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**International Commission for Alpine Rescue  
Commission for Mountain Emergency  
Medicine (ICAR MEDCOM)**

## **Current Status of Medical Training in Mountain Rescue in America and Europe**

***OFFICIAL RECOMMENDATION OF THE INTERNATIONAL COMMISSION FOR  
MOUNTAIN EMERGENCY MEDICINE (ICAR MEDCOM)***

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**This article reflects the consensus of opinion of the International Commission for Mountain Emergency Medicine which has full responsibility for the content.**

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# Current Status of Medical Training in Mountain Rescue in America and Europe

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## Abstract

Elsensohn, Fidel, Thomas Niederklapfer, John Ellerton, Michael Swangard, Hermann Brugger, and Peter Paal. Current status of medical training in mountain rescue in America and Europe. *High Alt. Med. Biol.* 10:195–200, 2009: —Limited medical training of mountain rescuers may adversely affect the outcome of casualties. Thus, this study evaluated medical training of mountain rescuers in countries associated with the International Commission of Mountain Emergency Medicine. A questionnaire was completed by 33 mountain rescue services from 18 countries in America and Europe. First-aid topics taught most often are (absolute values, percentage): chest compression, hypothermia, cold injuries (32 of 33 organization 97%); avalanche rescue, first-aid kit of rescuer, cervical collar (31, 94%); hemorrhagic shock, automated blood pressure measurement, wound dressing (30, 91%); and heat injuries and SAM<sup>®</sup> SPLINT (29, 88%). Cardiopulmonary resuscitation manikins are used in 32 (97%) organizations, and in 17 (52%) organizations manikins have feedback functionality. After training, exams are compulsory in 27 (83%) organizations. Yearly retraining is done in 12 (36%) organizations; 22 (67%) organizations would like to increase medical training. The study shows high variability in the medical training programs among the surveyed organizations and the need to improve medical education. The authors recommend standardization of medical training and examinations on an international level. Additional topics tailored to the typical injury and illness patterns of a particular area should supplement this core training. Training should be performed by highly qualified instructors on a yearly basis.

**Key Words:** basic life support; cardiopulmonary resuscitation; emergency medicine service; first aid; mountain rescue; training

## Introduction

**M**EDICAL EMERGENCIES IN MOUNTAINS or remote areas may present a severe health risk to a patient, even if the illness would be classed as minor in an urban setting. Limited medical training of mountain rescuers, inadequate equipment, long response and evacuation times, bad weather, and dangerous terrain may adversely affect patient outcome. Fortunately, training in first aid (Ali et al., 1997; Ali et al., 2007) and basic life support (Abella et al., 2005) can improve outcome. Some of these strategies are inexpensive, require only a short training time (Wik et al., 2005), and may be incorporated

into the medical training of mountain rescue services, despite limited financial funding.

The incidence of medical emergencies (Hearns, 2003) and the status of medical emergency services in the mountains have been reported (Brugger et al., 2005). However, no international survey on medical training in mountain rescue has been published. Thus, the purpose of this study was to evaluate medical training in countries associated with the International Commission for Mountain Emergency Medicine (ICAR MEDCOM) with the aim of enabling rescue services to improve their training curricula.

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TABLE 1. PARTICIPATING COUNTRIES AND MOUNTAIN RESCUE SERVICES

<i>Country</i>	<i>Mountain Rescue Service</i>
Argentina	Club Andino Bariloche
Austria	Österreichischer Bergrettungsdienst, Christophorus Flugrettung
Bosnia and Herzegovina	Gorska Sluzba Spasavawja
Bulgaria	Bulgarian Mountain Rescue Service
Canada	Parks Canada, Canadian Ski Patrol–Atlantic West Division, Canadian Ski Patrol–Prince George Zone, North Shore Rescue
Czech Republic	Horska Sluzba Ceske Republiky
Germany	Bergwacht Bayern
Greece	Hellenic Rescue Team
Italy	Bergrettungsdienst im Alpenverein, Südtirol, Corpo Nazionale Soccorso Alpino e Speleologico– Bergamo, Corpo Nazionale Soccorso Alpino e Speleologico–Alto Adige
Liechtenstein	Bergrettung Liechtenstein
Norway	Norsk Folkjehelp, Suolvaer Alpine Redningsgruppe, Norske Redningshunder
Poland	Polish Mountain Rescue
Slovenia	Gorska Rezevalna Zveza Slovenije
Spain	Guardia Civil, Servei de Rescat a Pistes
Sweden	Swedish Mountain Rescue, Swedish Police, Swedish Ski Lift Areas Organization
Switzerland	Air Zermatt, Alpine Rettung Schweiz, Kantonale Walliser Rettungsorganisation, Schweizerische Rettungsflugwacht /Garde Aérienne
United Kingdom	Mountain Rescue Council England and Wales, Mountain Rescue Council Scotland
United States of America	Mountain Rescue Association (MRA).

