



Complete Summary

GUIDELINE TITLE

ESC-ERC recommendations for the use of automated external defibrillators (AEDs) in Europe.

BIBLIOGRAPHIC SOURCE(S)

Priori SG, Bossaert LL, Chamberlain DA, Napolitano C, Arntz HR, Koster RW, Monsieurs KG, Capucci A, Wellens HJ. ESC-ERC recommendations for the use of automated external defibrillators (AEDs) in Europe. Eur Heart J 2004 Mar;25(5):437-45. [51 references] [PubMed](#)

GUIDELINE STATUS

This is the current release of the guideline.

COMPLETE SUMMARY CONTENT

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SCOPE

DISEASE/CONDITION(S)

Sudden cardiac death

GUIDELINE CATEGORY

Assessment of Therapeutic Effectiveness
Prevention
Treatment

CLINICAL SPECIALTY

Cardiology
Emergency Medicine

Family Practice
Internal Medicine
Preventive Medicine

INTENDED USERS

Emergency Medical Technicians/Paramedics
Health Care Providers
Hospitals
Nurses
Physicians
Public Health Departments

GUIDELINE OBJECTIVE(S)

- To provide a critical appraisal of the studies published in the scientific literature on the use of automated external defibrillators (AEDs)
- To present data on the status of legislation/organization of defibrillation by non-medically qualified rescuers in Europe
- To promote recommendations for the organisation of AED programmes in Europe that were collected and discussed during the policy conference
- To identify the areas in which more research is needed before evidence based guidelines for the use of AEDs can be developed

TARGET POPULATION

Patients at risk for sudden cardiac death

INTERVENTIONS AND PRACTICES CONSIDERED

1. Automated external defibrillators (AEDs)
2. Cardiopulmonary resuscitation (CPR)
3. Basic life support (BLS)

MAJOR OUTCOMES CONSIDERED

- Incidence of sudden cardiac death
- Incidence of cardiac arrest
- Survival rate
- Cost factors including cost-effectiveness, cost per life saved, cost per year of life saved, median cost per additional quality-adjusted life year (QALY)

METHODOLOGY

METHODS USED TO COLLECT/SELECT EVIDENCE

Searches of Electronic Databases

DESCRIPTION OF METHODS USED TO COLLECT/SELECT THE EVIDENCE

Not stated

NUMBER OF SOURCE DOCUMENTS

Not stated

METHODS USED TO ASSESS THE QUALITY AND STRENGTH OF THE EVIDENCE

Expert Consensus
Weighting According to a Rating Scheme (Scheme Given)

RATING SCHEME FOR THE STRENGTH OF THE EVIDENCE

Levels of Evidence

A: Data derived from multiple randomised clinical trials or meta-analyses

B: Data derived from a single randomised trial or non-randomised studies

C: Consensus opinion of the experts and/or small studies

METHODS USED TO ANALYZE THE EVIDENCE

Systematic Review

DESCRIPTION OF THE METHODS USED TO ANALYZE THE EVIDENCE

A systematic review of the literature is discussed and presented as Section 1 in the on-line Appendix (www.escardio.org and www.erc.edu).

Automated External Defibrillators (AED) Programmes in Europe: Strengths, Weaknesses, Opportunities, and Threats (SWOT) Analysis

The Members of the Policy Conference applied a systematic approach to the evaluation of the current situation on the use of AEDs in Europe by performing a "SWOT Analysis." This approach consists in the identification of the Strengths, Weaknesses, Opportunities, and Threats for early defibrillation programmes in Europe.

METHODS USED TO FORMULATE THE RECOMMENDATIONS

Expert Consensus (Consensus Development Conference)

DESCRIPTION OF METHODS USED TO FORMULATE THE RECOMMENDATIONS

A Policy Conference was organised jointly by the European Society of Cardiology (ESC) and the European Resuscitation Council (ERC) in December 2002 at the European Heart House in Sophia Antipolis, France. The conference was convened

after the publication of the guidelines on prevention of sudden cardiac death by the ESC and the international guidelines for cardiopulmonary resuscitation (CPR) by the International Liaison Committee on Resuscitation (ILCOR). Both documents had highlighted the concept that success in the fight against premature sudden cardiac death is influenced by the efficacy of in-hospital and out-of-hospital resuscitation.

