



**FEDERATION INTERNATIONALE DE SKI
INTERNATIONAL SKI FEDERATION
INTERNATIONALER SKI VERBAND**



**FIS Event Organizer
Medical Support Recommendations
For Ski & Snowboard Competitions**



(revised 2006)

INTERNATIONAL SKI FEDERATION
FEDERATION INTERNATIONALE DE SKI
INTERNATIONALER SKI VERBAND

Blochstrasse 2; CH- 3653 Oberhofen / Thunersee; Switzerland

Telephone: +41 (33) 244 61 61

Fax: +41 (33) 244 61 71

Website: www.fis-ski.com

Oberhofen, November 2006

Table of Contents

1.	Medical Services Recommended for Event Organizers	6
1.1	Required/Recommended Facilities & Ressources	6
1.2	Scheduling for Medical Support Coverage of Event	7
1.3	Recommended Personnel/Staff	7
1.4	Training of Personnel	9
1.5	Communication/Radio Protocol	9
1.6	Incident Management Recommendations	10
1.7	Additional Organization Recommendations	11
1.8	Suggested Published Information to Teams	11
2.	Event Injury – FIS Injury Surveillance System	12
2.1	Injuries in skiing and snowboarding	12
2.2	FIS Injury Surveillance System	12
2.3	Gathering the data	12
2.4	Roles & Responsibilities – who needs to do what	13
2.5	FIS ISS Steering Committee and reporting	14
2.6	Oslo Sports Trauma Research Center	14
2.7	DJO Incorporated	14
3.	FIS Medical Supervisor Role & Responsibilities	15
3.1	Specific Role/Responsibilities of FIS Medical Supervisor	15
3.2	Organizational Placement	15
3.3	Pre Event Requirements	15
3.4	Execution during Event	16
3.5	Post Event Report	16
4.	Physicians Traveling with Teams – Roles and Responsibilities	16
4.1	Team Physician	16
4.2	Role with event coverage and on hill safety protocols	16
4.3	Suggested Medical Kit Contents	17
5.	Acute Injury Incident Assessment – General Guidelines	18
5.1	Scene Assessment	18
5.2	Patient Assessment	18
5.3	Shock – symptoms and treatment	20
5.4	Transport, communication and documentation	21
6.	Injuries encountered in Ski and Snowboard Sports	21
6.1	Head Injury	21
6.2	Spinal Injury	29
6.3	Chest Injuries	31
6.4	Abdominal Injury	32
6.5	Pelvis Fracture	33
6.6	Extremity Fractures	33
6.7	Dislocation Injuries	35
7.	Environmental Issues and Conditions in Ski and Snowboard Sport	36
7.1	Altitude Acclimatization and Altitude Illness	36
7.2	Hypothermia and recommended guidelines	37
7.3	Frostbite evaluation/treatment	38

8.	Anti-Doping	39
8.1	General	39
8.2	Overview FIS Anti-Doping E-learning Program	40
8.3	Recommendations for Event Organizers	41

Appendices:

Appendix 1	Event Emergency Medical Services Action Plan (EAP) Planning for Event Medical Coverage Services Check-List
Appendix 2	FIS Injury Report Form
Appendix 3	Example Medical Kit contents – Trauma Kit and First Aid Kit
Appendix 4	Patient Home Instructions for Concussion
Appendix 5	FIS Head Injury Medical Evaluation Form
Appendix 6	Sport Concussion Assessment Tool (SCAT)
Appendix 7	Ideal Infrastructure for Doping tests

Foreword

October 2005

Participation in competitive ski and snowboard sport disciplines supports the foundation of a healthy lifestyle. The health, wellbeing and safety of all athletes become the principal aspiration of all medical support personnel working with athletes/teams. Providing the medical support services for athletes/teams throughout a highly competitive ski or snowboard event is a significant responsibility and can be quite complicated given the unique environment in which these events are produced. As such, the organizational planning for all the medical support services that might be necessary and the actual execution during the event under a variety of conditions can be complex and challenging yet incredibly rewarding as all the pieces planned for come together under these extreme conditions. The task of organizing such a support system provides a distinctive privilege of all those involved to work with athletes of such caliber to impart well executed and experienced assistance in times of need.

In recognition of the many specialized aspects involved in the organization for competitive events in skiing and snowboard sports, the FIS Medical Committee with the assistance of several experts in organization of medical support for such type of events has compiled this booklet to assist event organizers as a resource in their preparations for production of their event.

The main objective of this guide is to provide information based on scientific and internationally accepted standards of medical care as a resource to the individuals accepting the task of organization of medical services for the particular competitive ski or snowboard event. It also contains information regarding communication of the structure of your organization and plan for medical support to the teams to better facilitate a coordinated approach with the team medical support staff on site. We will request the information to be supplied to FIS offices in the autumn prior to your event to improve the delivery of this information to all teams attending your event.

This guide also contains the most recent recommendations regarding the management of concussion in sport that has been adopted by the IOC, IIHF and FIFA. The FIS also recognizes this injury as significant in their sport disciplines as well and has established a mechanism for event officials or medical personnel to intervene in management of concussion if it is felt the athlete is at risk for more significant injury.

It is our hope that you find this guide a ready reference aid for your medical personnel in planning and execution of the medical support.

The FIS Medical Committee foresees this will be a reference guide that will be reviewed and revised annually and thus, offer continual evaluation of issues or problems that become evident in competition of the sport disciplines involved of the International Ski Federation.

Melinda Roalstad, FIS Medical Committee Secretary
FIS Medical Committee

FIS Event Organizer Medical Support Guide

1. Medical Services Recommended for Event Organizers

The health and safety of all those involved in a ski or snowboard competition is a primary concern of all event organizers. This includes the competitors as well as volunteers, course workers and visitors to view events. In organizing the medical response team for an event, this becomes the mission for the medical team.

The specific composition of the medical support system; facilities, stations, mobile units, resources, and staffing is dependent on several variables:

- The nature of the sport discipline demands
- The size of the event being held
- The estimated number of competitors and their support staff and the estimated number of spectators
- The scope of responsibility for the Event Medical Organization (competitors, support staff, event support staff, spectators) should also be determined.

Thus, the following represents a general overview of an organizational structure for a medical system to be compiled for a ski or snowboard event. Obviously, the end product of the system organized will incorporate the special needs characteristic to the event being planned for. For example, the system set-up for an Alpine Downhill event will be quite different than for a Cross Country endurance event. This overview provides the foundation of the details for competition organizers to think about in structuring a system for the medical support of your particular event.

1.1 Required/Recommended Facilities & Resources

To summarize some of the specific resources and facilities to be considered, please find a general list below:

- **On site facilities**
 - Base Tent or clinic at base/finish of event location for initial triage and minor issues.
 - Non-race public facility or tent for medical care of spectators
 - Top of course station for any athlete needs prior to competition
 - Intermediate Course Stations depending on event
 - Ambulances for competitor transport – minimum of one for ALL events stationed at base with a back-up plan if transport occurs. All ambulances must be Advance Life Support equipped.
 - Helicopter as determined from event needs, nearest Trauma Level I centers and FIS requirements – see attached chart.
 - Anti-Doping Control Station – if event is chosen for controls to be accomplished.
- **Additional Resources**
 - Medically trained Personnel such as: Ski Patrol, Physicians, Emergent Medical Services, and other medical support personnel. Account for team physicians as a part of the plan if indicated.
 - All Equipment needs to supply; medical packs, ski patrol packs, trauma packs, toboggan kits, base tent equipment and supplies, etc.
 - Outline Equipment/supply lists for each pack or site.

- Nearest fully equipped facility – Hospital/Clinic.
- Additional Ambulance services to nearest hospital from event location – spectator use.
- Nearest Level I Trauma center.
- Compile information for all Local Medical Services – Physicians, Clinics/Hospitals, Dentist, Therapy clinics, etc. with addresses and phone numbers. This listing should be provided in Team Information Packets.

1.2 Scheduling for Medical Support Coverage of Event

The Event Organizing Committee (OC) must insure that emergency medical services are available for each official day of training and competition. Organization, coordination and scheduling of these services can best be accomplished and coordinated through an appointed individual for the event that is described below in suggested staffing as the Event Medical Supervisor for the event.

1.3 Recommended Personnel/Staff

Recruitment of all personnel should begin as soon as possible – especially for filling the organizational/management positions. Specific job descriptions with requirements can be created according to the specific requirements of the event.

Event Medical Director or Supervisor (EMS)

This individual is responsible to direct and coordinate all medical services provided at the event. This person is a member of the Organizing Committee and reports to the committee regarding medical issues with the event. This individual should be competent in Emergency Medical Care (ACLS, ATLS capable), triage and evacuation procedures, and have a good understanding of operational procedures of all systems with respect to the event and as such, have a good understanding of the sport with regard to possible injuries or incidents that could occur. If this person is not a medical doctor, then one should be appointed as an advisor for the event.

Specific responsibilities for the Event Medical Supervisor (EMS):

- Outline facilities and resources required for the event.
- Establish an evacuation plan for injured athletes – for all possible locations within the “field of play” from site of injury to initial triage to hospital or trauma center if indicated.
- Secure availability of all necessary facilities, resources and personnel to support evacuation plan through working inter-relationships.
- Create a back up plan/system that could be operational if one or more major evacuation is utilized.
- Determine training days as well as event days that will require emergency services and schedule accordingly.
- Establish a separate plan and/or staff for visitors, spectators of the event depending on expected crowds.
- Define specifically the personnel roles and responsibilities and communicate these clearly to all parties involved.
- Develop specific communications plan through use of two-way radios, cell phones, event radios that will be used with all medical support resources (on hill staff, triage center, ambulance, hospital and air medical if indicated).
- Review the emergency medical plan with the organizational committee and event staff to discuss the interactions with other aspects of the event – clarify communications protocol.

- The EMS should review the overall medical plan at the initial team leader meeting for all coaches and team medical personnel. At this time, he/she should establish a specific medical meeting/orientation with all team physicians and/or medical personnel to review the specific evacuation medical plan in detail. It is important that all teams and team medical personnel are comfortable with the plan and informed regarding the care of their athletes.
- Record and Track all incidents that occur during official training and competition and complete FIS Injury Report for each athlete injury. These reports are given to the Technical Delegate for the event to be included in final report.

Event Mountain Patrol Officer or Director (EMPO)

This individual is responsible for overall operations of on-hill “field of play” medical support staff in the treatment and evacuation processes. The Event Medical Supervisor and Mountain Patrol Officer work to coordinate appropriate treatment and evacuation protocols and procedures for the event.

Specific responsibilities of the Event Mountain Patrol Officer (ESPO):

- Coordinates with EMS regarding medical treatment and evacuation plan for the racecourse, providing guidance regarding placement of mountain patrol staff and trauma teams.
- Determines necessary on hill patrol staff, trauma teams and associated resources dependent on specific requirements for the particular event and the location of the course. This should be incorporated into overall Medical Plan.
- Develops the competitor down protocol in coordination with Emergent Medical System (EMS) encompassing severity level of injury. This should be published for education of specific medical staff but also education of team physicians prior to event.
- Coordinates all training sessions with volunteer staff for both on course evacuation as well as spectators.

Additional Medically Trained Support Personnel

Additional advanced trained individuals are recruited as determined by specific requirements of the sport event to provide for stabilization and treatment of the critically injured athlete. These individuals are generally placed in key locations along course and at base.

Physicians traveling with the teams will be located on course as desired within the specific teams. It is recommended the Event Medical Director review athlete down protocols with team medical staffs prior to training/event to improve communication and coordination with regard to incident management when an incident occurs. Team physicians are available to assist with athlete care and stabilization under direction of event medical staff. They also provide invaluable assistance with language barriers. Interpreters should be considered if there are expected difficulties with language between local medically trained personnel and the majority of the competitors.

Ski Patrol and equivalent Police/Army support in Europe

- Act as first responders to a downed athlete and carry standard first aid – ski patrol backpacks.
- This staff should be placed along a course so they always have the athlete in view. Not having an athlete in view can pose problems if they should go down in those areas.
- Numbers/staffing determined by the nature and course of event.

- Consideration of additional staffing to fill positions left open following response to an accident quickly and efficiently so as to not delay the competition.

Trauma Teams

- Determined from the overall medical plan regarding specific needs for event. Generally positioned along course where they can reach any critically injured athlete within 3-4 minutes maximum time limit.
- These teams generally consist of a medically trained individuals that are Advance Cardiac or Advance Trauma Life Support (ACLS/ATLS) qualified and/or paramedic with capability of advanced airway management (intubation and rapid sequence induction) if necessary and nurse or EMT trained individual to assist.

Doping Control Site Coordinator

Should your event be chosen for Anti-Doping Controls, there needs to be an individual delegated the responsibilities of organizing the doping control station for the event and act as the liaison between the Testing Agency, the FIS and the event.

1.4 Training of Personnel

All personnel should be required to attend organizational meetings and training sessions to assure safety of all staff, efficiency and effectiveness in execution of their specific responsibilities. Again the specific number and content of meetings and training sessions depends on the event being held. Some suggestions:

- Initial Organizational meeting with all medical personnel to review overall medical coverage plan, athlete down protocols, communication systems, hierarchy of organization and introductions of all staff as well as a review of safety issues for staff.
- Breakout meetings to review specific scenarios for staff on course, staff at base, staff for general public care.
- Training sessions on course to review athlete down protocols for minor as well as more severe accidents incorporating activation of trauma team response – “Practice Scenarios”. Communication system for these protocols should be practiced as well.
- Pre competition fine-tuning – meeting should be held 1-2 weeks prior to event to review the schedule for the entire competition week, review overall the plan, protocols, and communication with staff and coverage for training as well as competition.
- Daily debriefing – if applicable, a brief evening or morning meeting following each day of training/competition to review any accidents or issues addressed that day to improve upon operations.
- End of event debriefing is also suggested for educational purposes and documentation to prepare for future events.

All sessions should have written documentation provided summarizing information covered.

1.5 Communication/Radio Protocol

There are many communication mechanisms utilized during an event such as team/coaches radios, event staff/organizational radios, course crew, medical teams, timing crew, Competition Jury radios, etc. A specific plan for communications is

developed for each event and generally communication for Medical issues has its own system that coordinates with other divisions of the event as well.

- Event Medical Supervisor and Event Ski Patrol Officer determine the communication network of all their support staff as well as other aspects of the event and will develop a plan specific for communication of medical issues that coordinates with other aspects of the competition.
- It is recommended any injury/illness or medical issue requiring support should be categorized in some manner that quickly identifies the class of medical support required. The following illustrates such a grading system:
 - Level I Minor Injury no dispatch of support necessary
 - e.g.; sprains/strains/contusions
 - Level II Moderate Injury requiring transport but not serious
 - e.g.; knee ligament, shoulder dislocation, etc.
 - Level III Serious injury requiring additional stabilization or support
 - e.g.; possible fractures, internal injuries, concussion
 - Level IV Life threatening – fatal
 - e.g.; closed head injury, internal trauma, femur fractures
- A central dispatch point through which all medical communication flow can be most beneficial and often preferred for medical/safety.
- Once the plan is defined, it should be reviewed with all event staff.
- Generally, the EMS and ESPO have multi channel radios to enable communication with all other groups involved with the competition. Cell phones are also suggested for communication of confidential information. One individual should be the main contact point and dispatch for all on course medical response – Event Ski Patrol Officer. All medical communication should go through this central individual – dispatch.
- All other medical team members have a 2-way radio on the “Medical” frequency to allow for independent communication/dispatch.
- Develop event specific communications protocol and this should be practiced during training scenarios.
- NO member of the medical team will discuss any circumstances or athlete injury status with anyone except the Event Medical Supervisor or Event Ski Patrol Officer.
- **ALL communication with the Media** will be handled through the Event Medical Supervisor or the Organizing Committee Chair.

