



Cardiovascular Emergencies in Remote Areas

Peter Paal, MD, Associate Professor, DESA, EDIC

Introduction

- ❖ Pathophysiology
- ❖ Problems and needs
- ❖ Studies
- ❖ Outlook
- ❖ Conclusions

Pathophysiology

- ❖ Out-of-hospital cardiac arrest (OHCA) is 1.0 to 1.2 per 1000 inhabitants per year (de Vreede-Swagemakers et al., 1997)
in most cases myocardial infarction, presenting as VF in 50 -80%
(van Alem et al., 2003; Whitfield et al., 2005)
- ❖ With delayed CPR, VF within minutes degrades into asystole
- ❖ In ~20-35% VF occurs in a public area
(de Vreede-Swagemakers et al., 1997; Engdahl et al., 2005)
- ❖ In OHCA-VF “early defibrillation may be the single greatest advance in the treatment of VF since development of CPR” (Deakin et al., 2005) → AED has become an integral part of the chain of survival (Anonymous, 2000; Deakin et al., 2005)

Problems

- ❖ Scarcely populated, but partly crowded valleys
- ❖ High seasonal fluctuations in holiday areas with concomitant fluctuations in OHCA-VF



Cortina d'Ampezzo 6.000→50.000



St. Anton 2.600→13.000

Problems and needs

- ❖ Most AED studies have been performed in urban areas, e.g.
 - ❖ Maastricht, Netherlands, population density of 1975 inhabitants/km²
 - ❖ Göteborg, Sweden, 2562 inhabitants/km²
 - ❖ Copenhagen, Denmark, 5985 inhabitants/km²
(de Vreede-Swagemakers et al., 1997; Engdahl et al., 2005; Folke et al., 2009)
- ❖ For scarcely populated rural areas (e.g. Tyrol, Austria, population density of ~ 55.5/km²), outcome data is scant
 - it is still unclear how to equip rural areas with AEDs

ICAR MEDCOM Guidelines

- ❖ AEDs for
 - popular ski areas
 - busy mountain huts and restaurants
 - mass events
 - remote but highly-visited locations without medical coverage
- ❖ Automated external defibrillators should be available to first-responder groups and mountain-rescue teams
- ❖ BLS/D trained first responders available
Elsensohn et al. Wilderness Environ Med 2006
- ❖ Evidence?



ERC vs. AHA perspective

- ❖ ERC- an AED in all places with a cardiac arrest within two years
 - coverage for 20% of all cardiac arrests
 - 33.000\$ per life year
- ❖ AHA- an AED in all places with a cardiac arrest within five years
 - coverage for 67% of all cardiac arrests
 - 41.000\$ per life year
- ❖ Unguided AED placement 109.000\$ per life year

Folke et al. Circulation 2009



Early defibrillation in remote areas

Influence of automated external defibrillation programmes on survival from OHCA in rural areas							
Study	Design	Location	Responders	Controls	Survival to hospital discharge (%)		P
					No ED	ED	
(Stults et al., 1984)	Prospective controlled	Rural communities Iowa, USA	EMT-D	EMT	3	19	<0.05
(Vukov et al., 1988)	Prospective controlled cross-over	Rural communities Minnesota, USA	EMT-D	EMT	4	17	n.r.
(Killien et al., 1996)	Retrospective	Island community San Juan Isl., USA	EMT-D/ paramedic	EMT	n.a.	43	n.r.
(Kriegsman et al., 1998)	Retrospective	Rural community Alaska, USA	paramedic	EMT	9	20	n.s.
(Colquhoun, 2002)	Retrospective	GP's surgery Cardiff, UK	GP with AED	GP	n.a.	75	n.r.
(Colquhoun, 2006)	Retrospective	GP's surgery Cardiff, UK	GP with AED	GP	n.a.	32	n.r.

Studies on early defibrillation in rural areas. ED denotes early defibrillation; EMT emergency medical technician; EMT-D emergency medical technician with AED skills; EMS emergency medical service; GP general practitioner; n.a. not applicable, n.r. not reported; OHCA out-of-hospital cardiac arrest; OHCA-VF out-of-hospital cardiac arrest with ventricular fibrillation

Studies

- ❖ Few studies →
 - ❖ Scarce evidence
 - ❖ Good outcome, comparable to urban areas



Early defibrillation in alpine areas

- ❖ In small communities patients with OHCA-VF hardly can be reached within five minutes by a BLS or ALS team
- ❖ In some remote American and European alpine regions first responders, e.g. mountain rescuers, fire brigade members, ski lift officers, have been trained in BLS and AED use, reducing call-to-defibrillation time
- ❖ Outcome reports are rare, only few case reports with favourable outcome available

(Lienhart et al., 2005; Lienhart et al., 2006)

Mountain Hut Initiative

- ❖ Bergamo Section of Italian Alpine Club
- ❖ 10 Huts equipped with AED
- ❖ **BLSD courses provided to hut keepers**
(Barcella L et al. Wilderness Environ Med 2010)



Outlook

- ❖ AED helps saving lives in mountains
- ❖ Evidence will provide better care
- ❖ More studies needed
- ❖ More cooperation needed





Some answers there, but I've got a lot more questions