RATING SCHEME FOR THE STRENGTH OF THE RECOMMENDATIONS

Class of Recommendation

Class I: Conditions for which there is evidence or general agreement that a given procedure or treatment is useful and effective

Class II: Conditions for which there is conflicting evidence or a divergence of opinion about the usefulness/efficacy of a procedure or treatment

- **Class IIa:** Weight of evidence/opinion is in favor or usefulness/efficacy
- **Class IIb:** Usefulness/efficacy is less well established by evidence/opinion

Class III: Conditions for which there is evidence and/or general agreement that the procedure/treatment is not useful/effective and in some cases may be harmful

COST ANALYSIS

Cost Effectiveness of Community Automated External Defibrillator (AED) Programmes

Few clinical studies have been specifically designed to address this issue and at the present time there are only rough estimates of the cost involved. In one study, a cost of 46,900 US\$ per life saved was calculated for establishing the early defibrillator programme and 2,400 US\$ per life saved annually for maintaining the programme. In another study, the costs were 270,000 US\$ to acquire 39 AEDs and train 1,285 volunteers over a period of 22 months of observation in a medium-sized community.

A separate study estimated retrospectively the cost effectiveness of a 7-year police AED (P-AED) programme in four suburban communities. The estimated cost per life saved as a result of decreasing the time to first shock with the P-AED programme was 70,342 US\$ with the estimated cost per year of life saved of 16,060 US\$.

Cost-effectiveness of early defibrillation in public places was evaluated by researchers who analysed by simulation the costs associated with airline AED programmes. The conclusion of that study was that the cost-effectiveness of placing AEDs on commercial aircraft compares favourably with the cost-effectiveness of widely accepted medical interventions, but it was more evident with deployment on large aircraft. Another study provided additional data by performing a meta-analysis of published clinical trials. Public access defibrillation by community responders was associated with a median cost of 44,000 US\$ per additional quality-adjusted life year (QALY), while programmes involving police

had a cost of 27,000 US\$ per QALY. In casinos, standard Emergency Medical Service was associated with median cost of 24,800 US\$ per cardiac arrest, and early defibrillation by security guards was associated with an incremental cost of median 14,100 US\$, per additional QALY. Cost of AED programmes may vary significantly according to deployment locations: in airports early defibrillation by lay responders was associated with incremental cost of 55,200 US\$ per QALY, while in health club gymnasias costs were 4,759,200 US\$.

METHOD OF GUIDELINE VALIDATION

Peer Review

DESCRIPTION OF METHOD OF GUIDELINE VALIDATION

Not stated

RECOMMENDATIONS

MAJOR RECOMMENDATIONS

Strategies for community defibrillation with automated external defibrillators (AEDs)

AED programmes within the emergency medical system (EMS)

Recommendation 1

The goal of achieving an effective AED programme within the EMS should become a fundamental objective in every European country. Accordingly, it is recommended that an AED and properly trained personnel should be placed in every vehicle that may transport patients at risk of cardiac arrest. This should be the first priority for an early access defibrillation programme.

AED programmes outside the EMS

Analysis of the literature shows that there are three main strategies for the implementation of defibrillation programmes outside the EMS: community programmes, on-site programmes, and home programmes

Recommendation 2

Several models for the implementation of AED programmes outside the EMS have been described: we have identified three main strategies that have different and to some extent opposite characteristics (See below and refer to Table 1 of the original guideline document). It is recommended that once the priorities of implementation of an AED programme within the EMS have been achieved, a careful analysis is conducted in order to identify the community model that is most suitable for the specific environment. A cost-effectiveness analysis is an essential part of the implementation strategy. Every hospital should analyse whether the goal of early defibrillation is achieved and AED implementation can be

an important element in improving the in-hospital chain of survival. Home programmes are still in a preliminary phase of implementation: families with a genetic predisposition to sudden cardiac death and families with high risk individual(s) who are not scheduled for, or cannot receive, an implantable cardioverter defibrillator (ICD) represent the primary target for pilot projects on home defibrillation.