1.6 Incident Management Recommendations

The EMS and ESPO develop protocols for possible accidents that can occur within the competition arena. This could include care of competitors as well as care of event support staff. This protocol will be coordinated with competition jury, organizing committee and course crew so all competition staff are educated regarding standard management should an accident occur. Each Protocol should include:

- Notification of Incident - sequence of notification
- Competition hold guidelines and communication sequence
- Procedures for deployment of ski patrol, toboggan units, trauma teams
- Decision process for evacuation - recommendations with respect to location and nature of accident
- Decision process for interventions in competition arenas should be defined

- Decision process for further treatment requirements and transport to another facility
- Decision process for deployment of Ambulance or Helicopter – who calls for the Helicopter.
- Reporting procedures – written reports should be kept of any medical team response for records. Summary of all responses should be given to the Technical Delegate and Chief of Competition following the competition.
- If indicated, there should be a separate plan regarding any incidents that may occur within the spectator areas and how these will be handled with regard to normal management of public care delivery system within the location so as to not impact the event.

1.7 Additional Organizational Recommendations

- Organize on hill coverage in terms of 1st responders (usually army/ski patrol), 2nd responders (event physicians), and team physicians. Plan for several incidents to occur within one event so there is adequate back up when needed.
- Delineate response protocols for various grade of injury; life threatening, unconscious, moderate, or minor (MCL sprain).
- Once the athlete is medically stabilized, the evacuation of an athlete off the course is priority and Ski Patrol/Army is best trained for this process. If they require additional assistance from event physician or team physician in stabilizing prior to evacuation, they will indicate that need.
- Event physicians are 1st – 2nd responders. They should be ATLS qualified and well versed in medical emergencies and evacuation procedures. Typically there are 1-2 physicians stationed at top of the course with one at the bottom. If one physician is needed in an emergency, 1 remains at top for back up. If the accident is severe, one of these physicians accompanies the athlete to the hospital.
- Team physicians are working with athletes on their respective teams. They are available on hill to assist in triage **if requested** in care of their athletes and may assist in communication if there is a language barrier. It is important to clearly define their role at the Pre-Competition Medical Review and interaction in the overall medical plan to ensure cooperation and teamwork.
- Freestyle Aerial and Snowboard Boarder-cross and Big Air competitions as well as Alpine Speed events must have a **minimum of two** fully equipped Advanced Life Support/Paramedic Teams with transport at the base of the event at all times during official training or competition. This is due to the nature for these events to possibly incur more serious injury with the potential need for life saving measures. All other events should have one Ambulance with EMT Teams at the base/finish arena with another close by for back-up if needed.

1.8 Suggested Published Information to Teams

- General Medical Coverage of Competition Protocols should be published and given to all teams in their information packets for their medical personnel. This should include:
 - On-Course medical support map with detail of all stations (staffing/equipment/supplies)
 - Evacuation protocols for each level of injury from course with criteria for helicopter transport
 - Location/contact phone of Clinic or Trauma I Hospital that athlete would be transported to depending on Level of Injury
 - Contact for Event Medical Supervisor or Officer – the individual directing all medical care and services.

- A listing of all local medical services to include the phone contact and address for location. This information should include: local medical clinics, physicians, dental offices, pharmacy and if not local, the contact information for the Trauma I Hospital.
 - Anti-Doping Control Station location should controls occur following the event.
- A medical meeting should be scheduled in finish arena prior to the first official training session. This can provide the more detailed information regarding evacuation procedures from the course. The time of this meeting should be communicated to all teams at time of registration.
 - An Emergency Action Plan outline is included in the Appendices for example of outlined information to provide to teams (see appendix 1)

2. THE FIS INJURY SURVEILLANCE SYSTEM

2.1 Injuries in skiing and snowboarding

As we know, injuries happen in all skiing sports, most often in alpine skiing and snowboarding. The severity of injuries varies, but knee and head injuries are of particular concern in all disciplines, as are wrist fractures and other upper extremity injuries in snowboarding. Such injuries often lead to a long-time absence from sports, and increase the risk of chronic problems, permanent disability, or even death in the case of serious head and neck injuries.

Effective prevention depends on comprehensive information on risk factors and injury mechanisms. Unfortunately, our current understanding is limited and consequently, we have a limited ability to suggest effective preventive measures.

2.2 The FIS Injury Surveillance System

To reduce the number of injuries suffered by top level athletes, FIS is developing an Injury Surveillance System (ISS) for all FIS disciplines. The FIS ISS will be led by the Oslo Sports Trauma Research Center and supported by dj Orthopedics.

The main objective of the FIS Injury Surveillance System is to provide reliable data on injury trends in international skiing and snowboarding at the elite level. Specific objectives include:

- Monitoring injury patterns in all FIS disciplines
- Monitoring trends in injury risk with time
- Providing background data for in-depth studies of the causes of injury for particular injury types in specific disciplines, e.g. knee and head injuries in alpine skiing and snowboarding.

The ultimate objective of the FIS ISS is to reduce injury rates through changes in rules and regulations, equipment or coaching techniques based on data provided by the project.

2.3 Gathering the data

The FIS ISS will be developed based on the injury reporting system already established by the FIS Medical Commission, and will commence data collection at the beginning of the 2006-2007 winter season. Injury and exposure data for the FIS ISS will be collected from all FIS competitions.

For the purposes of the FIS ISS, **a reportable injury is defined as:**
all injuries that occur during competition or official training and require attention by medical personnel.

A detailed Injury Report must be completed for each injury. This report will include:

- event information
- personal information
- type of injury
- body part injured
- severity of injury
- injury circumstances
- course conditions
- weather conditions
- wind conditions
- availability of video recording of the injury

If multiple injuries result from the same accident, the report should include information on all injuries. An example would be a skier who suffers a concussion, fractured ribs and a punctured lung from the same fall.

The Injury Reports are collected by FIS for medico-legal purposes and the ISS protocol will be submitted to the National Committees for Research Ethics in Norway. All data entered into the ISS will be anonymized, and the identity of injured athletes will be protected.

2.4 Roles and Responsibilities – who needs to do what?

- The event **Technical Delegate (TD)** needs to collect the Injury Reports for all injuries occurring during competition or official training at their event. TDs at World Cup events should fax the Injury reports from their events to the FIS administration within three days. TDs at other events can send them by regular mail.
- To obtain the technical medical information to complete the Injury Reports, the TD should enlist the help of a medically trained individual (event medical supervisor, physician, physical therapist, athletic trainer, ski patrol), whenever available.
- Event TDs should also check whether tapes or videos were taken of the injury by team coaching staff or others, and provide information on contact details to obtain a copy of the injury videotapes.
- FIS Administration will check the Injury Reports for completeness of the event and personal information.
- The Oslo Sports Trauma Research Center will monitor the injury data for World Cup events on a continuous basis and actively contact TDs, team staff or athletes, to obtain missing information. It will also collect exposure data through the FIS results database.
- Oslo Sports Trauma Research Center will also validate the Injury Report data by comparison with data obtained through other sources, such as coach/athlete interviews and team medical personnel records.
- After the end of the season, the Oslo Sports Trauma Research Center will cross-check video recordings with the injury reports and analyze them to describe the mechanisms of injury.

2.5 FIS ISS Steering Committee and reporting

A Steering Committee has been established with three members, including the chair, appointed by FIS and the other two by the Oslo Sports Trauma

Research Center (OSTRC). The Steering Committee consists of Bengt Saltin, FIS (chair), Hans Spring, FIS, Eero Hyvärinen, FIS, Roald Bahr, OSTRC and Stig Heir, OSTRC. The Steering Committee will meet twice yearly to report on the ISS and related research activities. The Steering Committee will also handle requests from other research groups for access to data from the ISS.

Reports will be presented to the FIS Medical Commission and other relevant FIS commissions annually for review. The reports will serve as the basis for a risk management process, whereby the data are used to identify injury risk in FIS competitions and ensure that every possible effort is made to protect the health of the athletes.

2.6 Oslo Sports Trauma Research Center

The Oslo Sports Trauma Research Center (OSTRC) was founded in May 2000 and is chaired by professor Roald Bahr MD PhD and professor Lars Engebretsen MD PhD. Oslo Sports Trauma Research Center is a joint venture between Ullevål University Hospital and The Norwegian School of Sport Sciences, and is financed by the Royal Norwegian Ministry of Culture, the Norwegian Olympic Committee & Confederation of Sport, the Norwegian Eastern Health Corporate and Norsk Tipping AS. The main objective is to develop a long-term research program on injury prevention (including studies on basic epidemiology, risk factors, injury mechanisms, and intervention studies). The center focuses on the sports that cause the largest number of injuries in Norway, i.e. soccer, team handball, and skiing/snowboarding, and on the most common and serious injury types. The Oslo Sports Trauma Research Center staff includes scientists with a multidisciplinary background (medical doctors, sports scientists, physiotherapists and biomechanists). For the validation of the methods for video analysis, Oslo Sports Trauma Research Center has a state-of-the-art biomechanics lab. Through various projects, the center has established research collaboration with other skiing research groups, primarily in Germany, Austria, Australia and the United States. The Oslo Sports Trauma Research Center organized the 1st World Congress on Sports Injury Prevention in Oslo, Norway in June 2005, and will host the 2nd World Congress in Tromsø, Norway in June 2008.

2.7 DJO Incorporated

DJO Incorporated is proud to support FIS OSTRC in this important research project. Through products like their flagship DonJoy Custom Defiance knee brace, the Company has a rich history of bracing some of the world's most elite professional and amateur athletes across a wide spectrum of traditional and extreme sports to help protect against knee injuries. DJO's support also takes the form of important research funding through internal and external science focused on developing programs and treatments that keep athletes in the game. The International Ski Federation Injury Surveillance System is established at the Oslo Sports Trauma Research Center through generous support from DJO incorporated.

3. FIS Medical Supervisor Role & Responsibilities

For all major skiing and snowboarding events (Olympics and World Championships), the FIS will appoint one or more Medical Supervisors to act as a liaison or advisor to the Organizing Committee for the event regarding sport specific issues. The Medical Supervisor will be nominated by the FIS Medical Committee and communicated to the FIS Secretary General for approval by the FIS Council. This process will take place one year in advance of the scheduled event when possible.

In general, the individual nominated, will be a member of the FIS Medical Committee with current knowledge of specific nuances and issues within the realm of medical and anti-doping. If a committee member is not possible, then by general agreement from the committee, an individual may be recruited from outside the committee to perform the duties of the FIS Medical Supervisor. In his/her job as a Medical Supervisor for the FIS, the individual may not act as a team doctor nor doctor for the organizing committee concurrently with performing the job of Medical Supervisor.

Once approved by the FIS Council, the Event Organizers will be notified of appointed supervisor as well as recommendations set forth in the FIS Medical Guide regarding expected medical support services for the event. It is the responsibility of the Organizing Committee to contact the FIS Medical Supervisor and provide all information regarding organization and delivery of medical services that will be provided during the course of the event.

3.1 Specific Role/Responsibilities of FIS Medical Supervisor

- Liaison/Advisor to Event Organizing Committee
- Facilitate expected medical services of event as defined by FIS
- Understanding of overall event possible medical issues
- Understanding of Event Logistics and “flow” of schedule with ability to make recommendations to Organizing Committee

3.2 Organizational Placement

- Integration with Organizing Committee as advisor and FIS Staff for daily logistics
- Integration with Anti-Doping Agencies for logistical facilitation of the execution of anti-doping controls both pre and post event. The supervisor is not directly involved with doping controls or blood testing but rather the logistics surrounding appropriate execution of these requirements.

3.3 Pre Event Requirements

- Communication with Event Organizing Committee regarding FIS approved guidelines for organization, preparation and execution of all medical support services, safety issues and anti-doping organization and logistics associated with events
- Site Visit/Medical Check list to confirm FIS guidelines incorporated as well as familiarization with facility structure, location and availability
- Facilitate Pre-event Team Physician meeting to communicate logistics and execution of all medical support services and anti-doping controls
- Review Anti-Doping Logistics incorporating all aspects of event; ceremonies, awards, media

3.4 Execution during Event

- Facilitator and Problem Solver between all agencies providing services for the event
- Collaboration closely with all FIS appointed officials throughout duration of event
- Responsible for facilitation of FIS/WADA rules with respect of medical/safety issues and anti-doping rules
- Communicate directly with Race Director/TD regarding any medical or anti-doping issues not consistent with FIS/WADA rules

3.5 Post Event Report

- Medical Supervisor will provide a comprehensive report including communication prior to event, pre-site visitation and summary of all event medical services, injuries sustained during official training and competition and anti-doping logistics or issues encountered during the course of the event. This report will be forwarded to the following:
 - FIS Secretary General
 - Chairman of FIS Medical Committee and subsequently to Medical Committee Members
 - Organizing Committee for the Event

4. Physicians Traveling with Teams – Roles and Responsibilities

4.1 Team Physician

Physicians traveling with teams serve as a tremendous resource to athletes, physiotherapists, trainers and coaches in the management of elite athletes. The job involves a unique challenge not without responsibilities that at times can be demanding and difficult in time sensitive situations. They are often expected to make decisions regarding athletes' health, fitness and ability to train/compete in critical situations under immense pressure. The ramifications of such decisions can impact not only the individual athlete, but also many other individuals involved. The primary aim of a team physician is to provide for the safety and well-being of athletes as well as the best medical care possible with suitable management.

To fulfill the primary goal, a team physician must possess a broad base of medical knowledge with the ability to resource and manage multiple specialists if required to assure the best medical care and management for athletes. He/she should have a working knowledge of trauma, musculoskeletal injuries and general medical care for issues that commonly arise within the sport.

A team physician should also be willing to commit the time necessary to interface with a team, its support staff as well as individual athletes by involvement in training camps and competition scenarios to appropriately address medical management of injury and illness. This involvement will enhance the knowledge base with regard to medical issues within the sport of their involvement.

4.2 Role with event coverage and on hill safety protocols

Team physicians travel with athletes and staff to provide care and services while away from their homes. There is a wide variety of training experience in these individuals and it is important for not only event medical staff to communicate and educate these individuals with the plan for medical coverage of a particular event, but

also for the team physicians to communicate with event/location staff to improve their understanding of the medical support available in a particular location. The Emergency Action Plan (appendix 1) can offer assistance in organization of the information important to all individuals involved with providing medical care in an acute situation. It not only outlines information specific to the event but also assists in defining supportive roles within a team staff in management of an acute medical situation in a training scenario.

