerblading.<sup>3</sup> During classic skiing, pole use mimics the natural movement of the arms and legs during walking and running cycles.<sup>4</sup>

The use of poles during Nordic skiing places an added emphasis on upper-body strength and conditioning, making for a terrific full-body workout. Nordic skiers use upper-body, lower-body, and trunk muscles leading to a higher achieved heart rate.<sup>5</sup> But before heading to the trails, skiers must gauge their abilities and prepare themselves in an effort to avoid injuries.

While Nordic skiing remains a relatively low-risk sport, adequate rest and prior training are still essential. Injury rates are 0.51 per 1,000 skiers days for recreational skiers and 0.09 for competitive skiers. Frequent Nordic skiers typically suffer from overuse injuries of the knee, lower back, shoulder, and anterior thigh. The risk of these injuries increases five times for those with fewer than two days of rest per week.<sup>6</sup> Thus, to avoid injury, it is important to recover before revisiting the trails. In addition to rest, skiers, especially beginners, should prepare themselves physically. Strength training of the upper and lower body and increased range of motion at the knees, hips, and elbows has been noted to increase speeds and endurance during skiing cycles.<sup>6</sup> So if you are heading to the trails soon, be sure to incorporate some full-body exercises into your routine.

The learning curve for becoming proficient in Nordic skiing is short and it is a sport that is accessible to all ages. Nordic skiing is a great way to enjoy the outdoors during the winter while getting a fantastic workout.

### References

1. Greenwald R, Senner V, Swanson S. Biomechanics of carving skis. *Schweiz Z Sportmed. Sporttraumatol.* 2001. 49(1):40-44.
2. McKenney, K. Classic vs Skate. Retrieved September 27, 2017, from <http://crosscountrykitechnique.com/classic-vs-skate>. August 3, 2014.
3. Lawson SK, Reid DC, Wiley JP. Anterior compartment pressures in cross-country skiers. *The American Journal of Sports Medicine.* 1992. 20(6), 750-753.
4. Duoos BA. Kick, Glide, Pole! Cross-country skiing fun (Part I). *Strategies.* 2011. 25(2), 23-26.
5. Stöggel T, Schwarzl C, Müller EE, et al. A comparison between Alpine skiing, cross-country skiing and indoor cycling on cardiorespiratory and metabolic response. *Journal of Sports Science & Medicine.* 2011.15(1), 184-195.
6. Nagle KB. Cross-country skiing injuries and training methods. *Current Sports Medicine Reports.* 2015.14(6), 442-447.



# Proper Warm-up May Help Prevent Fencing Injuries

By Grant Jones, MD

The sport of fencing has increased in popularity over the past two decades with the Federation Internationale D'Escrime (FIE), the international governing body of fencing, reporting a 50% increase in the number of athlete licenses issued annually for international competitions. The popularity of fencing in the U.S. has stemmed from the expansion of classes into community-based facilities in schools and parks and recreation programs and from the rise of the U.S. as a world power in fencing.

The concern that many have with fencing is the chance of catastrophic and fatal penetrating wounds. However, despite extensive publicity when these injuries do occur such as the death of world and Olympic champion, Vladimir Smirnov at the 1982 World Championships, these injuries are extremely rare. In a large 5-year study on fencers in the USFA, the two most serious penetrating injuries did require hospitalization, but the injuries resolved without any consequences and the two fencers returned to competition within a few months of the injury.

Overall, fencing is one of the safest sports in terms of time-loss from injury. It has a substantially lower rate of time-loss injury than sports such as soccer (50 times greater risk than fencing) and basketball (31 times greater risk). However, as the sport has become more popular and more competitive, the training for the sport has become much more intense, leading to more overuse injuries. In fact, due to the intense training sessions, injuries occur much more frequently during training than during competition. Women's saber, for instance, has been the most



internationally successful of all of the U.S. fencing groups; but, possibly as a result of the intense, competitive training, it has the highest risk of time-loss injury.

The most common injuries seen in fencing are mild sprains and strains and more frequently involve the lower extremity, with the knee and ankle being the most commonly injured joints. Overtraining and improper stance in an "en garde" position can put the knee at risk for overuse injuries, such as patellar tendinitis. The most common injuries to the ankle are lateral ankle sprains which occur as a result of slipping or falling, usually after an excessive lunge position. Fencing requires quick, stop-start, change-of-direction movements of the lower extremity which can lead to overextension of the joints and subsequently tendon, muscle, and ligament injury.

There are several measures that can be taken to minimize fencing injuries. As a recent study demonstrated, the most frequently cited cause of injury was inadequate warm-up and stretching. Many fencers admit to not doing proper warm-up, and many coaches do not emphasize it. Educating fencers and their coaches is a

key element for injury prevention. Next, overtraining leads to many of these injuries, so it is important to monitor the athletes to make sure that they are taking appropriate breaks from the sport and that they are doing adequate conditioning to avoid overuse injuries. Finally, poor technique has been associated with increased risk of injury. It is important to have coaches or instructors carefully observe and emphasize proper technique. Poor technique can also result from fatigue, so it is important to have appropriate conditioning to prevent or limit fatigue during practices and competitions.