Table 1: Strategies for early defibrillation outside the emergency medical system

	Community Responder	On site responder (including bystander defibrillation)	Home responder
Location of victim	All areas, including home	Public or private areas, excluding home	Home
Training level	High	Moderate to untrained (for bystander defibrillation)	Moderate
Number of reachable victims	High	Limited	Low (relatives only)
Number of AEDs needed	Moderate	High	One per home
Time interval collapse-defibrillation	Reduction is limited	Potentially very short	Very short

AED: legislation and organisation in Europe

Recommendation 3

Legislation in Europe is heterogeneous, but where it has relevance to AEDs it either has permitted or is likely to permit their use by nonmedically qualified first responders. Automated external defibrillation does not require establishing a clinical diagnosis and therefore it should be lifted from the list of actions "reserved to doctors." Slow implementation is mainly the result of limited perception of the importance of early defibrillation programmes and by traditions and reluctance to "de-medicalise" the act of defibrillation. The lack of data on cost-effectiveness may discourage the support of governments for AED programmes. Therefore, this type of economical evaluation should be part of any planned developments. European legislation or recommendation issued by European policy makers and supported by all relevant major health care and scientific societies could promote implementation of this life saving strategy that is strongly supported by scientific evidence.

How should AED programmes be organised in Europe?

Recommendation 4

The Panel has reached a Consensus that an effective early defibrillation programme requires the setting of priorities and the integration of at least five different areas of activity:

- Analysis of local conditions and identification of priorities
- Identification of intervention protocols
- Identification and training of responders
- Efficient data – reporting and quality control systems
- Constant maintenance

All such activities are tightly linked: if one fails, the entire programme will probably be threatened. Accordingly, planning a defibrillation programme should include strategies and resources for all the components that will be discussed below. Furthermore, in order to establish an out-of-hospital early defibrillation programme with the endpoint of providing effective care for the largest possible section of the community in any given area, organisers should try to follow logical steps of development.

Analysis of local conditions and identification of priorities

Recommendation 5

In order to establish an effective programme, every attempt should be made to acquire exhaustive data on the prevalence and epidemiology of sudden death in the area. This allows the requirements for the success of the programme to be set and quantification of the resources (manpower and devices) that will be required. Although it is appreciated that detailed baseline epidemiological data may be lacking in some areas, it is important to consider that the data collected during the planning phase can have an impact on the cost-effectiveness and the overall success of the programme.

Identification of intervention protocols

Recommendation 6

The dispatching system and the clinical intervention protocol need to be standardised. A centralised dispatching system that can activate all responders is considered the best model. The intervention protocol should standardise all clinical actions following arrival on scene and include collection of all relevant data for systems monitoring.

Identification and training of first responders

Identification of responders

Recommendation 7

The identification of potential responders should be based on an analysis of local conditions. Where the EMS can provide adequate coverage, reinforcing the existing system may be an effective strategy. Deployment of AEDs at fixed locations in the community represents an alternative strategy that should now be considered feasible, safe, and effective even if it requires training of a large proportion of the community in the use of AEDs and in alerting the EMS system.

Training of responders

Recommendation 8

Training of responders should include basic life support (BLS) and AED skills, the duration depending on a number of factors including previous knowledge and skills of the target group. The need for teaching BLS to nonmedical personnel is currently a matter of debate, as some successful experiences have been conducted based on training of defibrillation only. For the time being it seems reasonable to support the view that combined BLS and AED training should be recommended even if in some circumstances it may be appropriate that AED training precedes BLS training.

Data reporting and quality control system

Recommendation 9

It is important that in every early defibrillation programme data collection and assessment of the results are carefully designed. International standards for uniform data collection are being developed. This is essential for monitoring and benchmarking of the programme. Continuation of a project is likely to require evidence of its efficacy and its quality that will have to be demonstrated through a data collection protocol that is methodologically sound.

Programme maintenance

Recommendation 10

It is important that, when budgeting the cost of an early defibrillation programme, the annual costs should include an allowance for maintenance including equipment, personnel, training, and monitoring costs.

