Preventing injuries in winter sports

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Preventing injuries in winter sports
Sports Vs winter sports

• Equipment

• Extreme weather conditions
Risk factors

Extrinsic
- Technique
- Equipment
- Training
- Environment

Intrinsic
- Sex
- Age
- Anatomy
Goals

- Epidemiology
- Common injuries
- Severe injuries
- Causes
- Prevention tips
- Specific programs
Epidemiology

- 3 injuries / 1000 skiers / day

- 1\textsuperscript{st} grade ligament or muscle $\Rightarrow$ DEATH
Competitive snow sports

- NO data published (yet)

- All publications for both competitive and recreational sports
Hypothesis for competitive winter sports

• More overuse injuries
• More muscle & tendon injuries

• Same patterns as in other sports
Prevention

FOCUS ON

• Knee

• Muscles
Differences in disciplines

- Skiers
  - Knee
  - Thumb
  - Spine

- Snowboarders
  - Knee
  - Shoulder
  - Wrist – Elbow
  - Spine
Common injuries

- Knee
- Thumb
- Shoulder
- Fractures
Knee injuries

ACL
- 24 – 25000 tears/year in USA
- Twisting or landing from jump

Meniscus

Cartilage

Lead to Osteoarthritis
Have to be prevented
Menisci

- Lateral meniscus
- Medial meniscus
- Articular cartilage
- Patella
Degenerative osteoarthritis

Cartilage worn away

Bone spurs

Leading to OA

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Thumb injuries

• Ulnar collateral ligament sprain – tear

• Caused by STRAPS
Shoulder injuries

- Dislocation
- Rotator cuff tear
- Fractures
- Acromioclavicular injuries
Fractures

- Tibia
- Ankle
- Wrist
- Clavicle
SEVERE INJURIES

• Collision on fixed object

• High speed
Severe injuries

Head & neck
- 5 – 10% of all injuries
- 16000/year in USA
- 7000 could be prevented if helmet was used

Abdominal/trunk
- Snowboard (jumping)
# Concussion

## Current Concussion Guidelines

<table>
<thead>
<tr>
<th>Grade</th>
<th>Cantu</th>
<th>AAN</th>
<th>Colorado</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>No LOC</td>
<td>Transient confusion</td>
<td>Confusion without amnesia</td>
</tr>
<tr>
<td></td>
<td>PTA &lt;30 min</td>
<td>No LOC</td>
<td>No LOC</td>
</tr>
<tr>
<td></td>
<td>Sx/mental status abn. resolve &lt;15 min</td>
<td>Sx/mental status abn. resolve &lt;15 min</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>LOC &lt;5 min or PTA &gt;30 min, but &lt;24 hr</td>
<td>Transient confusion</td>
<td>Confusion with amnesia</td>
</tr>
<tr>
<td></td>
<td>No LOC</td>
<td>No LOC</td>
<td>No LOC</td>
</tr>
<tr>
<td></td>
<td>Sx/mental status abn. resolve &gt;15 min</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>LOC &gt;5 min or PTA &gt;24 hr</td>
<td>Any LOC, either brief (sec) or prolonged (min)</td>
<td>Any LOC</td>
</tr>
</tbody>
</table>

### Return to Play

#### First concussion

<table>
<thead>
<tr>
<th>Grade</th>
<th>When Ax</th>
<th>AAN</th>
<th>Colorado</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>When Ax</td>
<td>*Normal @ 15 min</td>
<td>*Normal @ 20 min</td>
</tr>
<tr>
<td>2</td>
<td>Ax 1 wk</td>
<td>Ax 1 wk</td>
<td>Ax 1 wk</td>
</tr>
<tr>
<td>3</td>
<td>Wait 1 mo, then Ax 1 wk</td>
<td>Brief LOC; Ax 1 wk</td>
<td>Wait 1 mo, then Ax 2 wk, consider sooner if Ax 2 wk</td>
</tr>
</tbody>
</table>

#### Second concussion

<table>
<thead>
<tr>
<th>Grade</th>
<th>When Ax</th>
<th>AAN</th>
<th>Colorado</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>2 wk if Ax 1 wk</td>
<td>Ax 1 wk</td>
<td>Ax 2 wk</td>
</tr>
<tr>
<td>2</td>
<td>At least 1 mo, Ax 1 wk, consider terminating season</td>
<td>Ax 2 wk</td>
<td>Ax 1 mo</td>
</tr>
<tr>
<td>3</td>
<td>Terminate season, next yr if Ax</td>
<td>Ax 1 mo minimum</td>
<td>Terminate season, consider any RTP-contact sports</td>
</tr>
</tbody>
</table>

#### Third concussion

<table>
<thead>
<tr>
<th>Grade</th>
<th>When Ax</th>
<th>AAN</th>
<th>Colorado</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Terminate season, return next yr if Ax</td>
<td>Ax 1 wk</td>
<td>Ax 2 wk</td>
</tr>
<tr>
<td>2</td>
<td>Terminate season, next yr if Ax</td>
<td>Ax 2 wk</td>
<td>Ax 1 mo</td>
</tr>
</tbody>
</table>

*Mental status and postconcussive abnormalities must be clear.

1) No signs/Sxs at rest or with exertion.

abn., abnormality; Ax, asymptomatic; LOC, loss of consciousness; PTA, post-traumatic amnesia; RTP, return to play; Sxs, symptoms.

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**FIS RETURN TO SNOW SPORTS POST CONCUSSION**

Concussion is a very prevalent injury in snow sports. It is defined as a disturbance in the functioning of the brain following a blow to the head or a force transmitted to the head, which may or may not cause a loss of consciousness. This typically results in a rapid onset of a short-lived impairment of neurologic function, which resolves spontaneously. Athletes suffering from a concussion can display a wide variety of signs and symptoms, some of which can be very subtle. It is important to identify the athlete that has suffered a concussion, as they are more vulnerable for recurrent injury, persistent post concussive symptoms, cumulative injury, and potentially even life threatening injury, with subsequent concussive injury.

