



ICAR

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International Commission for Alpine Rescue

Commission for Mountain Emergency Medicine

**Recommendation REC M 0019 of the Commission for Mountain
Emergency Medicine**

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about

**THE USE OF AUTOMATED ELECTRIC
DEFIBRILLATORS AND PUBLIC ACCESS
DEFIBRILLATORS IN THE MOUNTAINS**

**Intended for local authorities, rescue organisations, emergency physicians and
rescuers**

**The USE OF automated electric defibrillators AND PUBLIC ACCESS
DEFIBRILLATORS in THE MountainS**
**OFFICIAL GUIDELINES OF THE INTERNATIONAL COMMISSION FOR MOUNTAIN
EMERGENCY MEDICINE ICAR MEDCOM**

**Intended for local authorities, rescue organisations,
emergency physicians and rescuers**

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In this article we propose guidelines for rational use of automated external defibrillators and public access defibrillators in the mountains. In cases of ventricular fibrillation and pulseless ventricular tachycardia, early defibrillation is the most effective therapy. Easy access to mountainous areas permits visitation by persons with high risks for sudden cardiac death, and medical trials show the benefit of exercising in moderate altitude. The introduction of public access defibrillators in popular areas in the mountains may lead to a reduction of fatal outcome of cardiac arrest. Public access defibrillators should be placed with priority in popular ski areas, in busy mountain huts and restaurants, at mass-participation events and in remote but often-visited locations that do not have medical coverage. Automated external defibrillators should be available to first responder groups in mountain-rescue teams. It is important, that people know how to perform cardiopulmonary resuscitation and how to use public access defibrillators and automated external defibrillators.

Key-words: automated external defibrillator, emergency medical system, cardiopulmonary resuscitation, mountain rescue, public access defibrillator

Introduction

The automated external defibrillator (AED) is a medical heart monitor and defibrillator capable of recognizing the presence or absence of ventricular fibrillation (VF) or rapid ventricular tachycardia and determining, without intervention by an operator, whether defibrillation should be performed. If it determines that defibrillation should be performed, it automatically charges and

requests delivery of an electrical impulse to an individual's heart.

The public access defibrillator (PAD) is designed to be used by anyone without medical training. It gives verbal advice on how to apply the pads and start the automated electric

shock procedure and also helps the first responder perform cardiopulmonary resuscitation (CPR) by audible instruction after or instead of shock advisement.

Eighty percent of sudden cardiac deaths are caused by VF,¹ and every minute of delay reduces the success of defibrillation by 10%.^{2,3} Thus, the time to the first attempt at defibrillation is the most important factor in survival of potential victims of sudden cardiac death.^{2,3} Cardiopulmonary resuscitation combined with early defibrillation represents the best therapy available for VF.^{2,3} Presently, over 75% of persons who experience cardiac arrests in urban areas do not receive adequate care.^{4,5} Because of logistic and local reasons, this percentage may be even higher in the mountains; therefore the numbers of successful outcomes may be lower.⁶⁻⁸ Many mountain huts and restaurants are readily accessible by lifts and trail-routes and thus bring a significant number of high risk people to mountainous areas. There is an increasing trend to advise and encourage people with medical conditions such as hypertension, other cardiac problems and diabetes to hike and exercise in mountainous areas resulting in an increasing number of people at risk.⁹ Cardiac arrest is the second most common cause of death in the mountains.¹⁰ A person's risk of cardiac arrest in the mountains increases over the age of 40, and vigorous exercise, dehydration, and hypoxia at higher altitude combined with medical problems may increase this risk.⁷ Also, there are increasing number of persons at risk of sudden cardiac death performing winter sports and attending mass events.^{8,11} Although CPR remains the fundamental aspect of resuscitation,^{2,3} the use of automated external defibrillation is an effective therapy of VF and pulseless ventricular tachycardia and is the first step in resuscitation by laymen on individuals over the age of 8 years.^{2,3,12} Public access defibrillators have been shown effective in urban areas, but early defibrillation should also be feasible in the mountains. The AEDs and PADs are simple to use and do not require any more medical knowledge than CPR.^{2,3} Therefore, as shown by a number of successful resuscitations, the introduction of PADs in busy mountainous areas is recommended.

Recommendations for the Use of AEDs in the Mountains

Ideally a PAD or AED should be available wherever a cardiac arrest occurs. In practice, PADs should first be placed in:

- Areas of highest probability of use, such as popular ski areas^{6,8,11}
- Highly frequented mountain huts and larger restaurants in the mountains
- Remote and highly frequented locations without medical coverage
- Mass-participation events in the mountains

Automated external defibrillators should be used by first-responder groups, according to International Liaison Committee on Resuscitation guidelines.^{2,3} Moreover, mountain-rescue teams should be equipped with AEDs.

Requirements for the Introduction of PADs in the Mountains.

The introduction and use of PADs in the mountains aims to reduce the frequency of cardiac deaths.^{6,10} Knowledge of and ability to perform CPR as well as knowledge of the use of a PAD are essential to improve the outcome of resuscitation.^{1,13,14} Frequent practice of both CPR and PAD use leads to a higher resuscitation success rate.^{2,3} It is important that the general population know the availability, location, and use of PADs, and they should be encouraged in CPR and PAD training. Consideration should be given to the use of a single model of defibrillator within a local region.

Reasons for the Use of AEDs in Mountain Rescue.

In particular situations, an AED is the device of choice for the advanced medical-care provider, such as rescue teams, because it may provide monitoring ability allowing additional treatment in contrast to a PAD.^{7,15} Even though the majority of casualties in mountain rescue are caused by trauma, rescue teams are facing an increasing number of cases of VF and pulseless ventricular tachycardia where an AED is the treatment of choice.¹¹

Technical Considerations

The storage location must meet the minimal environmental requirements set by the manufacturer. When an AED is selected, one must consider particular requirements:

- Automated external defibrillators should apply a biphasic waveform for lower energy, less battery power, less weight,¹⁶ less damage to the myocardium,¹⁷ and lower side energy to helpers who unintentionally touch the patient during shock.¹⁸
- The display should be easily readable in bright sunshine.
- The device must work at freezing temperatures and wet conditions. This includes the adhesion of pads.
- The weight should be as low as possible.
- In organized mountain rescue, an AED should have a monitor and the possibility of attachment of a pulse oximetry device, for rescue teams may be accompanied by a physician or trained paramedic with ALS competence. However, it should be noted that blood centralization and hypothermia can result in falsely low pulse oximetry values.

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