



SKIING INJURIES

The popular winter sport of skiing provides an opportunity for individuals to exercise in a stimulating and refreshing environment. Unfortunately, skiing is not without its risks. Individuals wishing to participate in skiing need to be aware of possible risks and methods for reducing these risks.

Skiing appeals to a broad cross-section of the community, including those from 3 to 83 years of age. For some of those taking to the slopes, skiing is their only form of vigorous exercise. Given that skiing is a very seasonal activity, this means that many skiers begin the season having not performed any serious alternative exercise or training since the previous ski season. This places those individuals at increased risk of injury. To be safe, the skier should have a basic level of fitness, skill and the appropriate equipment.

Injury facts and figures

Injury patterns have changed over the past 30 years with the overall rate of Alpine skiing injuries decreasing. Injuries to the lower legs have decreased significantly while injuries to the knees and upper limbs are increasing. Injuries to the upper limbs currently contribute approximately a third of all skiing injuries with the shoulder and the thumb being most affected. Knee ligament injuries are certainly very common in Alpine skiing and can result in significant sporting downtime and also loss of work time.

Skiing is one of the highest risk sports that adults undertake on a regular basis, in terms of injury. Injuries occur at a rate of approximately 3 per thousand skier-days. Children aged 7-17 years are at highest risk. The risk is increased even further for skiing associated with school-organized activities. Serious injuries occur more commonly in male skiers compared to female skiers.

The rate of injury occurrence in skiing is inversely related to the level of skiing experience. That is, skiers with the least experience are at the highest risk.

Knee injuries

Because the ski can act as a long lever on the end of the lower limb, loss of control of one or both skis can result in large rotational forces being placed through the lower limb. This can cause disruption of the ligament structures of the knee. The knee is the most commonly injured region in female skiers over seven years of age. The knee has several major stabilizing ligaments including the anterior and posterior cruciate ligaments, the medial ligament and the lateral

ligament. The anterior cruciate ligament (ACL) is the most important stabilizing ligaments of the knee and is commonly injured in skiing accidents. Not only can the ACL be injured with twisting activities, it can be disrupted by overloading the extensor mechanism at the front of the knee in situations where the skier "dumps" almost falling backwards to sit on the back of the skis. This places excessive strain on the extensor mechanism. Forceful contraction of the quadriceps pulls the lower leg forward, relative to the thigh, causing a shearing force which can disrupt the anterior cruciate ligament.

Twisting or collision injuries can result in disruption of the medial ligament if the lower leg is forced outwards, relative to the knee. The posterior cruciate ligament can be injured by a blow to the front and top of the lower leg and it can also be disrupted by a hyperextension injury. Disruption of the lateral ligament is less common and requires significant force. When lateral ligament injuries *do* occur, it is often associated with multiple pathologies affecting the knee, following a high-energy collision.

Other injuries that can occur to the knee include fractures, dislocation of the patellar and meniscal tears.

Thumb injuries

The classic skiers thumb refers to an injury to the ulnar collateral ligament, which braces the inside of the MCP joint (where the thumb joins onto the hand). This is usually caused by incorrect technique using the ski pole. When the thumb is wrapped around the pole and the pole comes to a sudden stop, the thumb can be stretched sideways, disrupting the ulnar collateral ligament.

Head and facial injuries

Head and facial injuries account for approximately a fifth of injuries occurring in children aged between 7-17 years. Of the head and facial injuries that occur, over 20% are severe enough to cause loss of consciousness or clinical signs of concussion.

Prevention of skiing injuries

Skiing injuries can be attributed to multiple causative factors and therefore prevention also has to be multifaceted. Individuals need to address the following issues if they want to minimise their risk of being injured while skiing:

1. Physical condition

Fitness to ski is an essential ingredient in preparation for the ski season. Fitness training needs to address issues such as lower limb strength, trunk core stability and aerobic fitness.

It is recognised in many sports that fatigue is a key factor in the occurrence of injuries. Once an individual becomes fatigued, their skill level decreases and they are more likely to find themselves in a situation where they lose control. Aerobic exercise targeted at improving endurance is essential. The skier should exercise at least three times per week for 30 minutes duration at each session. Exercise should be maintained at 60-70% of maximal heart rate for the 30 minutes. Activities such as running, step aerobics classes, cycling and using a stepper machine are recommended for improving aerobic endurance. The skier has to remember that they will often be skiing at high-altitude where atmospheric oxygen content is lower and perceived exertion for a set amount of work will therefore be higher than at sea-level.

Trunk core stability exercises improve control of the abdominal, lumbar and pelvic regions. This allows the individual to maintain control of body movements and efficiently transfer power between the lower limbs and upper body. These exercises are very specific and can be difficult to master initially. They should be undertaken under the supervision of a suitably qualified sports physiotherapist or sports trainer.

Lower limb strength is also vital to minimise injury risk. Strength of the calf, quadriceps and gluteal (buttock) muscles is especially important. As far as possible, strengthening exercises for these muscle groups should be done in a functional manner, that is, in such a way as to mimic the actions involved in skiing. Again, instruction by a suitably qualified physiotherapist or sports trainer is recommended.

2. Appropriate equipment

Skiers must use equipment that is safe, properly adjusted and appropriate for the skiing conditions and their level of skill. For the inexperienced skier, advice should be sought from a ski instructor with appropriate expertise. Bindings must be adjusted to allow release during a fall.

The bindings and other equipment should be adjusted by a professional. The skier should test their bindings as a matter of routine prior to commencing a day of skiing.

Helmets are advised, given the high proportion of injuries to the head and face. While rigorous scientific studies are not yet available regarding the benefits of helmets in skiing, evidence from other high-velocity sports (e.g. cycling) suggests that should a head injury occur, morbidity will be reduced by the wearing of a helmet.

3. Environment

The skier should have a realistic understanding of their own skill level and choose their venue accordingly. Selecting a terrain that poses challenges beyond your level of expertise is foolhardy and exposes you to real risk. Skiers tend to take risks more when skiing in a group than when skiing solo. You should never ski a slope that you would be unprepared to ski on your own.

4. Prevention of fatigue

As stated above, fatigue is implicated as a cause of injuries in many sports. While fitness training for skiing is a worthwhile strategy for preventing fatigue, other tactics are also useful. Stopping for short 'revival' breaks is a good idea during a full day of skiing. Having supplies of high energy food and drinks is also a sensible way of delaying fatigue. Don't be too ambitious when planning a day of skiing. The duration should be well within the limits of your physical stamina.

Summary

Skiing should be an exhilarating and enjoyable sport. Injuries inevitably occur but the risk can be minimized with attention to physical fitness, appropriate equipment, careful selection of venue and realistic planning of your day on the slopes.

Dr David Hughes

B.Med., Dip. Sports Medicine (London), FACSP
Sports Physician

References available on request