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The UIAA Medical Commission Injury Classification for Mountaineering and Climbing Sports

Intended for Physicians and Scientists

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Introduction

In the past 20 years several studies (pro- and retrospectively) were conducted to evaluate the injury and fatality risk of rock [1-18], ice [19, 20] and mountain climbing [16-18, 21-30]. Injury incidence was reported per 1000 hours of sport- specific performance, expedition days, summit attempts or other. Objective reporting of the injury site and its severity varied in most of these papers according to the injury definition and methodology used. This created differences in the injury and fatality results and conclusions, which in turn made inter-study comparisons difficult or impossible. In the absence of a common injury incidence and injury severity scoring system, some authors used the NACA score, while others used the AIS or ISS score [17-19]. Nevertheless all these scores demonstrated weaknesses in the evaluation of mountaineering and climbing injuries [18, 19]. Therefore a simple and common protocol was developed to report injuries in mountaineering and climbing studies. This protocol includes the use of a single climbing grade reference that converts UIAA climbing grades into a standardised metric form. The following recommendations were agreed by the medical commission that represent climbing sports and mountaineering internationally – the UIAA.

Methods

To increase inter-study comparability in football (soccer) the FIFA Medical Assessment and Research Centre established an International Injury Consensus Group which prepared a consensus statement on injury definitions and data collection procedures in studies on football injuries [31]. A similar procedure was performed for mountaineering and climbing sports under the auspices of the Medical Commission of the Union Internationale des Associations d` Alpinisme (International Mountaineering and Climbing Federation, UIAA MedCom, www.theuiaa.org). Using a nominal group consensus model approach [32] a working group was formed during the UIAA Medical Commission's meeting in Adršpach – Zdoňov, in the Czech Republic, 2008. A working document was prepared and circulated via email. After several revisions this final form was approved by written consent in lieu of a live meeting by UIAA MedCom at May 10th, 2010.

Based on the NACA score [33], which was developed by the National Committee on Aeronautics for patients receiving air transport during the Vietnam War, an adopted scoring system was developed and should be used for classification in Mountain Sports. A retrospective grading of the injury is recommended as the score also reflects the patient's outcome and mortality. The proposed protocol to record injuries in mountaineering and climbing studies is broken down into three simple components:

1. **Injury location** – main body parts are designated by a letter of the alphabet (Table 1);
2. **Injury classification** – this is numerically rated using one of seven objective descriptions provided; and
3. **Fatality risk** - numerically rated using one of five objective descriptions and/or the case fatality can be determined. Use of the 'injury and illness classification definitions' is recommended for field research studies on mountaineering and

climbing (including indoor and competition climbing studies). If climbing grades should be reported the single standardised metric scale should be used (Table 2).

Injury and Illness

An injury is defined as: Any physical complaint sustained by a participant during trekking, mountaineering or climbing. This includes belaying, ascent and descent to the climb and camp time for expeditions.

An illness is defined as: Any other medical condition sustained by a participant during trekking, mountaineering or climbing, including ascent and descent to the climb and camp time for expeditions. High altitude diseases are classed as illnesses. As the classification and diagnosis of high altitude illnesses may vary internationally, when using this protocol to collect data the following should be classed as „illnesses“: acute mountain sickness (AMS), high altitude pulmonary edema (HAPE), high altitude cerebral edema (HACE) and similar situations (e.g. subacute infantile mountain sickness (SIMS) or symptomatic high altitude pulmonary hypertension (SHAPH)). Hypothermia should be listed as an "illness" while frostbite should be listed as an "injury".

Injury Location

The location of the injuries should be recorded using the categories listed in table 1:

Table 1: Main groupings and categories for classifying injury location [31, 34]

Main Grouping	Category	Equivalent OSICS Body Area Character [34]
Head and neck	Head/Face	H
	Neck/cervical spine	N
Upper limbs	Shoulder/clavicle	S
	Upper arm	U
	Elbow	E
	Forearm	R
	Wrist	W
	Hand/finger/thumb	P
Trunk	Sternum/ribs/upper back	C,D
	Abdomen	O
	Lower back/pelvis/sacrum	B,L
Lower limbs	Hip/groin	G
	Thigh	T
	Knee	K
	Lower leg/Achilles tendon	Q,A
	Ankle	A
	Foot/toe	F

Injury and Illness Classification (IIC) - UIAA MedCom Score

0 No injury or illness

1 Slight injury or illness, no medical intervention necessary, self therapy (e.g. bruises, contusions, strains)

2 Middle severe injury or illness, not life threatening, prolonged conservative or surgical therapy, outpatient therapy, doctors attendance within a short time frame (days), injury related work absence, heals without permanent damage (e.g. undisplaced fractures, tendon ruptures, pulley ruptures, dislocations)

3 Major injury or illness, not life threatening, residential hospital therapy, surgical intervention necessary, immediate doctors attendance necessary, injury related work absence, heals with or without permanent damage e.g. dislocated joint, fractures, vertebral fractures, cerebral injuries

4 Acute mortal danger, polytrauma, immediate prehospital doctors or experienced trauma paramedics attendance if possible, acute surgical intervention, outcome alive, permanent damage

5 Acute mortal danger, polytrauma, immediate prehospital doctors or experienced trauma paramedics attendance if possible, acute surgical intervention, outcome dead

6 Immediate death

In contradiction to the prehospital NACA score[33] the UIAA MedCom Score is retrospective, considers outcome and mortality, and gives exact guidelines for classification.