## Materials and Methods

A standardized questionnaire was distributed and collected in 2007 among ICAR MEDCOM representatives nominated by the national mountain rescue services. ICAR MEDCOM representatives were asked to distribute the questionnaire to other mountain rescue services in their country. The questionnaire asked for the contents of medical training and sought to identify different stages of training in different organizations. Nominal data are given as counts (percentages). Multiple answers were possible for some questions; thus the cumulative results may be >33 (>100%) for some questions. Also, some results may be below 100% because of incompletely filled out questionnaires. Data were analyzed with Lime Survey ([www.limesurvey.org](http://www.limesurvey.org)), and figures were arranged with Excel 2008 (Microsoft, Seattle, WA, USA).

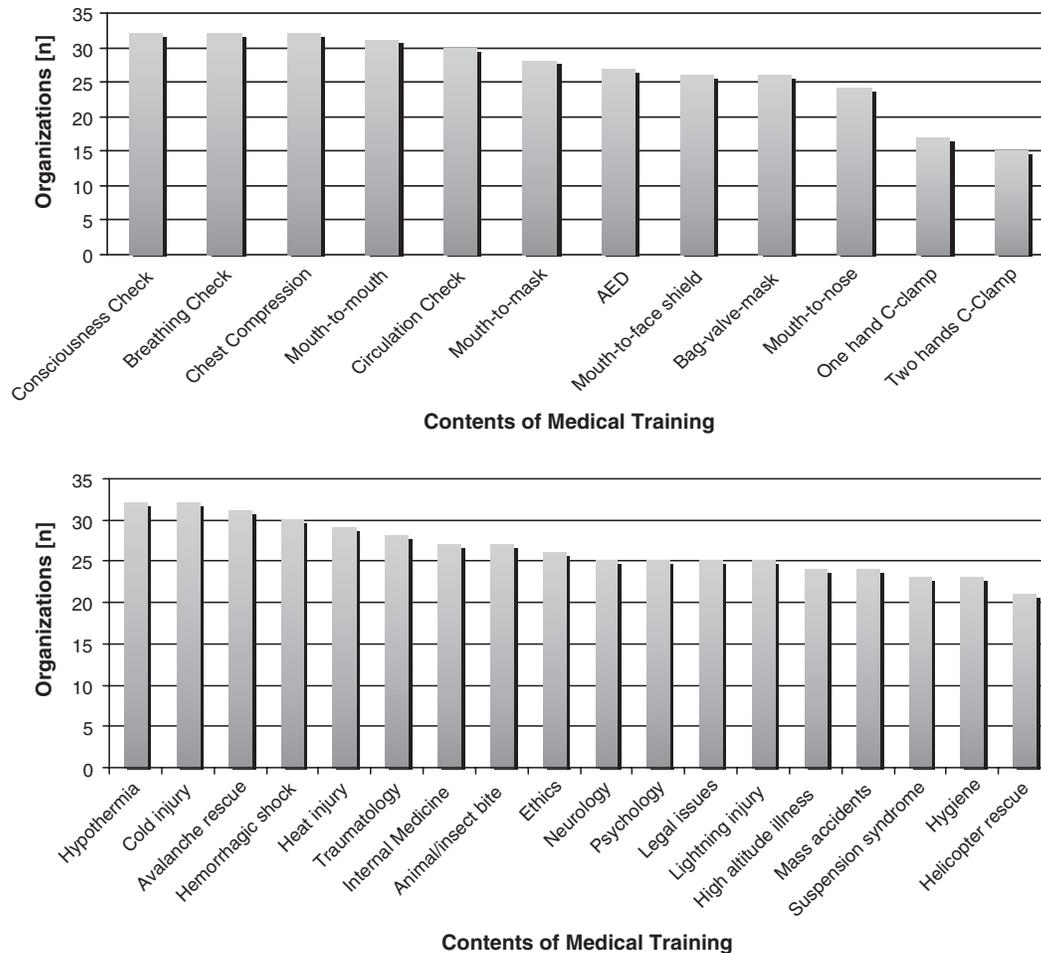
## Results

Thirty-three mountain rescue services from 18 of the 24 countries associated with ICAR MEDCOM in Europe and North and South America returned the questionnaire. Countries and participating organizations are listed in Table 1. Nine of the 33 (27%) organizations are the sole mountain rescue providers in their countries. Medical training is standardized in 22 (67%) mountain rescue services. Medical training is taught in-house in 24 (73%) organizations and augmented by external instructors in 15 (45%) organizations. External instructors augment basic life support (BLS) in 18 (55%) organizations, trauma in 16 (49%), and internal medicine and psychology in 12 (36%) organizations. Compulsory requirements for medical training exist in 20 (61%) mountain rescue services and are defined by law in 12 (36%) organizations. Mountain rescue services have one stage of medical training in 14 (43%) organizations, two stages in 10 (30%), three stages in 7 (21%), and more than three stages in 1 (3%). However, the number of stages does not necessarily correlate with the duration of training and its contents. For example, basic stage

training varies from 16 to over 500 h. Higher medical training stages exist for medical instructors in 13 (39%) organizations, for air rescuers in 12 (36%), for ski patrollers in 4 (12%), for terrestrial rescuers in 2 (6%), and for dog handlers in 1 (3%) organization.