CLINICAL ALGORITHM(S)

None provided

EVIDENCE SUPPORTING THE RECOMMENDATIONS

TYPE OF EVIDENCE SUPPORTING THE RECOMMENDATIONS

The type of supporting evidence is not specifically stated for the recommendations.

BENEFITS/HARMS OF IMPLEMENTING THE GUIDELINE RECOMMENDATIONS

POTENTIAL BENEFITS

The rationale for the implementation of automated external defibrillator (AED) programmes is based on the evidence that an improvement in survival after cardiac arrest can be obtained by reducing the time to defibrillation.

POTENTIAL HARMS

Not stated

IMPLEMENTATION OF THE GUIDELINE

DESCRIPTION OF IMPLEMENTATION STRATEGY

The guideline developers have identified priorities and needs for the achievement of better outcome for victims of cardiac arrest:

- Automated external defibrillator (AED) programmes within Emergency Medical Systems (EMS) and improved access to the EMS are fundamental priorities that should be achieved before taking defibrillation outside the EMS. Priorities for the implementation of AED programmes should stem from EMS and hospital programmes and progressively move to community, onsite, and home programmes.
- Common standards for defibrillation within EMS should be set for European Countries, and the 112 emergency number to access EMS across Europe should be implemented.
- The first requirement for the development of community, on-site, and home defibrillation programmes is the introduction of legislation in all European countries to permit defibrillation by non-medical personnel.
- Training requirements should be defined for individuals participating in a community defibrillation scheme. Common European standards for training, qualification of trainers, and monitoring of training programmes is an ideal that should be pursued. Research is needed to define the optimal integration of cardiopulmonary resuscitation (CPR) and AED training for community, on-site, and home AED programmes.
- A basic set of criteria for the design of AED programmes has been outlined that includes assessment of needs, expected benefit, and cost of each AED programme.
- A set of common definitions should be used (see Section 4 in the on-line Appendix www.escardio.org and www.erc.edu) and systematic data collection and data analysis should be incorporated in each programme in order to facilitate comparison of results from the different programmes.
- As a pivotal step to ensure the success of the plan, all stakeholders should be involved from the outset. The community, the patients, and the medical professionals represent key players in supporting and facilitating the implementation of AED programmes; scientific societies such as the ESC and the ERC should support AED programmes by promoting education in the community, among the patients and their families, and among relevant medical societies and physicians with a responsibility for resuscitation.

- The Panel advocates support from the ESC and the ERC to involve Ministers of Health and the European Parliament in the promotion of a "European Cardiac Arrest Survival Directive."

INSTITUTE OF MEDICINE (IOM) NATIONAL HEALTHCARE QUALITY REPORT CATEGORIES

IOM CARE NEED

Getting Better

IOM DOMAIN

Effectiveness
Timeliness

IDENTIFYING INFORMATION AND AVAILABILITY

BIBLIOGRAPHIC SOURCE(S)

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ADAPTATION

Not applicable: The guideline was not adapted from another source.

DATE RELEASED

2004 Mar

GUIDELINE DEVELOPER(S)

European Resuscitation Council - Medical Specialty Society
European Society of Cardiology - Medical Specialty Society

SOURCE(S) OF FUNDING

Not stated

GUIDELINE COMMITTEE

Not stated

COMPOSITION OF GROUP THAT AUTHORED THE GUIDELINE

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FINANCIAL DISCLOSURES/CONFLICTS OF INTEREST

Not stated

GUIDELINE STATUS

This is the current release of the guideline.

GUIDELINE AVAILABILITY

Electronic copies: Available from the [European Society of Cardiology \(ESC\) Web site](#).

Print copies: Available from Elsevier Publishers Ltd., 32 Jamestown Road, London, NW1 7BY, United Kingdom. Tel: +44 207 424 4422; Fax: +44 207 424 4433; E-mail: gr.davies@elsevier.com

AVAILABILITY OF COMPANION DOCUMENTS

None available

PATIENT RESOURCES

None available

NGC STATUS

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Date Modified: 11/3/2008