Fatality Risk Classification

To grade the fatality risk of mountaineering and climbing sports the UIAA`s risk classification to grade the seriousness in ice-climbing was adopted for use. This grading system is similar to the British ‘E’ grades that rate both the physical difficulty of the route, and the seriousness of it.

Fatality Risk Classification (FRC)

I Fatalities technical possible but very rare, no objective danger

e.g. indoor climbing

II Few objective dangers, fatalities rare, falls are not very dangerous, risk is mostly calculable e.g. sport climbing, mid range Himalayan peaks

III High objective danger, risk is difficult to calculate, falls lead frequently to injuries, fatalities more frequent e.g. traditional climbing, high Himalayan (7000-8000 m) or difficult peaks

IV Extremely dangerous, falls have a high fatality rate, totally unjustified to normal mortals.

Case Fatality

An alternative option to the FRC is to calculate the case fatality rate. The case fatality rate is the ratio of deaths within a designated population of people with a particular condition, over a certain period of time. Nevertheless it may be difficult to exactly quantify the population and the period of time in climbing studies. Ideally, the case fatality and fatality risk classification should be combined.

Time related injury risk

In order to compare the injury risk to other sports, further studies should evaluate the time spent on mountaineering sports to enable to calculate an injury risk per 1000h of sport specific performance. If the hours are not collected for individual rock climbing days, each day can be calculated as 4 hours for sport climbing and traditional climbing, 8 hours for alpine climbing, 2 hours for any indoor climbing, 6 hours for ice climbing and 16 hours for an expedition day. The 16 hours of an expedition day includes camp time and the risk during sleep.

Climbing grades

As almost every country has a different grading system to rate the difficulty of a climbing route, the metric scale [35] should be used for scientific studies. This metric scale is based on the UIAA scale where whole number UIAA grades are directly converted in metric numbers (e.g. UIAA 1 is metric 1.0 etc.), and uneven UIAA grades are converted metric numbers ending with 0.33 or 0.66 (Table 2). Thus the lower or future higher grades can similarly be calculated.

It is important to understand that the various international scales are not on even steps compared to each another and this makes comparisons very difficult - e.g. converting grade French 8a to UIAA 9+, 9+/10- or 10-. This becomes even more problematic with the lower grades and other scales - e.g. the British grades.

Table 2: Comparison of the recommended climbing grade metric scale for scientific studies to the UIAA, French, and American grades

Metric scale	UIAA	French (Fr.)	US-American (YDS)
5.66	6-	5b/c	5.8
6	6	5c/6a	5.9
6.33	6+	6a/6a+	5.10a
6.66	7-	6a+/b	5.10b/c
7	7	6b/b+	5.10d
7.33	7+	6b+/6c	5.11a/b
7.66	8-	6c+	5.11c
8	8	7a	5.11c/d
8.33	8+	7a+/7b	5.12a/b
8.66	9-	7b/7b+	5.12b/c
9	9	7c/7c+	5.12d
9.33	9+	7c+/8a	5.13a
9.66	10-	8a/ 8a+	5.13b/c
10	10	8b	5.13d
10.33	10+	8b+/8c	5.14a/b
10.66	11-	8c/8c+	5.14b/c
11	11	9a	5.14d
11.33	11+	9a+	5.15a
11.66	12-	9b	5.15b

Conclusion

The medical commission of UIAA recommends the use of the above listed criteria and scores for future research in mountaineering and climbing sports, to enable robust and comprehensive inter-study comparisons, and epidemiological analysis.