Overall, fencing is a fast-growing sport which is becoming more competitive and athletic. Fortunately, it is a relatively safe sport where many of the injuries are preventable if the athletes do appropriate conditioning, perform appropriate warm-up and stretching, avoid overtraining, and concentrate on appropriate technique.

## References

1. Park KJ, Byung SB. Injuries in elite Korean fencers: An epidemiologic study. *Br J Sports Med.* 2017. 51:220-225.
2. Harmer PA. Incidence and characteristics of time-loss injuries in competitive fencing: A prospective, 5-year study of national competitions. *Clin J Sports Med.* 2008. 18:137-142.

Fencing is one of the safest sports in terms of time-loss from injury. It has lower rate of time-loss injury than soccer and basketball.

# The Dangers of Extreme Weight-Cutting

By Jonathan Gelber, MD

**In wrestling and combat sports, weight-classes were devised to match opponents up in a more fair manner.** The athletes are required to weigh-in prior to competition to ensure they are not too heavy to compete against their opponent. As a result, athletes have sought ways to lose weight in a rapid manner in the days and hours prior to weigh-ins, and often regain the weight back just before the actual competition.

Methods for rapid weight-cutting include dehydration, saunas, plastic workout suits, “pre-loading” with excessive water, and diuretics. This rapid and extreme weight-cutting is an unsafe practice. Documented dangers of extreme weight-cutting include impaired glycogen utilization, Central Nervous System (CNS) dysfunction, increases in core temperature, cardiovascular strain, and increased catabolic markers.

In 1996, a series of three NCAA athlete weight-cutting related deaths within five weeks of each other led the organization to re-evaluate safe weight-cutting practices. The NCAA moved to a same-day weigh-in and also recommended a 1.5% rule. The 1.5% per week rule states that you should lose not more than 1.5% of your body weight in a week. For example, a 165-pound student-athlete trying to make a 157-pound weight class should lose not more than two pounds (i.e. 1.2% of total body weight) per week. This helps to minimize the degree of dehydration during weight-cutting.

In addition, the collegiate athletic trainers should monitor hydration status using skin calipers, underwater weighing, a “bod pod,” or urine refractometers that measure urine specific gravity.

Hydration status is also used to determine the lowest allowable weight-class at five percent body fat via a weight assessment program. The purpose of the NCAA weight assessment program is to assist wrestlers in determining a weight class most appropriate for them, based on their current body makeup. In addition to helping determine the best wrestling weight class, it also provides the wrestler with a weight loss descent plan to help keep them on track for a slow, steady, and safe weight-cut to their preferred (and allowed) weight class. An online tool used by many is Optimal Performance Calculator (OPC), a web-based system that distills many of the complex NCAA rules into a manageable and enforceable procedure.

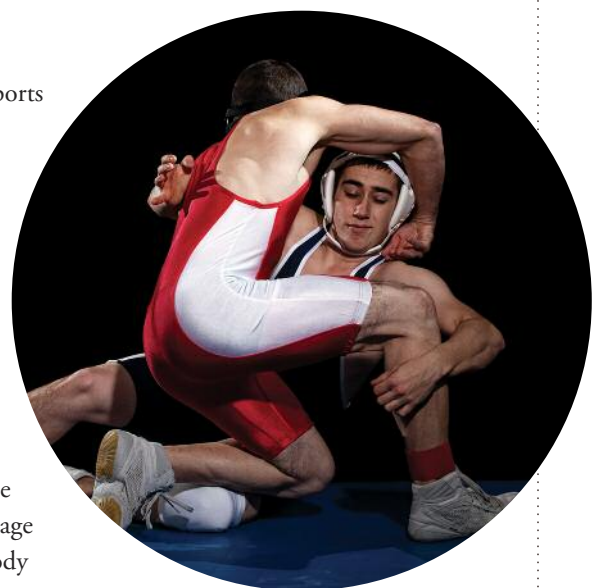
Unfortunately, in the combat sports of boxing and Mixed Martial Arts (MMA), weight-cutting is much less regulated and weigh-ins are usually done the day before the event, allowing for more extreme weight-cutting and rehydration. One study of professional MMA athletes measured urine specific gravity and body mass at the weigh-ins and again 22 hours later before the bout.<sup>1</sup> The athletes gained an average of 7.5 pounds or 4.4% of their body

weight in 22 hours before the fight, with ranges as high as 22 pounds and 10% body weight. At fight-time, 39% of the fighters were either significantly or seriously dehydrated as measured by urine specific gravity.