Any athlete suspected of having sustained a concussion should be withdrawn from that event or training session, and undergo formal medical evaluation. Therefore any athlete complaining of headache, nausea, vision change, ringing in the ears, dizziness, or confusion after a crash or displaying poor coordination, poor balance, difficulty answering questions, or easy distractibility, should be brought to the attention of the team physician. It is important that these athletes not be left alone and monitored for deterioration in the immediate post injury period.

The cornerstone of concussion management is rest, until complete resolution of symptoms. This includes both physical and cognitive or mental rest. Athletes should therefore have a quiet environment and avoid exposure to stimulation such as TV or computer screens, and avoid alcohol and medications. Some analgesics and anti-inflammatory agents may be prescribed but it should be recognized that these might mask some of the signs and symptoms of concussion.

The return to sport progression is begun once the athlete has been off all medications and completely symptom free for a minimum of 24 hours. The most widely accepted return to play guidelines are from the Summary and Agreement Statement of the Second International Symposium on Concussion in Sport—Toronto 2004. This is a step-wise process, each step being separated by a minimum of 24 hours. Progression to the next step only occurs if the athlete is completely asymptomatic at the current level. Any recurrence of symptoms should lead to the athlete dropping back to the previous asymptomatic level.

Steps included:

1. Complete physical and mental rest until asymptomatic
2. Low intensity aerobic exercise (walking, spinning on a stationary bike) but no resistance training
3. Higher intensity aerobic exercise
4. Easy free skiing/riding and light resistance training
5. After medical clearance can train fully (for example, ski gates)
6. After medical clearance return to full competition and racing

Athletes with a simple concussion typically easily progress through these steps over 7-10 days. Athletes with complex concussion (an injury where athletes suffer persistent symptoms, specific sequelae, or prolonged cognitive impairment, or athletes who have suffered multiple concussions) may require a prolonged period of asymptomatic rest as well as more time at each of the subsequent steps in the progression.

Neurocognitive testing has become an integral part of concussion management. This can be done as simple paper and pencil test (such as the SCAT) or using computer based tests. All athletes should have pre season baseline neurocognitive testing done. This should be repeated after a concussive injury and the athlete should not return to training until back to their baseline scores. The team physician should supervise the above outlined progression and give final clearance for return to training and competition.

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Causes of injuries

• Aggressive skiing
• Equipment problems
• Weather conditions

• Conditioning
Conditioning

- Balance
- Aerobic & anaerobic fitness
- Muscle parameters
• Regarding ACL injuries, we know that certain situations increase the risk of this injury –
  • Attempting to get up whilst still moving after a fall
  • Leaning right back on your skis or attempting to sit down after losing control
  • Attempting to recover from an inevitable fall
  • Landing after a jump off balance to the rear with the legs straight.
• To avoid ACL injuries remember the four golden rules* –
  1. WHEN YOU’RE DOWN, STAY DOWN - Don’t try to get up if you’ve fallen until you stop
  • sliding
  2. KEEP YOUR KNEES FLEXED - Don’t fully straighten your legs when you fall - try and keep them bent
  3. DON’T LAND ON YOUR HAND – Keep your arms facing upwards and forwards
  4. LAND WITH YOUR KNEES BENT – Don’t jump unless you know where and how to land.
• Always land on both skis with your knees bent
Pre Participation Examination

PPE
as a tool for PREVENTION
Organizing PPE

- No of participants
- Place - time
- Stations – HELP

- HISTORY
- Vision
- Anthropometric features
- ENT – Dental
- Cardiovascular
- Respiratory
- Locomotor system
- Chest X-ray – blood tests
Test & maximize performance

SPORT ADJUSTMENT

- Detailed examination of motor system
- Recognize individual anatomy
- % fat estimation
- Muscle flexibility – joint ROM

- Muscle strength – endurance - symmetry
- Exercise physiology
- Field tests
Detailed examination of motors system

- Knees
- Ankles
- Hips
- Spine
- Shoulders
Recognize individual anatomy

- Varus – Valgus Knees
- Femoral anteversion (in - out toeing)
- Pes cavus – Pes planus
Muscle flexibility – joint ROM
Muscle strength – endurance - symmetry
Exercise physiology
When PPE???

- Beginning sports
- Beginning of season
- Change of training level
- 1 month before starting (6-8/52)
- Partial PPE 3 -4 times annually
Injury Prevention Tips

- Improve conditioning
- Check & adjust equipment
- Gradual increase of training load (day, week, month, year)
- Rest when tired
- Respect nature
- Hydrate (not overhydrate)
- Use helmet & wrist guards
PREVENTION Program

• All year long training
• Off snow training

• Fitness
• Flexibility
• Muscle power – endurance - symmetry
• Core stability
• Proprioception
Flexibility

- Hams
- Quads
- Gluteal – piriformis
- Adductors – ITB
- Calf muscles
Muscle power – endurance - symmetry

- Isometrics ➔ Isotonic (endurance)
- Concentric ➔ eccentric
Core stability

3 x 5'' ➔ 3 x 10'' ➔ ...... ➔ 3 x 30''
Proprioception

Day 1: 3 X 3’
Day 2: 2 X 5’
Day 3: 2 X 10’

Stage 1: Both feet & balance with hands
Stage 2: Both feet without balance
Stage 3: Both feet without balance, ball play
Stage 4: One foot & balance with hands
Stage 5: One foot without balance
Stage 6: One foot without balance, ball play
Thank you