Team doctors can be extremely helpful in care for their athletes and assistance in the language barrier or any pertinent medical history. Clearly defining the team physician role/responsibilities within the medical care protocol for events can be helpful in assuring good interaction and coordination of medical care should an incident occur. Most commonly, the team physician should be allowed to come to the athlete in more severe situations with the 1st responders to the downed athlete.

4.3 Suggested Medical Kit Contents

See Appendix 3 for examples of medical kit contents ranging from a basic first-aid kit to a trauma pack.

4.3.1 General Medical Kit

All medical support staff should carry a minimum of medical supplies consistent with general first aid. Most teams will have physiotherapists who carry basic first-aid kit equipment and supplies, however, it is recommended if traveling with a team, determine the type of medical kit that is consistently with the team to determine the specific content of supplies that the physician should bring.

4.3.2 Trauma Pack

Carrying a complete Trauma kit will depend on the location of travel and available services on site as well as in season versus out of season training/camps. See Appendix 3 for an example outline of a trauma kit.

4.3.3 Medications

Medications both the category and amounts carried with the medical team can vary depending on the location and duration of the camp or event as well as the size of the team providing coverage for. Since the trade names of medications vary throughout the world, a general recommended list of categories consists of the following:

- Analgesics
- Anti-inflammatory
- Muscle Relaxant
- Antibiotics
- Antiviral
- Miscellaneous
- Upper Respiratory Issue Medications
 - Decongestants, Cough Suppressants, Throat Lozenges
 - Antihistamines
 - Asthma Management Medications
- Gastrointestinal Medications
 - Antiemetics
 - Antidiarrheal
 - Antacid/Reflux Medications
 - Constipation

- Miscellaneous
 - Anaphylaxis – Epinephrine
 - Glucagon Injection / Oral Glucose
 - Dental Topical Analgesic
 - Topical Corticosteroid
 - Cough and Sore Throat Lozenges

5. Acute Injury Incident Assessment – General Guidelines

The main goal in addressing any accident/injury is to save life and limb with transport to a medical facility as soon as possible. This is often referred to as “Load and Go”. Depending on the location of the incident as well as availability of medical support and transport capacity. The extent of interventions will vary. The time for transport, type of injury and severity are decisive for the pre-hospital care to be carried out. If distance to a hospital/trauma center is less than 20 minutes, the focus of the treatment is stabilization of life-threatening conditions and transport. If transport to a hospital is expected to be longer, a more thorough examination is appropriate.

5.1 Scene Assessment

5.1.1 SAFETY - Official Clearance to Enter Course or Field of Play

Medical Staff will be officially notified by event medical staff, TD or Coaches with radio communication to officials to know when it is safe to enter the course and proceed to the incident. At NO time will any medical personnel ascend/descend to the incident scene until the course/field is closed and cleared. Failure to regard this may result in severe injury to the medical support, athlete or other personnel on course.

5.1.1 Scene Assessment

When first approaching an incident, the caregiver should survey in general what has occurred which is referred to as the scene assessment. Typical areas of note should include:

- Safety at the scene – it must be secured. What are the environmental hazards that may be present; location of patient, weather, visibility, ongoing race, course hold, avalanche danger, steep/ice terrain, entanglement, etc.
- One or more patients – assess need for additional assistance
- Appropriate transport mechanisms (ski patrol/ambulance/helicopter) should be alerted as soon as possible once scene evaluated.
- Mechanism of injury (MOI) – what has likely happened
- Obvious indications - responsive/unresponsive, talking/breathing, bleeding, limb deformity, etc
- If patient transported to hospital/trauma center – then the facility should be alerted as soon as possible to patient general status/vital signs/responsiveness, name/age/sex, visible or probable injury, mechanism of injury, time of accident and expected arrival time at hospital and interventions completed in the field.

5.2 Patient Assessment

Generally, as approaching the sight of an accident, the scene assessment is automatically done on arrival and the general impression of the patient(s) is formed.

Care should be given as soon as possible for any life-threatening conditions remembering to address only those conditions that can be dealt with in the environment to stabilize and transport as quickly as possible. Typically, the patient assessment can be viewed in two steps - Primary (Rapid) Survey and Secondary Survey.

5.2.1 Primary Survey

- Assess Responsiveness – assume possible spinal injury; stabilize head by placing hand on forehead while talking to the patient to assess responsiveness. If patient is unresponsive, assess responsiveness to verbal stimulus by observation of eyes opening to verbal stimuli and responds in an intelligible manner. If patient remains unresponsive or answers in an unintelligible manner, assume serious injury. If patient does not respond to verbal stimulus, try response to a painful stimulus by pinching the earlobe.
- ALWAYS assume spinal injury especially cervical spine in unresponsive or altered responsive patient. Stabilize cervical spine and maintain stabilization throughout assessment and transport.
- Assess/Stabilize Airway, Breathing and Circulation (ABC's)
 - **A**irway - If normal breathing, wait for help to stabilize head/neck to move patient to supine position. If not breathing, quickly move patient to supine position to open the airway. The most effective method is the head tilt-chin lift technique. Test for gag reflex prior to inserting an oral or nasal airway to maintain open airway. If patient gags, do not insert airway.
 - **B**reathing - If patient is not breathing or breathing is ineffective, begin rescue breathing. Rescue breathing should be at a rate of one breath per 5 seconds (12/min) and each breath should last for 2 seconds. As soon as oxygen is available, begin high-flow oxygen at 10 L/min or more using a non-rebreathing mask.
 - **C**irculation – Assess carotid pulse. Be sure to check for up to 45 seconds particularly in a patient with hypothermia to not miss a very faint pulse. If pulse is present and there is no spontaneous breathing, continue rescue breathing. If pulse less, begin external CPR - chest compressions at 60/min pausing ea 15 for 2 rescue breaths. Note that CPR done at altitude can require additional individuals to continue compressions adequately for appropriate perfusion.
 - **AED** - Automatic External Defibrillator – A patient in cardiac arrest, should have access to AED use as soon as it is available and safe to do so. Use of most AED's involves the following simple steps:
 1. Confirm absence of circulation - No Pulse for >10 secs
 2. Wipe Chest Dry
 3. Attach pads to chest – 1 on upper right chest and other on lower left side
 4. Plug Electrode Cable into AED
 5. Let AED “Analyze” rhythm or push “Analyze” button
 6. MAKE SURE EVERYONE IS CLEAR
 7. Deliver Shock to Patient if Indicated by AED
- Supplemental Oxygen

- Without adequate oxygen, insufficient oxygen reaches the cells of the body. Supplemental oxygen can improve the delivery of oxygen, relieve pain and make breathing easier.

Rescue Breathing	→	delivers 16% oxygen
Resuscitation Mask	→	delivers 16% without Oxygen 50% with supplemental Oxygen
Bag Valve Mask	→	delivers 21 % without Oxygen 100% with supplemental Oxygen

- Management of Severe Bleeding (Hemorrhage)
 - Bleeding that is spurting or rapidly flowing from any wound can be as life threatening as respiratory or cardiac arrest. Control the loss of blood as quickly and effectively as possible by applying direct pressure to the wound site. This may involve cutting away clothing. Arterial tourniquets are generally not necessary but, if used, should be released every 5 minutes while continuing with the direct pressure to evaluate the need for the tourniquet.

5.2.2 Secondary Survey

- Rapid Total Body Survey once ABC's stable
 - Head – look for any lacerations, bleeding, contusions, pupil response, nose, ears, mouth. Palpate skull & face for defects or deformities.
 - Neck – with stabilization maintained, palpate for tenderness
 - Chest – observe for any abnormalities in breathing, inspect for wounds and palpate for tenderness
 - Abdomen/Pelvis – look for any irregularities, palpate for tenderness
 - Extremities – observe for deformity, check circulation, motion, sensation (CMS)
- **D**isability – evaluate of neurological status including Glasgow Coma Scale. Track the level of consciousness and responsiveness from the time of the accident until transported.
- **E**xposure – a major concern in the typical environment of skiing and snowboarding is hypothermia. Cover the patient with blankets and clothing as soon as possible. Remove the patient from cold surroundings as soon as possible. Clothing should be removed ONLY if patient is in warm surroundings.

5.3 Shock

The circulatory system of the heart, blood vessels and blood, delivers oxygen to the cells of the body. The failure of this system to deliver oxygen rich blood and perfuse the tissues is what is termed "Shock". It is a vague term used to describe how the body responds to decreased circulation (low blood pressure) with subsequent lack of oxygen delivery to the tissues and in particular to the brain.

5.3.1 Symptoms of Shock

- Pulse rate is rapid
- Blood Pressure is low
- Respirations are increased and shallow

- Skin is cold, clammy and bluish (sometimes difficult to assess in environments of skiing and snowboarding)
- Increased restlessness, agitation
- Delayed capillary refill (circulation)

5.3.2 Supportive Treatment awaiting transport

- ABC's
- Control bleeding, stabilize fractures
- Maintain Open Airway
- Provide Supplemental Oxygen
- Insulate from environment to prevent hypothermia
- Intravenous fluid support if available
- Pain Control if available and ventilations good

5.4 Transport, communication and documentation

All treatment occurring in the field should be documented and communicated during transportation. The patient must be continually monitored regarding level of consciousness, respiration and circulation. Cardiac monitoring, oxygen saturation and blood pressure if available, should be monitored and recorded at regular intervals throughout transportation. Timeline of treatment should be written as well as communicated to the trauma team receiving the patient in the hospital.

5.4.1 Radio Communication of Status – Radio Soap

Situation, Location, MOI, History

Observations and initial vitals

Assessment and possible problems to expect

Plan for evacuation and additional support/equipment needs

6. Injuries encountered in Ski and Snowboard Sports

6.1 Head Injury

Any patient with a hit to the head or face with or without the use of a helmet has the risk of developing an injury to the brain. Injury to the brain is the most common cause of death observed in skiing and snowboarding. Trauma to the head resulting in a change of mental status, symptoms such as headache, nausea, imbalance or clinical signs such as disoriented, amnesia, LOC are reflective of injury to the brain. If the patient is not responsive at all, has dilated pupils, slowed pulse and irregular respirations, the injury is severe.

6.1.1 Acute Treatment

- ABC's –The most important pre-hospital treatment for brain injury is an open airway and supplemental oxygen. Assume cervical spine injury. Stabilization of the neck is also important since approximately 15% of all extended unconscious individuals have a spinal injury as well.
- If vomiting, position on side with spine stabilization and maintain airway
- Elevate head slightly, do not elevate the legs
- Record neurological assessment
- In severe head trauma, the pulse slows and blood pressure increases (opposite of shock) and respiratory function is depressed.
- If patient regains consciousness or the injury does not appear to be severe, they should still be observed for mental status changes.

- Guidelines for Management of Concussion in Sport are discussed in section 6.1.3.

Glasgow Coma Scale

Eye Opening	Spontaneous	4
	Response to speech	3
	Response to pain	2
	No response	1
Best Verbal Response	Oriented	5
	Confused	4
	Inappropriate	3
	Incomprehensible	2
	None	1
Best Motor Response	Obeys Commands	6
	Localizes Pain	5
	Withdraws to Pain	4
	Abnormal flexion	3
	Abnormal extension	2
	None	1
<hr/>		
Total Score	14-15	Mild Dysfunction
	11-13	Moderate to Severe Dysfunction
	10 or less	Severe Dysfunction

6.1.2 Helmet Removal

Generally if a helmet fits well and prevents the head from moving it should be left on if; 1) there is access to treatment for airway compromise, 2) the individual is exhibiting no sign of breathing difficulty and 3) the spine can be properly immobilized. If the helmet includes a facemask or shield, these must be removed to have immediate access to airway management. If removal is necessary, suggested steps include:

1. Two People work together to remove helmet
2. 1st person stabilizes head in helmet and 2nd person removes facemask, goggles and chin strap.
3. 1st rescuer provides constant inline support of head and neck by placing one hand on jaw angle and the other at the head and neck junction. 2nd rescuer removes helmet slowly pausing ½ way to allow 1st person to reposition hand from base of head/neck junction to back of head to maintain neutral positioning.

6.1.3 Concussion in Sport – Recent Recommendations

Sport related minor head injuries have been increasingly more apparent in skiing and snowboarding disciplines over the past several years and they are often difficult to diagnose and treat. Recently, the management of sport related concussion is a strongly debated with regard to decision making in returning athletes to participation safely. Concussion can result from collisions

with other athletes, equipment or environmental surfaces as in skiing, snowboarding, or may even occur without any direct blow to the head if there are sufficient forces involved such as in a whiplash type mechanism. Sporting accidents have been the leading cause of head injury requiring medical attention in children. Most are mild in nature, however, it is important to be sensitive to the potential of significant consequences with more severe injury as well as those associated with repetitive or sequential injuries to the head.

In response for increasing concern regarding management of sport related concussion in many sports, the International Olympic Committee (IOC), the International Ice Hockey Federation (IIHF) and the Federation Internationale de Football (FIFA) organized the **1st International Symposium on Concussion in Sport** (CIS group) was held in 2001 to provide recommendations to improve the safety and health of athletes who suffer concussive head injury. A position stand regarding management of sport related concussion was generated from this meeting; *Clinical Journal of Sport Medicine*, 12:6-11. Since these guidelines were published, there has been increased research in the area of sport related concussion, which improved and increased knowledge with regard to appropriate management to avoid adverse outcomes.

The **2nd International Symposium on Concussion in Sport** was held in November of 2004 to review the recommendations from 2001 and update those based on recent research. The published position statement of this meeting can be found; *Clinical Journal of Sport Medicine* 2005, 15(2): 48-55.

The following represents a brief review of the critical points from these two meetings regarding the definition of concussion and proposed step wise approach recommended for appropriate management of mild traumatic brain injury in athletes.

6.1.4 Definition and Recognition of Concussion

The Congress of Neurosurgeons had previously defined concussion as: “a traumatic induced alteration in mental status that may or may not involve loss of consciousness”. The key to note from this definition is that loss of consciousness is **NOT** necessarily a criterion for concussion and does not imply severity. The terminology of “mild” or “ding” used often by athletes, coaches and physicians in describing a head injury diminishes the possible seriousness of the injury and can be misleading because even “mild” injury can result in adverse outcomes. While this definition had been long established, there were many limitations not accounting for the common symptoms observed. As a result, the international Concussion in Sport (CIS) group developed the following definition that remained consistent in 2004:

CIS Definition of Concussion from 2001 and again in 2004

Concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathological, and biomechanical injury constructs that may be used in defining the nature of a concussive head injury include:

- 1. Concussion may be caused either by a direct blow to the head, face, neck, or elsewhere on the body with an “impulsive” force transmitted to the head.*
- 2. Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously.*

3. *Concussion may result in neuropathological changes, but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.*
4. *Concussion results in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course.*
5. *Concussion is typically associated with grossly normal structural neuroimaging studies.*

In Summary:

- **No Loss of Consciousness necessary for an injury to the brain**
- **Recovery in most cases is rapid; days – weeks**
- **Post Concussive symptoms can be prolonged**
- **Traditional Diagnostic tests (CT, MRI) are not helpful**
- **Inappropriate management can be significant → Second Impact Syndrome**

Second Impact Syndrome

- An athlete who sustains a 2nd head injury prior to complete symptom resolution of the initial injury.
- 2nd injury can be very mild and not involve direct impact to the head.
- Sudden collapse, becomes semi-comatose and develops respiratory failure from rapid increase in Intracranial Pressure.
- Most common in athletes < 21 years old
- Despite emergent resuscitative efforts, there is nearly 100% mortality from increased intracranial pressure and brainstem herniation thought to result from the loss of autoregulatory mechanisms of blood flow to the brain.