Topics of medical training are shown in Fig 1. The time dedicated to theory and practice is equally shared. Twenty-two (67%) mountain rescue services feel there is a need to increase medical training. In basic stage training, written exams are compulsory in 20 (61%) organizations, oral exams in 11 (33%), and practice exams in 24 (73%), but a minimum percentage is required only in 22 (67%) mountain rescue services. The teaching methods and materials employed are cardiopulmonary resuscitation manikins in 32 (97%) organizations, lectures in 29 (88%), training with a rescuer's first-aid kit in 24 (73%), digital media (e.g., CDs and DVDs) in 23 (70%), and training with a first-aid backpack in 19 (58%); hand outs are given in 25 (76%). Manikins with feedback function are employed in 17 (52%) organizations. Medical retraining is compulsory in 29 (88%) organizations and must meet national regulations in 7 (21%). For basic stage rescuers, yearly retraining is compulsory in 12 (36%) mountain rescue services and, according to abilities, in 3 (9%). Retraining when compared to initial training is reduced in length and content in 13 (39%) organizations. Topics implemented in retraining are shown in Fig. 2. After retraining, exams are compulsory in 18 (55%) organizations.

Instructors for medical training are physicians, nurses, and other medically trained personnel, including emergency medical technicians (EMTs) and paramedics. Physicians are trained in emergency medicine in 21 organizations (64%), family medicine in 12 (36%), anesthesiology in 11 (33%), and critical care medicine or trauma surgery in 8 (24%). Physicians are BLS certified in 19 (58%) organizations, and advanced life support (ALS) is certified in 15 (45%) organizations. Nurses are trained in emergency medicine in 10 (30%) organizations, anesthesiology in 5 (15%), and critical care medicine in 3 (9%). Nurses are



**FIG. 1.** Results of completed questionnaires on the contents of medical training from 33 mountain rescue organizations in North America and Europe. AED, automated external defibrillator; KED, Kendrick extrication device; C-clamp (manual fixation of ventilation mask on the face).

BLS certified in 9 (27%) organizations and ALS certified in 7 (21%). Other medically trained personnel acting as instructors are BLS certified in 10 (33%) organizations and ALS certified in 6 (18%). This group includes paramedics in North America, who are all BLS and ALS certified. An instructor course is required for medical doctors in 9 (27%) organizations, for nurses in 14 (42%), and for other medically trained personnel in 12 (36%) organizations. Fifty percent of instructors are familiar with ICAR MEDCOM guidelines.