Unpublished studies among athletic commissions have even shown that most fighters do not even weigh within the agreed-upon fight weight-class the night of the bout. Most are one weight-class above and some may be two weight-classes above. Thus, these combat sports need to re-evaluate their weight-cutting strategies and look to the NCAA resources for safer, steady weight-cutting techniques.

## References

1. Jetton AM, Lawrence MM, Meucci M, Haines TL, Collier SR, Morris DM, Utter AC. Dehydration and acute weight gain in mixed martial arts fighters before competition. *J Strength Cond Res.* 2013. May;27(5):1322-6.





The American Orthopaedic  
Society for Sports Medicine  
9400 W Higgins Road, #300  
Rosemont, IL 60018

### About AOSSM and *In Motion*

As a world leader in sports medicine education, the American Orthopaedic Society for Sports Medicine (AOSSM), we have designed the publication to highlight relevant information for multiple age groups from exercise and rehabilitation to nutrition and psychology.

This important educational tool is published quarterly and distributed electronically.

**Medical Editors**  
Bruce Reider, MD  
C. David Geier, Jr., MD

**Managing Editor**  
Lisa Weisenberger

**Contributors**  
Lee Diehl, MD  
Jonathan Gelber, MD  
Grant Jones, MD  
Amber Parker, BS  
Arun J. Ramappa, MD  
Stephen Shaheen, MD



# Skin Infections in Wrestling

By Lee Diehl, MD, and  
Stephen Shaheen, MD

Wrestling continues to be a popular sport, with 76 NCAA Division I programs and many more high school and prep school programs in the United States. In preparation for the upcoming wrestling season, it's good to review the basics of common skin problems, their prevention and treatments, and what athletes need to do to return to sports participation.

Most common skin infections are viral, bacterial, or fungal. Examples of common viral infections include Molluscum (poxvirus), herpes simplex, and influenza which can be transmitted by skin to skin contact. Tinea, a fungus commonly called “ringworm,” is also one of the most common causes of skin infections. Different types affect different parts of the body, such as “Athlete’s foot,” “jock itch,” and “ringworm” on the scalp. Bacteria such as Staph or Strep species, including MRSA (anti-biotic resistant Staph) can cause infections of the skin including—abscesses, boils, folliculitis, impetigo, or cellulitis.

During contact sports, it's hard to avoid cuts and abrasions that can compromise the skin's natural protective barrier. Wrestlers traditionally have had high rates of skin infections.<sup>1</sup> Fifteen years of NCAA injury surveillance data in wrestlers published in 2007 showed Herpes gladiatorum to be the most common infection, followed by skin fungus and bacterial impetigo.<sup>2</sup>

Prevention is associated with personal hygiene (regular showering, handwashing), and regular cleaning/decontaminating uniforms, towels, and equipment. Research on products that seek to optimize skin barrier function, optimal PH, and decrease permeability is ongoing. Researchers hope one day to be able to spray or wipe something on the skin that decreases the ability of a bacteria to get established thus reducing risk of transmission.<sup>3</sup>



### Guidelines for returning to wrestling<sup>4</sup>:

- Active herpetic infections cannot be covered to allow participation. A wrestler must be free of systemic symptoms of viral infection, have no new blisters for 72 hours, have appropriate systemic antiviral therapy for five days, and all lesions must be dry and covered by a firm crust.
- Bacterial skin infections similarly cannot be covered to allow participation. A wrestler must have been without any new skin lesions for 48 hours, have completed 72 hours of appropriate antibiotic therapy, and have no moist or draining lesions.
- For most tinea (ringworm) infections a minimum of 72 hours of topical therapy is considered appropriate. However, at least two weeks oral (systemic) antifungal therapy is required for lesions on the scalp. Active tinea infections may potentially be covered to allow participation, if lesions are in an area of the body that can be “adequately covered.”

Rapid recognition of the problem and appropriate treatment will help get the athlete back in the game. Once a wrestler has a skin infection, following published guidelines will help everyone understand what and how long it may take to get them back on the mat.

### References

1. Hootman, Jennifer, et al. Epidemiology of collegiate injuries for 15 sports: Summary and recommendations for injury prevention initiatives. *Journal of Athletic Training*. 2007. 42,(2); 311-319.
2. Cantu RC. Descriptive epidemiology of collegiate men's wrestling injuries: National Collegiate Athletic Association Injury Surveillance System, 1988-89 through 2003-04. *Yearbook of Sports Medicine*. 2008. 4-5.
3. <https://theraworxclinical.com/2017/09/understanding-managing-skin-infections-wrestling/>
4. Skin Evaluation and Participation Status Form—NCAA.org [www.ncaa.org/sites/default/files/2016DIWRE\\_Skin\\_Evaluation\\_Form\\_20170327.pdf](http://www.ncaa.org/sites/default/files/2016DIWRE_Skin_Evaluation_Form_20170327.pdf)