6.1.5 Grading of Concussion Levels

The concept of grading as historically defined has been abandoned in favor of individual assessment of recovery to assess severity and guide return to sport decisions. Each injury requires combined measures of recovery with individually guided and progressive return to sport decisions utilizing the athletes recovery via symptoms, neurological assessment, mental status testing and if available, neurocognitive testing.

Prague 2004 – Classification of Concussion

Simple Concussion – an injury that resolves without complications over a 7-10 day period. Other than recommended evaluation and management guidelines of rest, alteration in activity until asymptomatic followed by appropriate progression into full training, no other interventions are required. A primary care physician and trainer can appropriately manage these injuries.

Complex Concussion – an injury that results in any of the following: persistent symptoms including those that return with exertion, additional sequelae with initial incident, prolonged LOC (>1 min) or prolonged cognitive difficulties. These injuries demand additional evaluation and management regarding return to sport decisions utilizing a multidiscipline approach of medical personnel with experience in sport concussion (neurosurgeon, neuropsychologist, trainer, physician).

6.1.6 Evaluation and Management

Any athlete participating in sports that have a high risk of head injury or concussion should have baseline neurological screening, postural-stability, mental status screening and, if available, computerized neurocognitive screening. If computerized testing unavailable, there are several sideline assessments available. This should be part of the annual pre-participation evaluation. The FIS recommends use of the Sport Concussion Assessment Tool (SCAT) for on course evaluation and if any concern regarding the status of an athlete in regard to head injury, will request a medical evaluation in addition to the SCAT for return to sport clearance. See Appendix 4

Goals in Appropriate Management of Concussion:

1. Rule out more severe intracranial pathology
 - If symptoms worsen -> Neurologist/Medical Evaluation, CT, MRI
2. Prevent Second Impact Syndrome
3. Prevent the cumulative effects of repeated injury
 - Increased vulnerability to additional injury
 - Additive post concussive symptoms
4. Prevent Post-Concussive Syndrome

Post-Concussive Syndrome

This refers to lingering symptoms following injury to the brain essentially thought to be reflective of metabolic dysfunction that is occurring with acute injury. It is postulated that this dysfunction predisposes the athlete to be susceptible for a more severe injury if additional trauma (even very minor) is sustained prior to complete recovery of the initial insult. Return of an athlete to sport prior to complete resolution of ALL signs and symptoms is critical to the appropriate and safe management for not only the lingering symptoms but also the long-term neurocognitive problems or catastrophic outcomes that can occur.

Signs and Symptoms of Concussion

If any of the following signs or symptoms is observed in an athlete, a head injury should be suspected with appropriate management steps initiated.

Symptoms of Acute Concussion

- ✓ Headache or pressure in head
- ✓ Dizziness, vertigo
- ✓ Lack of awareness of surroundings
- ✓ Nausea and Vomiting
- ✓ Loss of Balance – Unsteadiness
- ✓ Feeling “dazed, foggy” or stunned
- ✓ Ringing in the ears
- ✓ Visual Changes; Blurred/Double Vision
- ✓ Photosensitivity

Additional Symptoms to Indicate possible Concussion or Unresolved Concussion

- ✓ Feeling “slow” or fatigued unusually - sleepiness
- ✓ Poor attention and concentration
- ✓ Irritability, easily frustrated
- ✓ Anxiety/Depression/Sleep Disturbance

Physical Signs of Concussion

- ✓ Any Loss of Consciousness/Impaired
- ✓ Concussive convulsion/impact seizure
- ✓ Disoriented, Dazed in appearance
- ✓ Inability to focus, easily distracted
- ✓ Delayed verbal and motor responses
- ✓ Slurred Speech – slow to answer questions
- ✓ Unsteady, loss of balance, poor coordination
- ✓ Memory deficits – personality changes
- ✓ Emotional Instability/Inappropriate behavior
- ✓ Vomiting

Acute Management Steps:

1. Record time of initial incident
2. Sideline evaluation of Athlete (SCAT) to include:
 - Medical Evaluation – vital signs and level of consciousness – Triage as indicated. This should be completed by medical personnel on site.
 - Basic Neurological Screen
 - Standardized Assessment of Concussion Evaluation (see Appendix 4)
 - Have athlete complete Post Concussive Symptom Checklist - it has been shown to be more accurate to have the athlete actually rate their symptoms to improve the accuracy and honesty of athletes disclosing symptoms
 - If symptoms cleared, have athlete perform exertional activity and re-screen for symptoms. If symptoms return with exertion, athlete should be removed for day, re-evaluate in 24 hours.
 - If symptoms deteriorate, seek medical attention immediately
3. Sequential assessments should be completed every 5 minutes with vital signs and level of consciousness
4. Presence or absence of symptoms should be documented.
5. The athlete should also be monitored over the proceeding 24 hrs and few days after the injury to observe any delayed signs/symptoms that may arise.

Home Care Instruction Sheet for Athlete and Concussion – See Appendix 6

POST CONCUSSION SYMPTOM SCALE (Lovell, Maroon, Norwig, Bailes)

COMPLETED BY ATHLETE. CIRCLE APPROPRIATE NUMBER FOR EACH SYMPTOM

SYMPTOM	NONE	MILD		MODERATE		SEVERE	
HEADACHE	0	1	2	3	4	5	6
NAUSEA	0	1	2	3	4	5	6
VOMITTING	0	1	2	3	4	5	6
BALANCE PROBLEMS/ DIZZINESS	0	1	2	3	4	5	6
FATIGUE	0	1	2	3	4	5	6
TROUBLE FALLING ASLEEP	0	1	2	3	4	5	6
SLEEPING MORE THAN USUAL	0	1	2	3	4	5	6
DROWSINESS	0	1	2	3	4	5	6
SENSITIVITY TO LIGHT/NOISE	0	1	2	3	4	5	6
SADNESS	0	1	2	3	4	5	6
NERVOUSNESS	0	1	2	3	4	5	6
NUMBNESS/ TINGLING	0	1	2	3	4	5	6
FEELING SLOWED DOWN	0	1	2	3	4	5	6
FEELING LIKE "IN A FOG"	0	1	2	3	4	5	6
DIFFICULTY CONCENTRATING	0	1	2	3	4	5	6
DIFFICULTY REMEMBERING	0	1	2	3	4	5	6
MORE EMOTIONAL THAN USUAL	0	1	2	3	4	5	6
IRRITABILITY	0	1	2	3	4	5	6
OTHER:	0	1	2	3	4	5	6

RECOMMENDED CRITERIA FOR RETURN TO SPORT

- ☐ **ANY** signs/symptoms **NO** return to sport that session, competition or training.
- ☐ Athlete should be medically evaluated and monitored every 5 minutes for sign/symptom resolution or deterioration
- ☐ NEVER return an athlete to sport who is symptomatic

“WHEN IN DOUBT, SIT THEM OUT!”

- ☐ Once the athlete is **symptom free**, cognitive and postural stability testing is recommended to assist in determination of the severity of the injury and making appropriate return to sport decisions.
- ☐ At this time, computerized neurocognitive testing is recommended to detect subtle deficits not perceived with sideline evaluation techniques.
- ☐ Athletes who are symptomatic at rest or after exertion for at least 20 minutes from the initial injury should be removed from participation in the sport on the day of the injury.
- ☐ Any loss of consciousness or amnesia should warrant removal from the sport on the day of injury.
- ☐ Any loss of consciousness or any amnesia lasting longer than 15 minutes should be referred to a physician.
- ☐ Any previous history of concussion should warrant more conservative management of any concussion.

Checklist for Referral to Physician/Neurologist:

- ☐ Loss of Consciousness
- ☐ Anterograde & Retrograde Amnesia lasting longer than 15 mins
- ☐ Deterioration of neurological function; motor, sensory, balance
- ☐ Decreasing level of consciousness
- ☐ Decrease or irregularity in pulse or respirations
- ☐ Increase in blood pressure
- ☐ Unequal, dilated or unreactive pupils

- ☐ Cranial nerve deficits
- ☐ Any s/s of associated injuries; spine, skull, fracture, bleeding
- ☐ Mental status changes
- ☐ Seizure activity
- ☐ Persistent vomiting
- ☐ Post concussion symptoms that worsen and do not improve over time

6.1.7 Event Official Responsibility in Management of Concussed Athlete

If an athlete suspected of having sustained a concussion by exhibiting signs or complaining of symptoms is returned or cleared to return to training and/or competition that day according to their team personnel and there are concerns from Event medical personnel or other medical personnel not related to the team based on their observations, an independent review can be requested by the Technical Delegate (TD) or Race Director for the event if concern is brought to the attention of the TD.

The TD or Race Director will notify the Team Official (Coach and Medical Personnel) regarding the concern and request the athlete obtain an independent evaluation by Event Medical Supervisor or equivalent medical personnel with experience in management of concussion in sport. It will be requested the medical personnel complete the SCAT and Clearance Form to be returned to the Race Official (TD or Director) prior to allowance to train or compete. See Appendix 5 for appropriate Forms.

6.1.8 Rehabilitation and Return to Sport Decision Making

In an acute setting for assessment of concussion and evaluation for return to sport decisions, there must be a component under consideration that includes assessment of cognitive domains. There is in existence many sideline cognitive tests can be administered and utilized effectively particularly if baseline scores have been obtained. The Standardized Assessment of Concussion (SAC – Appendix 4) is a paper/pencil sideline test that offers a tool to be utilized for rapid evaluation. However, it does not replace more complete computerized neurocognitive testing.

The consensus of the CIS Group was that neuropsychological testing is one of the cornerstones of concussion evaluation and contributes significantly to both understanding of the injury and management of the individual. Organized sport federations have access to and should attempt to employ such testing as appropriate. To maximize the clinical utility of such neuropsychological assessment, baseline testing is recommended. (Clin J Sport Med, 12:6-11)

Head injury as in any injury requires a rehabilitative process to assure the most optimal, efficient and safe mechanism to allow for a successful return to full training/competitive ability. The basic principles are essentially quite similar to rehabilitation for all injury; a graded step-wise approach to increasing the training loads while observation for any abnormal responses to the progressive loads.

Basic requirements to begin a Return to Sport progression:

- ☐ Asymptomatic at rest
- ☐ Normal neurological and cognitive evaluations (SCAT/Computerized such as "IMPACT")

- ❑ If symptoms return at any level of the progression, then the athlete returns to step where they were symptom free
- ❑ Each step may take a minimum of 1 day

Return to Sport Protocol:

1. Rest with NO activity until all symptoms are cleared at rest.
2. Activities of Daily Living (ADL's), generally walking, going out to market, light computer/reading/television, light activity. If no symptoms return with ADL's, proceed to 3.
3. Light Aerobic Activity for short duration such as cycling 15-30 mins
4. Increase intensity of aerobic activity by short intervals
5. Resistance training
6. Sport specific training drills in controlled settings
7. Sport specific training
8. Full training/competition

It is recommended from *2nd International Symposium on Concussion in Sport* for each sport discipline to design specific progressive return to full load training and then competition protocols as typically seen with returning athletes from other injuries.

6.2 Spinal Injuries

High velocity sports such as Skiing and Snowboarding that include rapid acceleration, deceleration and rotation of the spine can be a source of mechanism causing injury to the spine. The majority of injuries to the spine result from trauma or excessive movement of the spine in flexion, extension, rotation, lateral bending, compression or distraction. The type of forces involved can cause vertebral fractures, dislocations, subluxations, cord contusions or vascular damage.

6.2.3 Initial Assessment and Treatment

- ABC's – ALWAYS assume spinal injury in an unconscious person. Maintenance of airways, breathing and circulation remains the primary focus initially while limiting spinal movements. Use of manual motion restriction of head and neck in neutral should be established prior to any other assessment/interventions if possible.
- Airway - Hypoxia is a major factor in cord damage, thus establishing adequate airway and adjunct oxygenation if possible should be the initial focus in stabilization.
- Circulation – If CPR measures are necessary; attempt to perform with a minimum of cervical movement however, realizing ABC's are priority over spinal injury if there is no breathing or pulse. Due to peripheral dilatation of vessels below the level of the spinal injury, the danger of hypothermia is a significant concern and can become life threatening.
- ABC's secured, immobilization of head and neck in a neutral position on a rigid litter with cervical collar for evacuation. Neutral positioning is beneficial for two reasons:
 - It allows for maximum space for the cord within the vertebral column. This can be critical because edema and the resultant pressure may contribute to cord hypoxia.

- It is generally accepted to be the most stable position for the spine. Instability of the spine makes movement at the injury site more likely.

Neutral positioning can be estimated in the field by positioning patient so the gaze is perpendicular to the long axis of the spine. Maintain this position manually during treatment to ensure it is consistent throughout all motion-restricted interventions. Most adults are put into extension when supine on a backboard - consider the use of padding under the occiput in adults unless helmet is left on. Children generally have larger heads in proportion to their body and thus, placement on a backboard causes cervical flexion. This can be prevented by padding under shoulders and the torso in children to assist in maintenance of neutral positioning. Body restraining systems should prevent movement in the following directions:

- Laterally – side to side
- Anterior from the board/stretcher
- Axially – head to foot or loading and unloading of body weight during breaking or acceleration.

Only when the head is secured with a cervical collar or appropriately padded and secured to the backboard/stretcher and the body restrained to a rigid spinal support, should manual motion restriction be released.

Movement of a patient into neutral alignment is contraindicated if this movement causes neck or back pain or if resistance is met in this process.

Signs & Symptoms of Spinal Cord Injury

- Mechanism
- Loss of strength or inability to move extremities
- Loss of sensation in extremities
- Extremity Weakness
- Soft tissue injury near spine or tenderness
- Numbness or tingling in extremities

6.2.4 Use of Cervical Collars

Cervical collars must restrict motion safely and effectively. Safe motion restriction means that a correctly sized and applied collar does not alter the neutral segmental alignment of the vertebrae. Cervical collars DO NOT completely immobilize the head and neck by themselves. They do limit motion during patient movement as well as reduce the effect of compression forces. They should be considered as ONE component of a fully motion-restricted system and should not be used alone. No collar will function correctly unless it is sized and applied correctly.