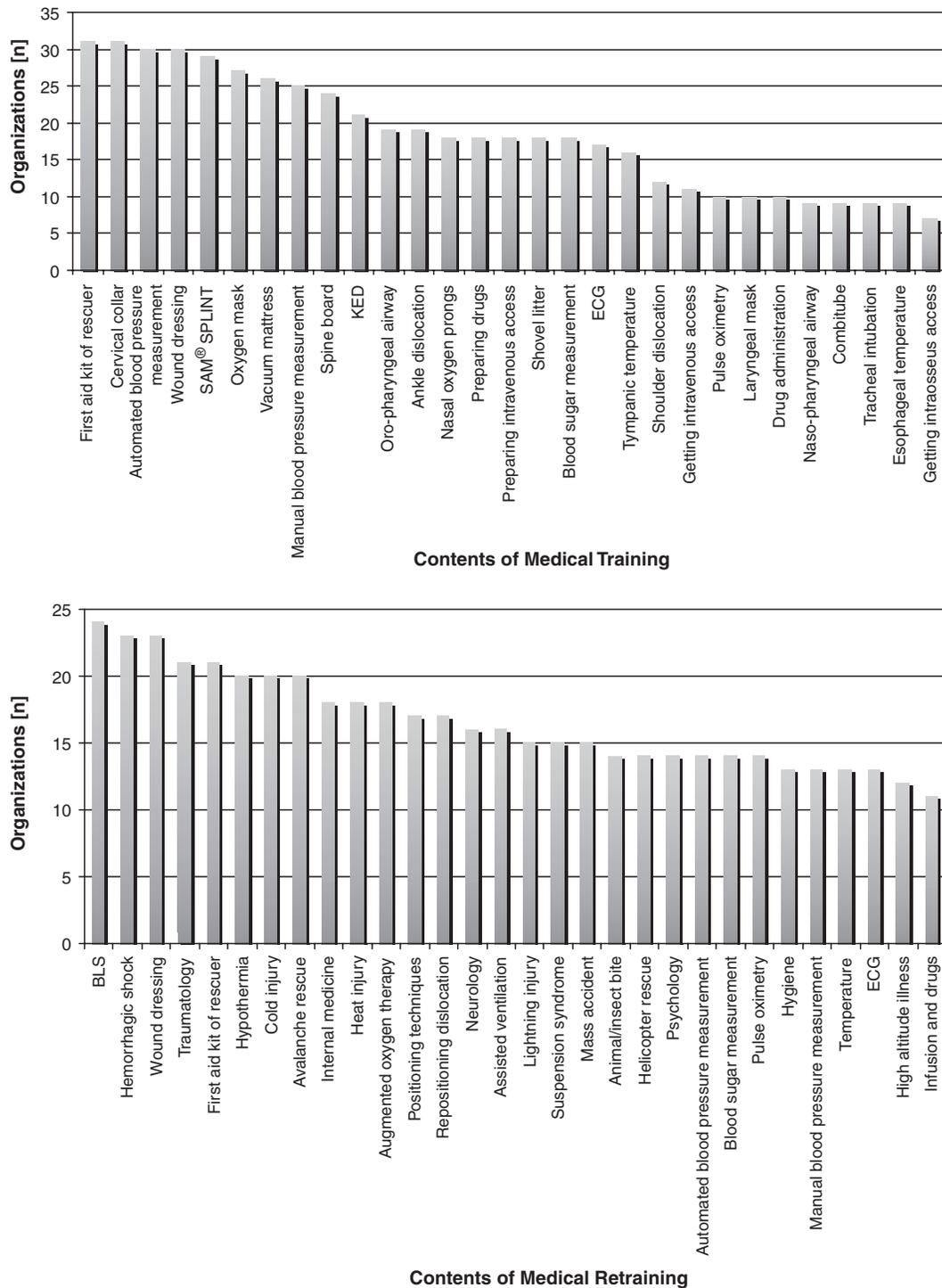
Fourteen (42%) mountain rescue services are funded by the national government and 11 (33%) by local government, members, and other local donations. Insurance payments cofinance 8 (24%) mountain rescue services. In 13 (39%) organizations, mountain rescuers are paid for their rescue time and in 8 (24%) for medical training time. Seventeen (52%) organizations pay instructors for instruction and 8 (24%) for instruction training time. Funding is adequate for 18 (54%) mountain rescue services, but 22 (67%) would like increased funding.

**Discussion**

Medical training and retraining are standardized in two-thirds of the surveyed mountain rescue services. Potentially life-saving topics, for example, basic life support, automated

external defibrillation, traumatology, and hygiene, should be taught in all training curricula. Interactive training material should be employed by all organizations, and retraining should be done on a yearly basis. Most mountain rescue services would like to increase medical training and funding.