References

1. Addiss D G, Baker S P. Mountaineering and rock-climbing injuries in US national parks. *Ann Emerg Med* 1989;18(9):975-9.
2. Bowie W S, Hunt T K, Allen H A, Jr. Rock-climbing injuries in Yosemite National Park. *West J Med* 1988;149(2):172-7.
3. Schussmann L C, Lutz L J, Shaw R R, Bohn C R. The epidemiology of mountaineering and rock climbing accidents. *Wilderness Environ Med* 1990;1:235-48.
4. Paige T E, Fiore D C, Houston J D. Injury in traditional and sport rock climbing. *Wilderness Environ Med* 1998;9(1):2-7.
5. Rooks M D. Rock climbing injuries. *Sports Med* 1997;23(4):261-70.
6. Rooks M D, Johnston R B, 3rd, Ensor C D, McIntosh B, James S. Injury patterns in recreational rock climbers. *Am J Sports Med* 1995;23(6):683-5.
7. Gerdes E M, Hafner J W, Aldag J C. Injury patterns and safety practices of rock climbers. *J Trauma* 2006;61(6):1517-25.
8. Josephsen G, Shinneman S, Tamayo-Sarver J, Josephsen K, Boulware D, Hunt M, Pham H. Injuries in bouldering: a prospective study. *Wilderness Environ Med* 2007;18(4):271-80.
9. Jones G, Asghar A, Llewellyn D J. The epidemiology of rock climbing injuries. *Br J Sports Med* 2007.
10. Hearns S T, Fraser M H, Allan D B, McLean A N. Spinal injuries in Scottish mountaineers. *Wilderness Environ Med* 2006;17(3):191-4.
11. Logan A J, Makwana N, Mason G, Dias J. Acute hand and wrist injuries in experienced rock climbers. *Br J Sports Med* 2004;38(5):545-8.
12. Rohrbough J T, Mudge M K, Schilling R C. Overuse injuries in the elite rock climber. *Med Sci Sports Exerc* 2000;32(8):1369-72.
13. Limb D. Injuries on British climbing walls. *Br J Sports Med* 1995;29(3):168-70.
14. Schöffl V, Küpper T. Injuries at the 2005 World Championships in Rock Climbing. *Wilderness Environ Med* 2006;17:187-90.
15. Schöffl V, Winkelmann H P. [Accident statistics at "indoor climbing walls"] Unfallstatistik an „Indoor-Kletteranlagen". *Sportverletz Sportschaden* 1999;13(1):14-6.
16. Nelson N G, McKenzie L B. Rock climbing injuries treated in emergency departments in the U.S., 1990-2007. *Am J Prev Med* 2009;37(3):195-200.
17. Schöffl V. *Fels- und Eisklettern - Eine Risikoanalyse.* Diplomica Verlag: Hamburg, 2009; 100.
18. Schöffl V, Morrison A B, Schwarz U, Schöffl I, Küpper T. Evaluation of injury and fatality risk in rock and ice climbing (in print). *Sport Med* 2010.
19. Schöffl V, Schöffl I, Schwarz U, Hennig F, Küpper T. Injury-risk evaluation in water ice climbing. *Med Sport* 2009;2 (1-2):32-8.
20. Schwarz U, Küpper T, Schöffl I, Dickschas J, Schöffl V. Eisklettern - Unfälle und Überlastungen. *Sport Ortho Sport Trauma* 2008;24:235-8.
21. American-Alpine-Club. Accidents in North American Mountaineering. *The American Alpine Club* 2006;9(1):59.
22. Canadian-Alpine-Club. *Accidents in North American Mountaineering*. Canadian Alpine Club: 2005.
23. DAV *Bergunfallstatistik 2006-2007*; Deutscher Alpenverein, München, 2008.
24. Schindera S T, Triller J, Steinbach L S, Zimmermann H, Takala J, Anderson S E. Spectrum of injuries from glacial sports. *Wilderness Environ Med* 2005;16(1):33-7.
25. McIntosh S E, Campbell A D, Dow J, Grissom C K. Mountaineering fatalities on Denali. *High Alt Med Biol* 2008;9(1):89-95.

26. McIntosh S E, Leemon D, Visitacion J, Schimelpfenig T, Fosnocht D. Medical Incidents and Evacuations on Wilderness Expeditions. *Wilderness Environ Med* 2007;18:298-304.
27. Shlim D R, Houston R. Helicopter rescues and deaths among trekkers in Nepal. *JAMA* 1989;261:1017-19.
28. Malcom M. Mountaineering fatalities in Mt Cook National Park. *N Z Med J* 2001;114(1127):78-80.
29. Salisbury R. *The Himalayan Database: The Expedition Archives of Elizabeth Hawley*. ed.; American Alpine Club: Golden, CO, 2004.
30. Monasterio M E. Accident and fatality characteristics in a population of mountain climbers in New Zealand. *N Z Med J* 2005;118(1208):U1249.
31. Fuller C W, Ekstrand J, Junge A, Andersen T E, Bahr R, VDvorak J, Hägglund M, McCrory P, Meeuwisse W H. Consensus statement of injury definitions and data collection procedures in studies of football (soccer) injuries. *Scand J Med Sci Sports* 2006;16:83-92.
32. Fink A, Kosecoff J, Chassin M, Brook R H. Consensus methods: Characteristics and guidelines for use. *Am J Public Health* 1984;74(9):979-83.
33. Veldman A, Fischer D, Brand J, Racky S, Klug P, Diefenbach M. Proposal for a new scoring system in international interhospital air transport. *J Travel Med* 2001;8(3):154-7.
34. Orchard J. Orchard Sports Injury Classification System (OSICS). *Sport Health* 1995;11:39-41.
35. Schöffl V, Hochholzer T, Winkelmann H P, Strecker W. Pulley injuries in rock climbers. *Wilderness Environ Med* 2003;14(2):94-100.

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History of this recommendation paper

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