In Summary:

- ❑ **Secure ABC's while maintaining head and neck in a motion restricted neutral position – Stabilize Spine – Move with Log Roll mechanism**
- ❑ **Immobilize with cervical collar and backboard**
- ❑ **prevention measures for hypothermia until evacuation can be accomplished**

6.3 Chest Injuries

Injuries to the chest can potentially be serious if they compromise respiration and the delivery of oxygen to the tissues. The chest contains the heart, lungs and major vessels all vital to delivery of oxygen rich blood to the tissues. Preventing damage to tissues depends on continuous oxygen supply. Expansion of the chest is essential for air exchange. Difficulty with breathing is indicated by strain of the intercostals and accessory muscles of the neck. Normal respiration rate in an adult is 12-20 breaths per minute, however, this rate can be varied affected by conditioning level, current exercise, altitude, illness or injury. Injuries to the chest can often be overlooked in conjunction with head injury. Chest injury in combination with cerebral injury can be particularly serious when combining poor oxygenation with reduced circulation.

6.3.3 Initial Assessment and Treatment

- ABC's are first and foremost in addition to reducing patient's pain
- Seal open wounds with impermeable dressing
- Position of comfort, fold arms across chest and turn patient on side to use body as a splint to chest wall. Do not bind chest with strapping as this can encourage decreased breathing.
- Observe for symmetrical breathing, assess skin color - bluish about the lips indicates poor oxygenation. Listen for irregular or decreased breathing on side of injury, hissing of air or sucking noise. Feel rib cage for tenderness or unstable section in chest wall.
- Percussion for hyper-resonance (pneumothorax) or dullness (hemothorax, hemopericardium).
- Auscultation for reduced respiratory sounds, inequality between sides.

6.3.4 Acute Chest Injuries

Rib Fractures – generally caused by a direct hit to the chest and can result in extreme pain with normal inhalation, pain with coughing and sometimes bruising over the area. X-ray for diagnosis of extent/number of ribs fractured. Treatment consists of analgesics and supplemental oxygen. Do not strap the chest because it prevents normal breathing.

Lung contusion – can result from a direct blow to chest wall with no rib fracture or in combination with rib fracture(s). Pulmonary alveoli become filled with blood and fluids causing hypoxia. Symptoms may include general pain with breathing and blood tinged sputum. Treatment includes ABC's, supplemental oxygen and pain control.

Flail Chest – If several ribs are fractured in more than one location, the section of the chest wall can become unstable moving in the opposite direction of what is normal; in on inspiration and out on expiration. This is termed paradoxical breathing and results in poor ventilation and oxygenation. Patient also becomes anxious, and sweaty from lack of oxygenation. Artificial ventilation may be necessary. Stabilize and transport with injured side down.

Pneumothorax/Hemothorax – with penetrating wounds to the chest, air or blood can enter the pleural space causing collapse of the lung. This causes acute severe chest pain, shortness of breath and increased pulse. The trapped air or blood may need to be drawn off with use of a needle or chest tube in cases of severe hypoxemia. Insert wide bore needle at or above nipple level, midclavicular line pointing the needle upward and backward. Allow air to escape out on exhalation and cover on inspiration.

Tension Pneumothorax (sucking wound) – this can be a life threatening condition especially at altitude – urgent definitive action is required. Injury causes a puncture to lung. -Pleura acts as a one-way valve where air enters pleural space on inspiration and injured tissue blocks the air from returning on expiration, pressure increases rapidly in pleural space causing obstruction of blood flow return to heart. Neck veins become distended, mediastinum shifts and cardiac output decreases. Treatment consists of venting the chest either anteriorly or laterally.

Pericardial Tamponade –

Extremely rare, however, blunt trauma to the chest can cause an injury to the heart itself where the sac surrounding the heart (pericardium) fills with blood. This causes decreased ability of the heart to fill in diastole and decreased blood pressure. If bleeding continues into the pericardium, the heart becomes so compressed that it cannot function and cardiac arrest occurs. Signs and symptoms include faint muffled heart sounds, thready/weak pulse, decreased blood pressure, neck vein distension and shock. This is a life-threatening situation requiring respiratory support with oxygen and prompt transport.

Injury to Trachea/Bronchus – generally found in combination with pneumothorax, often tension pneumothorax. Look for subcutaneous emphysema, blood tinged sputum and shortness of breath. Treatment consists of thoracic drainage and endotracheal intubation.

In Summary

- ❑ **ABC's**
- ❑ **Oxygen by mask if available**
- ❑ **Stop Bleeding, seal open wounds, stabilize impaled objects**
- ❑ **Pain control & decompression of pneumothorax or hemothorax if significant respiratory distress**
- ❑ **Sedation/intubation if failing in control of ventilation**

6.4 Abdominal Injury

Abdominal trauma can occur in skiing and snowboarding with any type of rapid deceleration (closed trauma) or penetration when the abdomen comes into contact with a sharp object such as a ski pole (open trauma). Injury to the abdomen may not manifest itself immediately. Thus, one must always be aware of the possibility of injury to the abdominal cavity. The abdomen contains the digestive system as well as the major organs – liver, spleen, kidneys and bladder. The organs are referred to as either hollow (stomach, intestines, gallbladder, urinary bladder and ureters) or solid (liver, spleen, pancreas or kidneys). Solid organs tend to bleed with trauma and hollow organs tend to spill their contents into the abdominal cavity with trauma. Either type of organ injury leads to inflammation of the peritoneum which is severe and must be stabilized as best as possible and transported as soon as possible.

6.4.3 Acute Assessment and Treatment

- ABC's first and foremost
- Record vital signs every 15 minutes
- Treat for Shock – Keep NPO
- Reassure patient and try to keep them at rest as best as possible
- Prepare for immediate evacuation "LOAD and GO" and if possible, begin intravenous fluid replacement with large bore needle.

- If pain medication available – use it – Morphine for pain but always use with promethazine for nausea/vomiting caused by morphine. Record use of medication with vital signs for trauma surgeon.

Closed Abdominal Injury – determined from history, observation of contact.

- ◆ Check for sign and symptoms (s/s) of shock; rapid weak pulse, low blood pressure, cold, clammy skin. If s/s of shock with no obvious external bleeding – assume abdominal trauma.
- ◆ If patient alert, assess pain, tenderness, bruising, abdominal extension, presence or absence of bowel sounds and symptoms of shock.

Penetrating Abdominal Injury –

- ◆ Generally obvious wound
- ◆ Cover wound with clean, sterile, dressing moistened with sterile saline. If the object still in the wound, leave it as it may be plugging the dike. Support with intravenous volume. Pain medication if patient alert.

In Summary

- **ABC's**
- **NPO - Intravenous support if available and time**
- **Pain control if available and ventilations good**
- **Leave impaled objects in place and stabilize with dressings**
- **Rapid evacuation to trauma center**

6.5 Pelvis Fracture

Fracture to the pelvis take considerable forces often from compression or a fall from a height. A fracture of the pelvis may result in significant blood loss. This is a serious injury. The volume of blood loss can lead to shock and if not treated can be lethal. Always begin treatment for possible shock if a pelvis fracture suspected. Additionally, suspect a possible associated internal injury to the bladder that can often accompany pelvis fractures.

6.5.2 Acute Assessment and Treatment

- ABC's
- Treat for Shock
- Splinting by securing an inflatable splint surrounding the pelvis or simply wrap the pelvis with a sheet
- Prepare for immediate evacuation "LOAD and GO"
- Intravenous fluid replacement if available and time

6.6 Extremity Fractures

Accidents in skiing and snowboarding commonly involve collision with the hard solid surface of snow or ice often from high speeds or significant drop in altitude. Advances in equipment add to the risks. A basic understanding of the nature and possible complications of various fractures is critical for triage. Evaluation includes "open" versus "closed", "simple versus comminuted", possible joint involvement, possible vascular compromise or hemorrhage and possible damage to nerves.

6.6.1 Initial assessment and treatment

- ABC's are always the priority, followed by thoracic or abdominal injury before addressing an extremity fracture.

- Signs of fracture include; localized pain/tenderness (usually intense with any movement), deformity and obvious discoloration or swelling.
- Primary goal should be to immobilize, stabilize, splint, reduce pain and transport to the hospital.
- Determine mechanism of injury
- Evaluate and record circulation, motor and sensory (CMS) function distal to the fracture site

6.6.2 Common Fractures

Hand and Fingers – Immobilize by bandaging hand with soft, ball shaped material (rolled sock) held in the palm. The wrist should be supported/splinted if fracture thought to be in carpal bones close to wrist. Use of forearm sling is beneficial to enhance immobilization and elevate the hand/wrist.

Forearm/Wrist – Immobilization should include elbow, wrist and hand and is generally placed in forearm sling and upper arm swathe to secure forearm to chest.

Elbow/Upper Arm/Shoulder – Immobilization utilizing forearm sling and upper arm swathe around chest. If numbness/tingling occurs in ring and small finger, pad the nerves around the elbow.

Clavicle – A very common injury seen in Nordic Jumping, Combined and Cross-country skiing. Sometimes this can be made more comfortable for the athlete by utilization of a figure of eight wrap to hold the shoulders back or a sling.

Toes – possible fractures to toes are best splinted by buddy taping to another toe and use of a stiff soled shoe/boot.

Foot – fractures of the small bones within the foot can result from stress over time. Localized pain that does not resolve over time should be evaluated for possible stress fracture.

Ankle – fractures to the ankle have been more common in snowboarding. These are sometimes difficult to assess in comparison to a more severe sprain. Generally splint with U shaped splint around foot and lower leg to immobilize until full evaluation can rule out fracture.

Lower Leg – fractures to the tibia or tibia/fibular fractures seem have increased with the advances in skis, lifts and boots contributing to increased torque to the lower leg. These require immobilization of knee and ankle in transport until full evaluation of extent of fracture and attention to possible nerve or vessel damage.

Upper Leg – Suspected femur fracture should be splinted in traction to avoid excessive bleeding into the thigh. If fracture is movable and unstable, the strength of the musculature can cause increased deformity, disruption of the vasculature and increased bleeding leading to shock.

Hip – The typical position for a suspected fractured hip is with the leg found in external rotation and shortening of the involved leg with complaint of pain with any motion and any weight bearing. Splint by securing involved leg to uninvolved leg.

6.7 Dislocation Injuries

A dislocation is an injury where the normal joint relationship is disrupted either by being forced out of the joint socket or displacement from normal alignment. If possible, it is best to reduce dislocations as quickly as possible after it occurs. Reduction is usually easier to accomplish shortly after the injury, results in tremendous relief of pain and reduces the chance of vascular or neurological damage to the extremity involved.

6.7.1 Initial Assessment/Treatment

- Signs and symptoms of dislocation include obvious deformity, pain with motion, localized tenderness, swelling and possible discoloration
- Muscles surrounding a dislocated joint can spasm rapidly making reduction more difficult. In general, the longer the time between dislocation and attempted reduction, the greater the risk of complications
- Relocation of dislocated joints can be problematic and should not be attempted if not skilled to do so to avoid damage to vessels or nerves. Key factors to be cognizant of include, numbness, pale coloration or absence of pulse distal to dislocation. All these can indicate loss of blood supply to the limb and require a rapid attempt to reduce adverse outcome. ALWAYS check CMS distal to joint pre and post reductions.
- A simple suggested approach would be a steady, gradual, firm pull of the limb along the long axis of the limb while additional support provides counter traction.
- Pain medication can enhance reduction. If available, allow at least 15 minutes between administration of medication and attempted reduction
- Once reduction occurs, the limb should be splinted similarly to a fracture in the area with appropriate follow-up evaluation and x-ray.

6.7.2 Joint specific Concerns and Recommendations for treatment

Elbow – Dislocation of an elbow joint is usually due to high-energy trauma. You can see the misalignment in the arm and with palpation or slight passive movement you can usually differentiate from a fracture. Record the gross neurovascular status distally to the dislocation. After reduction check again the neurovascular status and record it. The injured athlete should be taken to the hospital for x-ray to exclude any fractures that need operation. Splint the arm for transport.

Shoulder – Shoulder dislocation is the most often seen dislocation in ski sports. Normally the humerus dislocates anteroinferiorly, a posterior dislocation is rare. Typically it is easy to make the diagnosis, but, a proximal humerus fracture can simulate dislocation. Reduction early is normally easy with traction and small rotating movements. If time has passed and protective muscle contraction has occurred, reduction can be impossible without anesthesia. You may try reduction by letting the athlete to lay on a table with his arm hanging over the edge.

Ankle – Ankle dislocation is a severe condition. Usually it occurs with a trimalleolar ankle fracture. Reduction should be done immediately, otherwise severe skin problems will develop. Transport to hospital for operative treatment.

Knee – A total knee dislocation is rare. Usually when an athlete says his knee is dislocated, it is a dislocation of the patella. A dislocated patella is normally

easily reduced with extension flexion movement of the knee. X-ray is recommended to exclude osteochondral fractures. A total knee dislocation needs a high-energy trauma. The knee should be reduced as soon as possible to avoid severe vascular and neural damages. Follow up evaluation at a Hospital is required.

Hip - A high-energy trauma is needed. A dislocation almost never occurs without acetabular fracture. Reduction should be achieved as soon as possible to avoid damage to sciatic nerve. Hospital treatment is always obligatory after a hip dislocation

7. Environmental Issues and Conditions in Ski and Snowboard Sport

7.1 Altitude Acclimatization and Altitude Illness

In training for skiing and snowboarding athletes can be exposed to “moderate” to “high” altitudes, (5-12,000 ft or 1550-3660 m). Altitude illness syndromes are rarely encountered under 7000 ft (2100m), and are almost universal over 14,000 ft. if ascent is rapid. Multiple physiologic events occur to produce symptoms. At 8000 ft (2440m), the “normal” PaO₂ is 60 with an arterial saturation of 92%. Ventilation increases producing a respiratory alkalosis for several days, plasma volume decreases 10-15 % within hours but fluid may third space producing peripheral edema. Eventually red cell mass and hematocrit increases, sometimes above the allowed limits. Resting HR is higher yet cardiac output drops due to lower stroke volume. Acclimatization occurs gradually with 80 % occurring in 10 days. The risk of acute altitude syndromes is highest in those first few days.

7.1.1 Categories of Altitude Illness

There are 3 main altitude syndromes of concern:

Acute Mountain Sickness (AMS) is the most common and is characterized by global dull headache in conjunction with 1 or more of: GI distress, fatigue, lightheadedness, sleep disturbance and malaise. Symptoms rarely present in less than 8 hr after arrival, usually occur after the first sleep period, and peak at 72-96 hr. Headache is worst in early AM after nocturnal desaturation. Dyspnea is universal at altitude so is not generally part of the diagnostic criteria. Additionally, cognitive function may be impaired. Prior history of altitude intolerance portends repeat problems.

High altitude Pulmonary Edema (HAPE) is characterized by progressive dyspnea and cough with eventual rales and wheeze. Low grade fever, < 100.00 (37.8) is common, patient will appear dusky and cyanotic and severely ill people will have pink frothy sputum. CXR shows bilateral “fluffy” infiltrate, usually greater on the Right.

High Altitude Cerebral Edema (HACE) is much less common, but may be catastrophic. Ataxia, anorexia, vomiting, confusion, and eventual altered LOC are seen. Head CT may be normal early on, with no evidence of edema but MRI will be markedly abnormal.