Some mountain rescue services delegate part of their medical training to other organizations. This may be beneficial since these organizations may use more efficient equipment and teaching methods than the mountain rescue services. For example, Red Cross in Austria and Canada use highly effective feedback manikins (Wik et al., 2005), which may be too expensive for a mountain rescue service to purchase. Many mountain rescue services offer more than one training stage to their members. A comparison of training stages among rescue organizations is not possible because of widely varying medical training curricula, resulting from the differing duties of members and the medical prerequisites of the surveyed regions. The survey shows a broad coverage of topics in medical training; however, some potentially life-saving topics are not taught by all organizations. For example, basic life support and an automated external defibrillator may improve survival in a cardiac arrest patient if the time scale is short, as might occur in ski areas and mountain huts (Gottschalk et al., 2002; Elsensohn et al., 2006). Also, knowledge of trauma and the use of a cervical collar and vacuum mattress



**FIG. 2.** Results of completed questionnaires on the contents of medical retraining from 33 mountain rescue organizations in North America and Europe. BLS, basic life support; ECG, electrocardiogram; KED, Kendrick extrication device.

may reduce further injuries to a casualty (Hamilton et al., 1996; Hearn et al., 2006). Moreover, hygiene may reduce morbidity for both patient and rescuer.

Most mountain rescue emergencies result from trauma. Although most casualties suffer minor injury, a small percentage sustains major or lethal injury. Approximately 50% of injuries are of the lower extremity, with a lower percentage for the upper extremity, trunk, head, and spine (Hearn, 2003). Thus, medical training should set a focus on trauma management. In contrast, internal medicine pathologies, for

example, hypothermia, frostbite, and exhaustion, are encountered in only ~15% of casualties and in less than 1% of patients who are unconscious (Hearn, 2003). In these cases, knowledge of life-saving measures can avoid additional damage to or the death of the victim. In addition, the character of the emergency will vary from region to region. For example, a mountain rescue member in warmer regions will rarely be confronted with hypothermia or avalanche, but more often with heat injury or animal and insect bites. Thus, focusing medical training and equipment on the character and inci-

dence of medical emergencies in a given region could further improve resource distribution and treatment quality.

Notably, examinations are compulsory only in 82% of organizations. Examinations may be a useful tool to improve skill acquisition and retention, because multiple examinations motivate students to learn (Margolis et al., 2008). Thus, examinations should be a compulsory part of medical training. Lectures and digital media are frequently used as teaching methods, while important materials, for example, the rescuer's first-aid kit and backpack, are less used. Familiarity with the basic first-aid equipment available to the rescuer should be mandatory in medical training. All but one organization uses resuscitation manikins, but manikins with a feedback function are used in only 52%. Teaching with feedback-aided manikins should be promoted, because such training is more effective than with standard nonfeedback-aided manikins (Wik et al., 2005). Although medical retraining is compulsory in 86% of mountain rescue services, it is done on a yearly basis in only 32%. Evidence suggests that BLS skills are lost rapidly over time, and retraining should take place every 6 to 12 months (Eisenburger and Safar, 1999). In retraining, potentially life-saving topics and examinations after training should be compulsory.

Specific training for instructors is required in only half of the organizations, although well-trained instructors can improve the training outcome of candidates (Margolis et al., 2008). For example, only some of the instructors are BLS or ALS certified and familiar with ICAR MEDCOM guidelines. These should be part of the minimum requirements for instructors.

### Limitations

Some limitations must be mentioned. First, questionnaires always carry a responder bias. Second, generalization of data may be limited, because not all organizations associated with ICAR MEDCOM participated in this inquiry. Although we surveyed a varied group of mountain rescue organizations that reflect the diversity of the need for mountain rescue in mountainous areas in America and Europe, bias could have been introduced. In only 27% of countries does a single organization provide medical care in mountains and remote areas, whereas in the majority of countries (72%) multiple organizations perform rescue. For example, ski patrols that provide first aid on ski slopes may also carry out more remote rescues. Such groups have a wide variety of functions, organizational structures, personnel, and training and may have been underrepresented in this survey.

### Conclusion

The study shows high variability in medical training programs among the surveyed organizations. Final examinations to evaluate rescue personnel are not compulsory in all organizations. Two-thirds of the surveyed organizations believe that it is necessary to improve medical education. The authors recommend standardization of medical training and examinations on an international level. Additional topics tailored to the typical injury and illness patterns of a particular area should supplement this core training. Rescuers should be familiar with the equipment they carry. Highly qualified instructors should perform the training on a yearly basis. Funding should be increased to meet ever higher standards of medical training in mountain rescue.

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### Disclosures

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