No Financial Disclosures
History

- Developed from Nordic (cross-country) skiing as a method of transportation in Scandinavia
- Sondre Norheim regarded as father
- Olympic Sport in 1936
History

- Non-competitive = recreational
- Competitive
  - Slalom, GS, super G, and downhill
- Freestyle
- Freeride
- 200 million skiers worldwide
- On piste and off piste
Equipment

- 2 skis attached to plastic boots
- Poles to aid balance
- Bindings
  - Designed to release to prevent injury
  - Ski brakes
- Carving skis – 1990s
  - Improves turning and maneuverability
  - Twin tip
  - Rockered
  - Sidecut
Equipment

- Helmet
  - Standards set for impact protection
  - 60% skiers wear in USA, 80% in Switzerland\(^2\)
  - Reduces injury\(^3-6\)
    - Head injury, skull fracture\(^7\), intracranial injury\(^8\)
    - Low risk of head injury\(^8\)
    - Debate to make helmets required\(^9-11\)
    - No data that reduces death
    - Don’t interfere with vision, or increase risk of injury\(^5,12-14\)
Injury

- Injury reporting
- 2-4 injuries per 1000 participant days\textsuperscript{15}
- Decreased significantly
  - Improvement in equipment, ski area design and piste maintenance and prep lowered rates recently\textsuperscript{16}
- More LE then UE
- 17 per 1000 runs for professionals\textsuperscript{17}
Injury classification

- Sprain/Strain: 47.7%
- Fracture: 18.9%
- Laceration: 10.4%
- Joint injury: 6.5%
- Contusion: 12.1%
- Concussion/LoC: 4.4%
Anatomic Area

Commonly injured areas
Alpine skiing

- Knee: 33.4%
- Head/face: 13.5%
- Shoulder: 9.5%
- Lower leg: 8.6%
- Ankle: 6.1%
- Thumb: 4.4%
Knee injuries

- MCL
  - Valgus stress
- ACL
  - Backward twist
  - Forward twisting fall with carving skis
  - Hyperextension
  - ? ACL prevention bindings
- Treatment?
  - Surgery, non-op?
KneeBinding
Lower Leg

- Tibia fracture
  - More common in skiing
- Ankle Injury
  - More common in snowboarding
    - Talus fracture\(^{18}\)
  - Syndesmosis
Femur

- Uncommon
- Higher incidence in Children?
- Visitors to Colorado.....
UE

• Shoulder
  • AC joint, clavicle, dislocation, proximal humerus
  • Higher in snowboarders\textsuperscript{19}

• Wrist
  • Higher in snowboarders\textsuperscript{19}
  • Braces?
UE

- Thumb
  - Gamekeepers thumb
  - Ski pole fulcrum
  - Treatment
    - Stener lesion
Axial Injuries

- Head Injury
  - Up to 15% of all injury (?15)
- Spinal Injury
  - Increasing with increased risk in tricks and terrain parks
  - Rare in controlled skiing events
Treatments

• Up to 70% can be treated on the slopes by ski patrol
• Transfer to medical facility often needed with head and axial injury
Prevention

• FIS code on piste safety

• 1. Respect for others
   A skier or snowboarder must behave in such a way that he does not endanger or prejudice others.

• 2. Control of speed and skiing or snowboarding
   A skier or snowboarder must move in control. He must adapt his speed and manner of skiing or snowboarding to his personal ability and to the prevailing conditions of terrain, snow and weather as well as to the density of traffic.

• 3. Choice of route
   A skier or snowboarder coming from behind must choose his route in such a way that he does not endanger skiers or snowboarders ahead.

• 4. Overtaking
   A skier or snowboarder may overtake another skier or snowboarder above or below and to the right or to the left provided that he leaves enough space for the overtaken skier or snowboarder to make any voluntary or involuntary movement.

• 5. Entering, starting and moving upwards
   A skier or snowboarder entering a marked run, starting again after stopping or moving upwards on the slopes must look up and down the slopes that he can do so without endangering himself or others.

• 6. Stopping on the piste
   Unless absolutely necessary, a skier or snowboarder must avoid stopping on the piste in narrow places or where visibility is restricted. After a fall in such a place, a skier or snowboarder must move clear of the piste as soon as possible.

• 7. Climbing and descending on foot
   A skier or snowboarder either climbing or descending on foot must keep to the side of the piste.

• 8. Respect for signs and markings
   A skier or snowboarder must respect all signs and markings.

• 9. Assistance
   At accidents, every skier or snowboarder is duty bound to assist.

• 10. Identification
   Every skier or snowboarder and witness, whether a responsible party or not, must exchange names and addresses following an accident.
Prevention

- Equipment
  - Helmets
  - Boots and bindings
    - Testing equipment
  - Appropriate fit
Prevention

- Obey signs
  - CLOSED
- Ski patrol
- Ski lift
- Backcountry
Enjoy the slopes!
References


15. Ekeland A, Rodven A. Skiing and boarding injuries on Norwegian slopes during the two winter seasons 2006/07 and 2007/08. Skiing Trauma and Safety 18th volume. ASTM STP. 2011;1525:139–49.