7.1.2 Prevention Strategies

Slow ascent, for example stopping at 5000 ft for 1 overnight, has been shown to prevent about 50 % of the problems in people with a history of mild altitude

illness. In non-athletes, Acetazolamide 125 mg bid or dexamethasone are useful if begun 24 hr. before ascent and continued for 3 days after, BUT neither medication is permitted by WADA in athletes. Nifedipine XL 20 mg Q8Hr can also be used and in my experience, in NON hypertensive individuals does NOT cause hypotension. For all, extra attention to hydration is mandatory and will also help prevent syncope and thromboembolism, both of which are seen more frequently at altitude. NSAIDS have been evaluated for prevention and found to not be useful.

7.1.3 Treatment Recommendations

Once symptoms have begun, Nifedipine can still be used. Oxygen, if available, at 2-3 L/m, especially at night can be all that is required. Acetaminophen or NSAIDS for headache and extra fluids are helpful but the fluids may worsen the peripheral edema. The most effective treatment is descent; sometimes only 1000 ft is enough. Activity should be light, complete rest exaggerates the tendency to hypoventilate. Full training can resume when the symptoms are completely resolved.

7.2 Hypothermia and recommended guidelines

Ski and Snowboard competitions and training occur in environments where hypothermic reactions can develop. Hypothermia occurs with the body cannot generate or conserve enough heat to overcome losses due to exposure in the environment. Exposure causing heat loss can be due to temperature, humidity or wind chill factor. The impact that the wind chill has on lowering the relative temperature has often been overlooked in winter competitions, which has lead to severe cases of hypothermia.

Acute Hypothermia – refers to a sudden drop in body core temperature within a few hours. This generally happens when the body has been submerged in cold water with resultant wet clothing or in a change in the environment suddenly where the ambient temperature drops rapidly possibly in combination with precipitation and increased wind.

Chronic Hypothermia – refers to a gradual drop in the body core temperature following several hours of exposure to environmental conditions not considered extremely severe simply by not paying proper attention to basic prevention considerations.

7.2.1 Prevention – Heat loss occurs through conduction, convection, radiation and evaporation. Most cases can be prevented by attention to minimizing heat losses through these mechanisms by choosing appropriate clothing, staying dry, avoiding overexertion and maintaining adequate hydration and nutrition.

7.2.2 Treatment – general principles apply for all levels:

- Remove from the environmental exposure
- Remove any wet clothing
- Increase heat production (shivering)
- Increase heat retention (insulate)
- Exercise can increase heat production but also may cause “afterdrop” – a drop in core body temperature. Thus, mild exercise should only occur after 45-60 mins of shivering in a protected environment

7.2.3 Recommendations for Evaluation/Treatment of Hypothermia

Mild Hypothermia – core body temperature of 32-35 C (90-95 F).

Signs/Symptoms:

- mental status changes/mild confusions
- persistent shivering
- poor fine motor coordination
- lack of judgment, sluggish thinking
- lethargic, irritable, withdrawn

Treatment:

- General Tx as above
- individuals at this level can re-warm themselves though shivering to create heat production as long as exposure can be protected
- Fatigue from energy required for shivering may inhibit recovery over time - assure adequate hydration and nutrition utilizing warm high-energy drinks will help with energy requirements
- Warm water bottles may also be used for re-warming – avoid direct contact with skin.

Moderate Hypothermia – core body temperature of 28-32 C (82-90 F)

Signs/Symptoms:

- core temp drops, shivering becomes progressively inhibited, the individual is unable to re-warm on own
- Mental status changes become apparent, apathy
- muscular rigidity develops,
- pulse slow and respirations decreased.

Treatment:

- General Tx as above
- Shivering is non-apparent
- Spontaneous re-warming does not occur.
- Use of body to body contact may help as will application of warm water bottles.
- Oxygen that is warmed and humidified can also be helpful.

Severe Hypothermia – core body temperature < 28 degrees C (82 deg F).

Signs/Symptoms:

- severe increase in mental status changes
- conscious with fixed dilated pupils,
- decreased or impalpable pulse, decreased or no respirations, decreased BP – Metabolic Icebox
- a severely hypothermic person cannot be considered dead until warmed with no respirations and no pulse.

Treatment:

- Treat Gently, keep in horizontal position to prevent V-Fib
- Add heat packs to axilla, groin and head
- No aggressive shell re-warming (no immersion)
- Cardiac monitoring is necessary
- Rapid central re-warming with humidified oxygen and IV fluids

7.3 Frostbite evaluation/treatment

Frostbite refers to a localized freezing of cells and tissue death. Areas most commonly affected are toes, fingers, ear lobes and nose. There are progressing levels of tissue death with specific treatment recommendations. Always maintain adequate hydration and nutrition for metabolically active tissue healing. Use Ibuprofen 400mg prior to spontaneous thawing for inhibition of thromboxane production to minimize cellular damage.

Frostnip – refers to a superficial level of frostbite where a small area of skin turns white but can rapidly return to normal with warming. There is no special treatment required. Loosen constrictive clothing/boots.

Partial Thickness (superficial layer) – refers to an area of skin exposed that is pale, cold and numb however, the underlying tissue is soft and pliable. This can be re-warmed with skin-to-skin contact and rapid re-warming. Do not expose to excessive heat for re-warming. A few blisters may develop in the re-warming process. Avoid refreezing throughout the healing process. Management of blisters as in treatment of superficial burn.

Full Thickness (deep tissue) – refers to involvement of deep tissues being involved such as muscle, tendons and bone. Area is hard and non-pliable. These patients should be evacuated immediately with area protected from environment with dry, insulated material. In controlled setting, rapid re-warming with water bath (40-42 deg C) where body part is fully suspended in water bath. Avoid excessive heat and treat pain with analgesics/narcotics. Hemorrhagic blistering will occur. Treat to minimize likelihood of development of infection.

Prevention:

- Minimize exposure of skin to cold environment – keep head, face and neck covered
- Avoid tight fitting boots/gloves that inhibit circulation for re-warming
- Stay dry and avoid skin-fluid contact
- Stay well hydrated and have adequate caloric intake for maintained metabolism

8. Anti-Doping

8.1 General

Any Anti-doping programme seeks to preserve what is intrinsically valuable about sport. This intrinsic value is often referred to as "the spirit of sport"; it is the essence of Olympism; it is how we play true. The spirit of sport is the celebration of the human spirit, body and mind, and is characterized by the following values:

- Ethics, fair play and honesty
- Health
- Excellence in performance
- Character and education
- Fun and joy
- Teamwork
- Dedication and commitment
- Respect for rules and laws
- Respect for self and other participants
- Courage
- Community and solidarity

Doping is fundamentally contrary to the spirit of sport.

8.1.1 Description of FIS Anti-Doping Activities

The International Ski Federation (FIS) has been one of the most active and innovative leading International Sport Federations in the tough and very complex fight against doping. FIS is strongly committed to the fight against doping, in order to offer to all athletes and participants in every discipline fair and safe competitions.

The FIS Medical Committee is responsible for advising the FIS Council on anti-doping education and preventative programmes, which includes:

- Development of anti-doping education and preventative programmes which can be used by National Ski Associations;
- Review the WADA Prohibited List in relation to specific knowledge about the FIS disciplines;
- Advising on sports-specific information in regard to characteristics of disciplines and types of performance-enhancing substances.

Responsibilities for other aspects of FIS Anti-Doping activities, such as the organisation of testing, etc. are defined in the relevant articles of these FIS Anti-Doping Rules.

8.1.2 FIS Anti-Doping Rules

The International Ski Federation has approved World Anti-Doping *Code* (the "*Code*") by the FIS Council on 10th May 2003 and by the 44th International Ski Congress on 4th June, 2004 in Miami (USA). The FIS Anti-Doping Rules and the FIS Procedural Guidelines to the FIS Anti-Doping Rules have been compiled in accordance with the Code.

Anti-Doping Rules, like Competition rules, are sport rules governing the conditions under which sport is played. Athletes accept these rules as a condition of participation. Anti-Doping Rules are not intended to be subject to or limited by the requirements and legal standards applicable to criminal proceedings or employment matters. The policies and minimum standards set forth in the Code and implemented in these Anti-Doping Rules represent the consensus of a broad spectrum of stakeholders with an interest in fair sport and should be respected by all courts and adjudicating bodies.

The FIS Anti-Doping Rules and its Procedural Guidelines can be downloaded from the FIS Website in the section Rules and Publications/Medical/Doping.

8.2 Overview of the FIS Anti-Doping e-learning Program

FIS e-learning is an education programme on the subject of anti-doping and is designed using a proven virtual learning framework.

The object of the programme is to enable interested individuals and/or groups to learn the core elements of ethics and relevant knowledge of anti-doping issues.

FIS e-learning consists of an information section for all users and a course section developed for any persons who are interested, such as coaches, medical staff, team managers and athletes within the affiliated National Ski Associations of the International Ski Federation (FIS).

The Aim of the Course

The aim of the e-learning course is to reduce the abuse of performance enhancing drugs in sport by helping skiers to make informed decisions. In addition to providing the relevant facts, the course also seeks to stimulate debate on the ethical issues related to doping.

While anti-doping education is especially important for athletes and sports officials, the problem has also spread to younger athletes and other groups in society and it is therefore necessary for everyone to have access to information that will help them to understand the risks associated with doping.

The objectives of the e-learning course include:

- Making the course users reflect on their own attitude toward doping
- Awakening course user's interest on moral and ethical issues
- Persuading the course users to ask more questions
- Providing a virtual social meeting point for course users from around the world
- Disseminating relevant facts and information
- Helping course users to find further information on the subject.

The International Ski Federation (FIS) has been involved in the development of the course section in co-operation with International Doping Tests & Management (IDTM). The FIS rules and procedures referred to are based on the World Anti-Doping Code and the World Anti-Doping Agency (WADA) International Standard. The information contained in the FIS Anti-Doping e-learning programme does not constitute the FIS Anti-Doping Rules or Procedural Guidelines and is not valid for any purpose as a substitute for the rules.

8.3 Recommendations for Event Organizers

(see Appendix 7 for an ideal infrastructure plan for a doping control station)

Doping Control Station

The Organiser shall provide a Doping Control Station that is used solely as a Doping Control Station for the duration of the event, situated near to the location where the press conference is taking place (finish area, press conference vicinity) and is clearly marked, where urine and blood sampling can be undertaken. The Doping Control Station must consist of a waiting area, a working room and toilets (men and ladies).

Sealed refreshments (mineral water, soft drinks, fruit juice, etc.) must be available in the waiting area. These drinks should only contain water, minerals, sweeteners and carbohydrates. It is recommended that the Doping Control Station is also equipped with running water and TV set.

The Doping Control Station shall be adequately equipped and facilities to allow the Doping Control Officer(s) and Blood Collection Official(s) to wash his/her hands and fulfil usual medical standards.

Blood testing Station

Requirements for the Blood Testing Station are also described under Article FIS.B.5.1. The location for the blood testing will be indicated and should, wherever possible, be at the stadium and in the same location as the Doping Control station. The Blood Testing Station requires a separate room for the blood drawing containing, if possible a lockable refrigerator, one table and two chairs, and an additional secure and lockable room with

electricity and a room temperature between +15 to 28 degrees C for the analysis of the blood samples that can only be accessed by the qualified expert.

Support Personnel

The organiser shall provide six to eight Chaperones (twelve for sprint races) to accompany the athletes from the appointed announcement place to the blood testing station. (If urine testing is also taking place these may be the same chaperones as foreseen under art. FIS.C.3.5. of the FIS Procedural Guidelines to the FIS Anti-Doping Rules). They should be able to communicate in principle in English and if possible other languages and be able to recognise the athletes on sight. Otherwise the organiser shall provide an additional person who can assist the Doping Control Officer identify an athlete. It is helpful if the chaperones can assist with translation during the doping control procedure.

Accreditation of Doping Control Personnel

The organiser shall be responsible for providing all doping control personnel, including WADA Independent Observers, appropriate accreditation to enable them to access the necessary areas.

Event Emergency Medical Services Action Plan (EAP)**Location:****Event:****Date:****Prepared Documents for Medical Plan – Please Provide this information to FIS Offices**

- ☐ Map with Medical Station Locations
- ☐ Outline of Staff/Equipment/Supplies for each Station
- ☐ Team Information Booklet - should include all the information outlined on this plan with a local area map in addition to course specific maps, medical station locations and staffing capabilities

Local Medical Facilities

- ☐ Medical Clinic: _____ Contact Name: _____
 Capabilities: _____ Telephone: _____
 Location: _____ Directions from Course: _____
 Hrs: _____
- ☐ **Pharmacy (Location/Hrs/Phone):** _____

Event On-Course Injury Protocol

- ☐ Medical Meeting(s) Time & Place: _____
- ☐ Event Medical Supervisor (Name/Phone): _____
- ☐ Base Medical Station (staffing/Equipment/supplies/capability)

- ☐ Course Medical Stations (personnel/Equipment/Capability)

- ☐ **Event Course Evacuation Protocol**
 - Level I – Minor - Strains/Sprain

 - Level II/III – Moderate – Stable Concussion/Stable Fractures/Knee Ligament/Shoulder

 - Level IV Injuries – Life Threatening – Closed Head/Internal Trauma/Unstable

- ☐ Radio Communication Protocol:
- ☐ Ambulance Location: _____ Transport to: _____
- ☐ Helicopter Location(s): _____
- ☐ Trauma I Hospital: _____ Phone: _____
- ☐ Anti-Doping Control Station Location: _____

Planning for Event Medical Coverage Services Check-List

The safety of the competitors is the main concern of any event organizer at any level of ski and snowboard competition. The following represents some basic organizational details to be established and executed with regard to Medical coverage care of athletes competing in the event.

- ❑ Medical Clinic/Hospital/Trauma Center Availability - establish facilities and resources available to be involved in event:
 1. On site facility – Triage clinic/tent
 2. Nearest fully equipped facility (Clinic/Hospital), what are capabilities of this facility, ie., imaging, laboratory, physicians and hours of operation
 3. Nearest Trauma Center and capabilities – specific comments → language assistance if necessary?
 4. Evacuation Resources; ambulances, helicopter, etc
- ❑ Event Medical Supervisor - Establish primary medical person for the event who will direct and coordinate all medical services provided at the event. This individual should be competent in the following:
 1. Background in Emergency Medical Care, triage and evacuation procedures
 2. Good understanding of overall event production, the sport involved, the possible emergent situations that could arise
 3. Excellent understanding of operational procedures of all systems in coordination of medical coverage for events
- ❑ Event Evacuation Plan - Establish evacuation plan for injured athletes – detail sequence of this plan for Level I-IV type injuries from triage to clinic to trauma hospital if necessary.
- ❑ Communication Sequence/Radio protocol for all responders needs to be clearly outlined regarding 1st responders and decision protocol for helicopter transport.
 1. Organize on hill coverage in terms of 1st responders, event physicians and team physicians
 2. Typically, ski patrols are the 1st responders to triage on hill injury with back up of physicians in severe trauma accidents. They are the individuals in charge of the injury site. If they need assistance, they will call for back up.
 3. Event physicians are 1st-2nd responders depending on the severity of the accident. They should be ATLS qualified and well versed in medical emergencies and evacuation procedures. Generally, on event days, there are 1-2 stationed at top of course with one at the bottom so if one is needed in emergency, 1 remains at top for back up. Should a severe accident occur one of these physicians accompanies the athlete to the hospital
 4. Team Physicians are at events to work with athletes on their respective teams. They are available on hill to assist if asked with care of their athletes. They can be helpful in communication. Generally, the evacuation of an athlete off the course is the priority once stabilized - Ski Patrol are best trained for this process.
- ❑ In this organization, plan for several incidents to occur within one event so there is adequate back up if needed.
- ❑ Schedule - Determine training days as well as event days to be covered with emergency personnel and schedule accordingly. Outline clearly for teams the differences in triage, evacuation and follow up care between training days and event days.
- ❑ Infectious Disease Protocol – establish plan for infectious disease outbreak and outline information for team personnel.

- ❑ Emergency Action Plan (EAP) – Finalize the EAP for the event with map of courses to include medical stations staffing/equipment at each station to be included in the team information packets. If possible, this EAP should be sent to FIS offices by September annually.
- ❑ Event Medical Meeting for Team Personnel - Event Medical Supervisor for the Event should review the medical plan for the event at the initial team leader meeting for all coaches and team medical personnel. At this time, he should establish a specific medical meeting with all team physicians and/or medical personnel to review the medical plan in more detail on course. It is important that all teams and team medical personnel are comfortable with the plan and informed regarding the care of their athletes should an accident occur.
- ❑ ANY additional comments – regarding issues that may be specific or unique to this event location.

FIS Injury Report form



FÉDÉRATION INTERNATIONALE DE SKI
INTERNATIONAL SKI FEDERATION
INTERNATIONALER SKI VERBAND



Injury report / Verletzungsmeldung / Rapport de blessure

All injuries that occur during official training or competition and require attention by medical personnel should be reported/ Alle Verletzungen, die während des offiziellen Trainings oder des Wettkampfes auftreten und Betreuung durch medizinisches Personal erfordern, sollten gemeldet werden/Toutes les blessures qui se produisent pendant l'entraînement officiel ou la compétition et qui nécessitent l'attention du personnel médical doivent être rapportées

Event information/

Informationen zum Bewerb/Information sur l'événement

Discipline/ Disziplin/Discipline:

Site/

Ort/Lieu:

Country/

Land/Pays:

Category/ Kategorie/Catégorie:

Codex:

Date (DD.MM.YYYY)/

Datum/Date:

Athlete information/

Informationen zum Athleten/Données sur l'athlète

Name/ Name/Nom:

FIS Code:

Country/

Land/Pays:

Gender/

Geschlecht/

Sexe:

Male/ Mann/Homme

Female/ Frau/Femme

Birth date (DD.MM.YYYY)/

Geburtsdatum/

Date de naissance:

Injury information/

Information zur Verletzung/Information sur la blessure

To be completed in collaboration with event or team medical staff (if possible)/ Bitte in Zusammenarbeit mit den medizinisch Verantwortlichen der Veranstaltung oder des Teams ausfüllen (wenn möglich)/Svp remplir en collaboration avec le personnel médical de l'événement ou de l'équipe (si possible)

Body part injured/ Verletzter Körperteil/Partie du corps blessée:

- ☐ Head-face/ Kopf-Gesicht/Tête-Face
- ☐ Neck-cervical spine/ Nacken-Halswirbel/Nuque-Vertèbre cervicale
- ☐ Shoulder-clavicle/ Schulter-Schlüsselbein/Epaule-Clavicule
- ☐ Upper arm/ Oberarm/Bras
- ☐ Elbow/ Ellbogen/Coudes
- ☐ Forearm/ Unterarm/Avant-bras
- ☐ Wrist/ Handgelenk/Poignet
- ☐ Hand-finger-thumb/ Hand-Finger-Daumen/Main-Doigt-Pouce
- ☐ Chest (sternum-ribs-upper back)/ Brustkasten (Brustbein-Rippen-Brustwirbelsäule)/Thorax (Sternum-Côtes-Haut du dos)
- ☐ Abdomen/ Bauch/Abdomen
- ☐ Lower back-pelvis-sacrum/ Lendenwirbelsäule-Becken-Kreuzbein/Bas du dos-Pelvis-Sacrum
- ☐ Hip-groin/ Hüfte-Leiste/Hanche-Aîne
- ☐ Thigh/ Oberschenkel/Cuisse
- ☐ Knee/ Knie/Genoux
- ☐ Lower leg-Achilles tendon/ Unterschenkel-Achillessehne/Jambe-Tendon d'Achille
- ☐ Ankle/ Fussgelenk/Chevilles
- ☐ Foot-heel-toe/ Fuss-Ferse-Zehen/Pied-Talon-Orteils
- ☐ Information not available/ Information nicht verfügbar/Information non disponible

Side/

Seite/Part:

☐ Right/ Rechts/Droite☐ Left/ Links/Gauche☐ Not applicable/ Nicht anwendbar/Non applicable

Specific diagnosis (if available)/ Genaue Diagnose (wenn verfügbar)/Diagnostic spécifique (si disponible):

Note: If there are multiple injuries resulting from the same accident, please describe the most serious injury above and the less serious injuries here/ Anmerkung: Wenn aus dem gleichen Unfall mehrere Verletzungen resultieren, bitte beschreiben sie die schwereren Verletzungen oben und die leichteren Verletzungen hier/Note: S'il y a des blessures multiples résultant du même accident, veuillez décrire les blessures les plus sérieuses ci-dessus et les blessures moins sérieuses ci-dessous:

Contact information to obtain further medical information/ Kontakt für weitere medizinische Informationen/Contact pour obtenir des informations médicales supplémentaires:

Name/

Name/Nom:

Mobile telephone/

Mobiletelefonnummer/

Numéro mobile:

E-mail:

Please complete page 2/ Bitte vervollständigen Sie Seite 2/Svp remplir page 2

Injury circumstances/*Umstände der Verletzung/Circonstances de la blessure:*

- ☐ Competition/ *Wettkampf/Compétition*
☐ Official training/ *Offizielles Training/Entraînement officiel*

Type of snow/ *Schneeart/Genre du neige:*

- ☐ Natural snow/ *Naturschnee/Neige naturelle*
☐ Artificial snow/ *Kunstschnee/Neige artificiel*
☐ Plastic/ *Plastik/Plastique*

Course conditions (multiple choices possible)/ *Strecken Zustand (mehrere Antworten möglich)/Condition de la piste (choix multiples possibles):*

- ☐ Ice/ *Eis/Glace*
☐ Soft/ *Weich/Doux*
☐ Compact/ *Kompakt/Compact*
☐ Injected snow/ *Wasserbehandelter Schnee/Neige traitée par l'eau*
☐ Chemicals used (salt, snow solidifier, others)/ *Gebrauchte Chemikalien (Salz, Schneeverfestiger, andere)/Produit chimique utilisé (sel, solidification de neige, autres)*

Weather conditions (multiple choices possible)/ *Wetterbedingen (mehrere Antworten möglich)/Conditions météorologiques (choix multiples possibles):*

- ☐ Sunny-clear/ *Sonnig-klar/Beau temps-clair*
☐ Cloudy/ *Bewölkt/Couvert*
☐ Raining/ *Regnerisch/Pluvieux*
☐ Snowing/ *Schneefall/Chute de neige*
☐ Foggy/ *Nebel/Brouillard*
☐ Flat light/ *Diffuses Licht/Mauvaise visibilité*
☐ Artificial light/ *Künstliche Beleuchtung/Illumination artificielle*

Wind conditions/ *Windkonditionen/Condition de vent:*

- ☐ No wind/ *Kein Wind/Pas de vent*
☐ Some wind/ *Etwas Wind/Peu de vent*
☐ High wind/ *Starker Wind/Vent fort*

Video/ Video/Vidéo:Video available from accident (multiple choices possible)/ *Video vom Unfall verfügbar (mehrere Antworten möglich)/Vidéo de l'accident disponible (choix multiples possibles):*

- ☐ No/ *Keines/No*
☐ TV broadcast/ *Fernsehanstalt/Chaines TV*
☐ Other video/ *Anderes Video/Autres video:*

Explain/ *Erklärung/Expliquez:*

Contact information to obtain copy of video/ *Kontakt um das Video zu erhalten/Contact pour obtenir une copie de la vidéo:*

Name/

Name/Nom:

E-mail:

Mobile telephone/
Mobiletelefonnummer/
Numéro mobile:**Other comments/***Weitere Bemerkungen/Autres commentaires:*

Please send this injury report as soon as possible to/
Bitte schicken Sie diese Verletzungsmeldung so rasch als möglich an/
Veuillez envoyer ce rapport de blessure le plus vite possible à la:

FIS, Blochstrasse 2, CH-3653 Oberhofen, SUI**fax: +41 33 244 61 71****e-mail: fisiss@nih.no**

Example Medical Kit contents – Trauma Kit and First Aid Kit

Trauma Pack - Kit List					
Laceration, Wound and Injection			Diagnostic Tools-		
Injectables	Dose	Quantity	Stethoscope		1
Lidocaine	1% Plain	1	BP Cuff		1
Marcaine	0.25% Plain	1	Thermometer		1
Kenalog **Requires TUE**	10mg	1	Pen Light		1
Kenalog **Requires TUE**	40mg	1	Reflex Hammer		1
Sutures			Otoscope		1
Vicryl	2-0	1	Magill Forceps		1
Vicryl	3-0	1	Tongue Depressor		1
Nylon	3-0	2	Bandage Scissors		1
Nylon	4-0	2	Shears		1
Nylon	6-0	2	Sharpie		1
Wound Care			Splinting-		
ABD pad		2	Femur Traction Splint -Kendrick		1
Alcohol Swabs		6	Triangular bandages		3
Band-aids		15	Cervical Collar	Adjustable	1
Benzoin Tincture		5	Aluminum Splint	Finger	1
Betadine Swabs		6	Ace Wraps	4"	1
Biohazard Bag		1	Ace Wraps	6"	1
Chest Seal		1	Ace Wraps	Double 6"	1
Dermapore Tape	1/2"	1	Sling	Universal	1
Gauze Rolls	4"	2	Felt		1
Triple Antibiotic Ointment		6 pouches	Sam Splint	4x30	1
Non Sterile Gloves		10	Tape	1-1/2"	2
Scalpal	11, 15 ga	1 ea	Tape- Conform	2"	2
Steri Strips	1/4", 1/2"	2 ea	*IV Start Kit-		
Sterile Gauze Pads	4x4	20	IV Start Kit		1
Sterile Q-Tips		2	Normal Saline	500mL	1
Sterile Saline	250mL	1	IV Catheters	14 ga	1
Tagaderm	4x4, 2x4	2 ea	IV Catheters	22 ga	1
Laceration			Butterflies		1
Laceration Tray		1	Lrg Op Sites		2
Sterile Gloves	7.5, 8	1 ea	Hand Warmers		2
Needles			Alcohol Swabs		10
Needle	18ga	2	Penrose Tourniquet		1
Needle	22ga	2			
Needle	25ga	2	*Airway-		
Syringes			Pertrach Kit		1
Syringe	5cc	2	Non Rebreather Mask		1
Syringe	10cc	2	Ambu Bag		1
Syringe	60cc	1	Nasal Airway		Various Sizes
Medications			Oral Airways		Various Sizes
In addition to 1st Aid Kit Medications:		Quantity	Lubricant		1
Epi Pen		3	Hand Suction Unit		1
Albuterol Inhaler		1	Equipment		
Torodol		2	Chest Tube		1
Glucose	Tube	1	AED		1
Injectables - Anesthetic & Pain	Laceration Section		Field Trauma Guide		

Example Medical Kit contents – First Aid Kit

Category	Description	Category	Description
Wound Care		Kit Equipment and Misc	
	Alcohol Wipes		CPR mask
	Triple Antibiotic Ointment		Thermometer
	Bandaid-Regular (sm,md,lg)		Tongue Blades
	Betadine Swabs		Tweezers
	Cotton Swabs		Pen Light
	Eye Wash		Scissors- Bandage 6"
	Gauze Pad - 4"x4"	Tape Supplies	
	Hydrocortisone Cream 48		Athletic Tape 1.5"
	Latex Gloves		Athletic Tape 1/2"
	Nasal Bleed Plugs 50		Coban 2"
	Second Skin		Elastikon 2"
	Steri Strip 1/4 x 2	Medications	
	Steri- strips 1/8 x 3		Aspirin
	Ace Elastic Bandage - 2"		Ibuprofen
	Ace Elastic Bandage - 4"		Acetamenophin
	Ace Elastic Bandade- Double 4"		Glucose
	Ace Elastic Bandage- 6"		Diphenhydramine
	Ace Elastic Bandage- Double 6"		Cough Drops
Splint/Padding			Guiaphensin Syrup
	Felt 1/4", 1/8", 3/8"		Guiaphensin Capsules - 600mg
	Alumafoam		Nasal Spray (Afrin)
	Moleskin		Saline Nasal Spray
	Sam Splint		Pseudoephedrine

Patient Instructions for Head Injury

Common symptoms of head injury include headache, nausea and mild dizziness. Although your exam to this point is normal, head injuries can cause slow bleeding or swelling in your head that may not be detectable at this time.

You are cleared to return home and rest. However, you are requested to be re-evaluated in 24 hours by the team medical personnel. If any of the below symptoms occur or you experience any new symptoms, return to hospital or contact medical personnel with team.

Contact your Physician or return to the Hospital if any of the following occur:

- Persistent nausea and vomiting
- Headache that is severe, worsening or persistent
- Dizziness, trouble with gait, stumbling
- Visual disturbances such as blurring, photosensitivity or double vision
- Ringing in ears or any drainage of blood or clear fluid from ears
- Inability to awaken or excessive sleeping
- Any numbness or tingling noted in extremities
- Any twitching movements noted in eyes, arms, legs or body
- Irregularity in pupils – unequal in size
- Fever greater than 101 degrees F or if shaking chills develop

Home Care Recommendations

You may use Acetaminophen (Tylenol, Panadol, Tempra) for headache.

It is recommended to have a responsible adult observe at home for 1st 24 hrs to assure head injured patient is arousable periodically.

Do NOT take any sedative medication or sleeping pills.

Do NOT take any aspirin or aspirin containing medications.

Do NOT take Ibuprofen or any medications containing Ibuprofen such as Advil, Nuprin or Motrin.

- Rest, do not exert yourself
- No activity, working or school until symptoms resolve
- Sleep, however, able to be aroused periodically
- Light eating with clear liquids best if nauseated for at least 24 hours
- **NO ALCOHOLIC BEVERAGES.**
- No operation of motor vehicles or machines requiring alertness

There is **NO** need to:

- Check eyes with a flashlight
- Wake up every hour
- Test reflexes
- Stay in bed

FIS HEAD INJURY MEDICAL EVALUATION FORM

To Be Completed by Physician

This athlete is being referred for evaluation following a concussion. There are concerns about his/her return to sport at this time. Please evaluate the athlete's readiness to return to sport based on the description of their particular sport listed below. As part of your evaluation, please complete the SCAT exam as well as a neurological examination and any other medical tests that you feel are appropriate. The athlete will be required to return this completed form and attached results to the Competition Official/Technical Delegate to be allowed to participate.

Athlete Name: _____ **Date:** _____

Neurological Examination **Normal** ____ **Abnormal** ____

SCAT Examination **Normal** ____ **Abnormal** ____

Additional Comments:

If additional procedures/tests done, please describe results below:

In your medical opinion, is this athlete ready to return to sport/competition based on the description listed below? Yes ____ No ____

Signature **Phone** **Date**

Name Printed **Email** **Address**

- Alpine Speed Skiing (DH/SG): Athlete skiing at speeds of over 100 KPH for up to 2-3 minutes.
- Alpine Technical Skiing (SL/GS): Athlete skiing up to 45-55 turns on course in 40-75 seconds.
- Freestyle Aerial: Jumping 40 to 50 feet in the air with multiple flips and twists.
- Freestyle Moguls: Skiing through mogul field with two turns per second and inverted and/or upright multiple jumps 12-15 feet in air.
- Snowboard Half-pipe: Riding in a U-shaped ditch with walls 8-15 feet high performing a series of 4-8 tricks 12-15 feet above the lip of the pipe, landing on a steep incline.
- Snowboard Alpine: Multiple turns in a 40-80 second course at speeds of 20-40 mph
- Snowboard Boarder Cross: Multiple jumps, turns and terrain changes with multiple competitors on course at same time traveling at speeds of 25 mph
- Nordic Ski Jumping: Jumping for 90 to 130 meters off Nordic ski jumps.
- Nordic Cross Country: Skiing with multiple competitors on course with possibility of collision between athletes or with other objects.

Sport Concussion Assessment Tool (SCAT)

Statement of the Second International Symposium on Concussion in Sport
Clinical Journal of Sport Medicine 2005; 15(2): 48-55

This tool represents a standardized method of evaluating people after concussion in sport. This Tool has been produced as part of the Summary and Agreement Statement of the Second International Symposium on Concussion in Sport, Prague 2004

Sports concussion is defined as a complex pathophysiological process affecting the brain, induced by traumatic biomechanical forces. Several common features that incorporate clinical, pathological and biomechanical injury constructs that may be utilized in defining the nature of a concussive head injury include:

1. Concussion may be caused either by a direct blow to the head, face, neck or elsewhere on the body with an 'impulsive' force transmitted to the head.
2. Concussion typically results in the rapid onset of short-lived impairment of neurological function that resolves spontaneously.
3. Concussion may result in neuropathological changes but the acute clinical symptoms largely reflect a functional disturbance rather than structural injury.
4. Concussion results in a graded set of clinical syndromes that may or may not involve loss of consciousness. Resolution of the clinical and cognitive symptoms typically follows a sequential course.
5. Concussion is typically associated with grossly normal structural neuroimaging studies.

Post Concussion Symptoms

Ask the athlete to score themselves based on how they feel now. It is recognized that a low score may be normal for some athletes, but clinical judgment should be exercised to determine if a change in symptoms has occurred following the suspected concussion event.

It should be recognized that the reporting of symptoms may not be entirely reliable. This may be due to the effects of a concussion or because the athlete's passionate desire to return to competition outweighs their natural inclination to give an honest response.

If possible, ask someone who knows the athlete well about changes in affect, personality, behavior, etc.

Remember, concussion should be suspected in the presence of ANY ONE or more of the following:

- Symptoms (such as headache), or
- Signs (such as loss of consciousness), or
- Memory problems

Any athlete with a suspected concussion should be monitored for deterioration (i.e., should not be left alone) and should not drive a motor vehicle.

For more information see the "Summary and Agreement Statement of the Second International Symposium on Concussion in Sport" in the: Clinical Journal of Sport Medicine 2005 (vol 15), British Journal of Sports Medicine (vol 39), Neurosurgery (vol 59) and the Physician and Sportsmedicine (vol 33). This tool may be copied for distribution to teams, groups and organizations.

The SCAT Card

(Sport Concussion Assessment Tool)

Athlete Information

What is a concussion? A concussion is a disturbance in the function of the brain caused by a direct or indirect force to the head. It results in a variety of symptoms (like those listed below) and may, or may not, involve memory problems or loss of consciousness.

How do you feel? You should score yourself on the following symptoms, based on how you feel now.

Post Concussion Symptom Scale

	None		Moderate		Severe	
Headache	0	1	2	3	4	5
"Pressure in head"	0	1	2	3	4	5
Neck Pain	0	1	2	3	4	5
Balance problems or dizzy	0	1	2	3	4	5
Nausea or vomiting	0	1	2	3	4	5
Vision problems	0	1	2	3	4	5
Hearing problems / ringing	0	1	2	3	4	5
"Don't feel right"	0	1	2	3	4	5
Feeling "dinged" or "dazed"	0	1	2	3	4	5
Confusion	0	1	2	3	4	5
Feeling slowed down	0	1	2	3	4	5
Feeling like "in a fog"	0	1	2	3	4	5
Drowsiness	0	1	2	3	4	5
Fatigue or low energy	0	1	2	3	4	5
More emotional than usual	0	1	2	3	4	5
Irritability	0	1	2	3	4	5
Difficulty concentrating	0	1	2	3	4	5
Difficulty remembering	0	1	2	3	4	5

(follow up symptoms only)

Sadness	0	1	2	3	4	5
Nervous or Anxious	0	1	2	3	4	5
Trouble falling asleep	0	1	2	3	4	5
Sleeping more than usual	0	1	2	3	4	5
Sensitivity to light	0	1	2	3	4	5
Sensitivity to noise	0	1	2	3	4	5
Other: _____	0	1	2	3	4	5

What should I do?

Any athlete suspected of having a concussion should be removed from play, and then seek medical evaluation.

Signs to watch for:

Problems could arise over the first 24-48 hours. You should not be left alone and must go to a hospital at once if you:

- Have a headache that gets worse
- Are very drowsy or can't be awakened (woken up)
- Can't recognize people or places
- Have repeated vomiting
- Behave unusually or seem confused; are very irritable
- Have seizures (arms and legs jerk uncontrollably)
- Have weak or numb arms or legs
- Are unsteady on your feet; have slurred speech

Remember, it is better to be safe. **Consult your doctor after a suspected concussion.**

What can I expect?

Concussion typically results in the rapid onset of short-lived impairment that resolves spontaneously over time. You can expect that you will be told to rest until you are fully recovered (that means resting your body and your mind). Then, your doctor will likely advise that you go through a gradual increase in exercise over several days (or longer) before returning to sport.

Sport Concussion Assessment Tool (SCAT)



The SCAT Card (Sport Concussion Assessment Tool) Medical Evaluation

Name: _____ Date: _____

Sport/Team: _____ Mouth guard? Y N

1) SIGNS

Was there loss of consciousness or unresponsiveness? Y N
Was there seizure or convulsive activity? Y N
Was there a balance problem / unsteadiness? Y N

2) MEMORY

Modified Maddocks questions (check correct)

At what venue are we? ____; What day is it? ____

Can you tell me what happened? ____ Pre/Post Incident? ____

How did you do in your last competition? ____; Where was it? ____

3) SYMPTOM SCORE

Total number of positive symptoms (from reverse side of the card) = ____

4) COGNITIVE ASSESSMENT

5 word recall	(Examples)	Immediate	Delayed
			(after concentration tasks)
Word 1 _____	cat	_____	_____
Word 2 _____	pen	_____	_____
Word 3 _____	shoe	_____	_____
Word 4 _____	book	_____	_____
Word 5 _____	car	_____	_____

Months in reverse order:

Jun-May-Apr-Mar-Feb-Jan-Dec-Nov-Oct-Sep-Aug-Jul (circle incorrect)
or

Digits backwards (check correct)

5-2-8 3-9-1 _____
6-2-9-4 4-3-7-1 _____
8-3-2-7-9 1-4-9-3-6 _____
7-3-9-1-4-2 5-1-8-4-6-8 _____

Ask delayed 5-word recall now

5) NEUROLOGIC SCREENING

	Pass	Fail
Speech	_____	_____
Eye Motion and Pupils	_____	_____
Pronator Drift	_____	_____
Gait Assessment	_____	_____

Any neurologic screening abnormality necessitates formal neurologic or hospital assessment

6) RETURN TO PLAY

Athletes should not be returned to play the same day of injury.

When returning athletes to play, they should follow a stepwise symptom-limited program, with stages of progression. For example:

1. rest until asymptomatic (physical and mental rest)
2. light aerobic exercise (e.g. stationary cycle)
3. sport-specific training
4. non-contact training drills (start light resistance training)
5. full contact training after medical clearance
6. return to competition (game play)

There should be approximately 24 hours (or longer) for each stage and the athlete should return to stage 1 if symptoms recur. Resistance training should only be added in the later stages.

Medical clearance should be given before return to play.

Instructions:

This side of the card is for the use of medical doctors, physiotherapists or athletic therapists. In order to maximize the information gathered from the card, it is strongly suggested that all athletes participating in contact sports complete a baseline evaluation prior to the beginning of their competitive season. This card is a suggested guide only for sports concussion and is not meant to assess more severe forms of brain injury. **Please give a COPY of this card to the athlete for their information and to guide follow-up assessment.**

Signs:

Assess for each of these items and circle Y (yes) or N (no).

Memory:

Select any 5 words (an example is given). Avoid choosing related words such as "dark" and "moon" which can be recalled by means of word association. Read each word at a rate of one word per second. The athlete should not be informed of the delayed testing of memory (to be done after the reverse months and/or digits). Choose a different set of words each time you perform a follow-up exam with the same candidate.

Concentration / Attention:

Ask the athlete to recite the months of the year in reverse order, starting with a random month. Do not start with December or January. Circle any months not recited in the correct sequence.

For digits backwards, if correct, go to the next string length. If incorrect, read trial 2. Stop after incorrect on both trials.

Neurologic Screening:

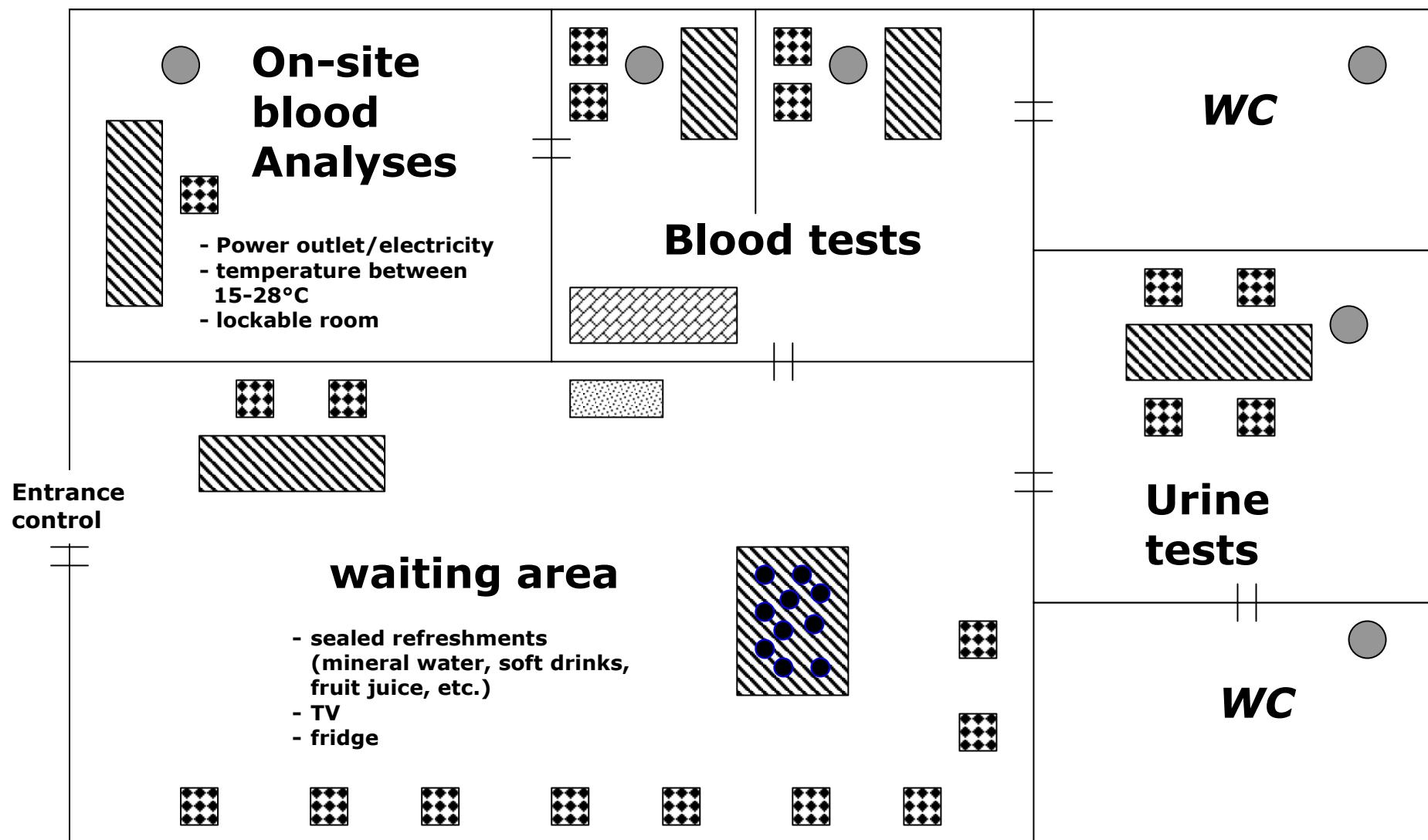
Trained medical personnel must administer this examination. These individuals might include medical doctors, physiotherapists or athletic therapists. Speech should be assessed for fluency and lack of slurring. Eye motion should reveal no diplopia in any of the 4 planes of movement (vertical, horizontal and both diagonal planes). The pronator drift is performed by asking the patient to hold both arms in front of them, palms up, with eyes closed. A positive test is pronating the forearm, dropping the arm, or drift away from midline. For gait assessment, ask the patient to walk away from you, turn and walk back.

Return to Play:

A structured, graded exertion protocol should be developed; individualized on the basis of sport, age and the concussion history of the athlete. Exercise or training should be commenced only after the athlete is clearly asymptomatic with physical and cognitive rest. Final decision for clearance to return to competition should ideally be made by a medical doctor.

For more information see the "Summary and Agreement Statement of the Second International Symposium on Concussion in Sport" in the: Clinical Journal of Sport Medicine 2005 (vol 15), British Journal of Sports Medicine (vol 39), Neurosurgery (vol 59) and the Physician and Sportsmedicine (vol 33).

Infrastructure for Doping tests



Caption:



= Table



= Chair



= trash



= TV



= beverages



= bed or possibility to lay down