

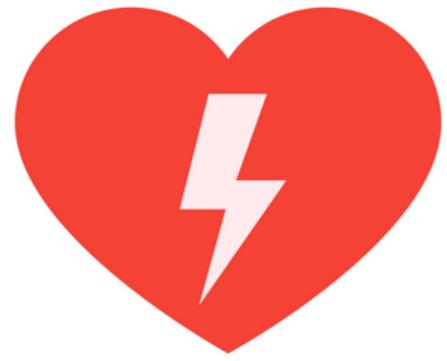
EENA Document

AED Mapping & Emergency response



112 SOS
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AED Mapping & Emergency Response - EENA Document



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DOCUMENT DETAILS

Version: 1.0

Revision date: 4-05-2018

Status: Approved

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Survival rates decrease 10% a minute without intervention...

1. Executive Summary

AED mapping is being used by some emergency services organisations to locate the closest AED to the scene of an incident, so that people onsite can start rescuing someone suffering from a cardiac arrest until emergency services arrive.

This document highlights why and how AED Mapping can make an impact to the emergency services and to people in distress. Also, it explains the challenges behind the implementation and the maintenance of such a tool.

2. Introduction

Cardiac arrest is the sudden cessation of the spontaneous heart activity leading to failure of blood, and therefore oxygen, transport to all organs and tissues. The predominant underlying cause in adult population is the ischemic coronary artery disease. The partial or total obstruction of the coronary arteries leads to an increased susceptibility of the ischemic areas predisposing to the development of ventricular fibrillation (1). The development of the electrical disorder (uncoordinated heart activity) causes the cessation of the mechanical pump function.

An immediate restoration of an artificial circulation through chest compression (particularly uninterrupted CC) (2) is mandatory as survival dramatically decreases by approximately 10% for every minute elapsed in the absence of any intervention (3,4). Chest compression alone, however, does not convert VF into a pulsatile rhythm as only an electrical defibrillation can interrupt the malignant arrhythmia.

Early chest compression and early defibrillation have proven to be highly effective in favoring the restoration of cardiac and, in turn, of neurological functions (5). Successful rates rose up to 65% when lay people could begin the initial CPR maneuvers together with an early defibrillation by an AED (6,7). These results prompted the diffusion of these devices in many public locations to allow anyone to defibrillate even before the arrival of the ambulance or of the experienced emergency teams (8,9).

So far the overall proportion of cardiac arrest victims treated by lay people with both interventions (early CC and early DFIB) is less than 5%, being the greatest proportion of interventions still performed by emergency crews (3,6-8,10,11). Recently, however, The Resuscitation Outcomes Consortium investigators showed a much higher proportion of cardiac arrest

victims defibrillated by lay people (18.8% of the shockable rhythms), leading, in turn, to a proportion of 66.5% of discharged alive patients vs 43% of the group defibrillated by the EMS personnel (12).

The AED diffusion is now favoured by large information campaigns which prompted the acquisition of thousands of AEDs by either individuals, authorities, companies or associations (10-15). However, an AED unknown to the local Emergency Dispatch Center is a useless resource as the dispatcher cannot activate it even in case of a cardiac arrest in a nearby AED vicinity (14). Indeed, there is evidence that AEDs are still infrequently used and that many of them are unknown to the local EMS (16,17).

Based on these considerations, all representative members of EENA and of the European countries pinpointed the necessity to provide an AED mapping to the Emergency Dispatch Centers.

Acronyms:

AED: Automated External Defibrillator

AHA: American Heart Association

BLSD: Basic Life Support and Defibrillation

CA: Cardiac Arrest

CC: Chest Compression

CPR: Cardio Pulmonary Resuscitation

EDC: Emergency Dispatch Center

EMS: Emergency Medical Service

ERC: European Resuscitation Council

ILCOR: International Liaison Committee On Resuscitation

PSAP: Public Safety Answering Point

VF: Ventricular Fibrillation

The aim of defibrillation is to interrupt the most dangerous cardiac arrhythmia....

3. What is an AED & how can it increase survival from cardiac arrest?

An AED is a small (approximately 20 x 20 x 7 cm) portable device that can analyse automatically the underlying rhythm in a victim of suspected cardiac arrest. The AEDs can be easily used by applying two adhesive jelly pads to the chest of the unconscious victim after which the machine vocally communicates whether an electric shock (defibrillation) must be delivered to the heart. This feature allows to relieve the lay rescuer from the responsibility of choosing whether or not to defibrillate, as they have the unique task of guaranteeing the safety of the scene by preventing anyone from touching the patient while the defibrillator is operating (analysing, charging and shock delivering).

The aim of the defibrillation is to interrupt ventricular fibrillation, which is the most dangerous cardiac arrhythmia. Although the ultimate goal is the return of a spontaneous cardiac activity, the shock alone rarely converts VF into a viable perfusing rhythm unless the time interval between the collapse and the defibrillation is very short (no more than 30 -60 seconds). In the majority of the events, it is the combination of both early external chest compression and early defibrillation that increases survival. Accordingly, the EDCs must have a clear overview on the AED location to favour their early arrival to the scene.

It is important to look for an AED in every instance of suspected CA and not only after having ascertained a real CA, as any delay may compromise the restoration of the cardiac (and ultimately neurological) function. It is important that the Dispatcher verifies the presence of dangerous scenes as any intervention should be avoided or (delayed) whenever there is a risk for the health and life of the lay rescuer.

As per the welfare/mental health of the responder, it is quite difficult for a dispatcher to identify potential mental health limitations. If so, the dispatcher should ask for assistance from another person on the scene.

An unresolved issue relates to the minimum age for AED deployment. There is anecdotal evidence that demonstrated that teenagers or even children are able to activate the emergency service and/or to correctly use an AED. It is quite difficult at the present time to specify a precise cut-off age for the deployment of an AED.

An issue that EENA is pursuing is the goal that anyone should be allowed to take an AED and to apply the paddles on the chest: the AED vocal prompts and the dispatchers' instructions are sufficient to allow a correct use of the device.

4. Ownership & Maintenance

Anyone can buy an AED. There is a wide availability of Automated Defibrillators on the market and all possess the requirements described in the Guidelines (i.e. delivering energy of 150J for truncated exponential waveform and 120J for rectilinear by-phasic waveform). There are, conversely, differences concerning the peak current, the average current, the duration of the first and second phase as each Company developed its own software and algorithm (18).

AEDs can be deployed by the owners or by others who receive the good by the owners (custodian). It is important to emphasise that the maintenance belongs to the custodian, who has the task of guaranteeing that the device is fully operating. Future development could favour private companies with whom an agreement of maintenance service on behalf of the local authorities could be activated.

5.1. Why an AED mapping?

The most important information the owner should know is the necessity to provide the data of the purchased AED to the local Dispatch Center such as to feed the database. This database should be continuously updated and the Emergency Service should be aware of the precise location of the device and of its accessibility. The mapping system thus works by providing to the dispatchers (and/or to the local Emergency Service) the exact location of the Automated External Defibrillator spread on the territory and by concurrently highlighting additional paramount information such as their accessibility, the daily availability, the battery and paddle conditions. In addition, the software handling the AED mapping should also allow the recruitment of the volunteers who could perform not only the first resuscitation

maneuvers (chest compression and/or artificial ventilation) but could also use an AED.

AED mapping can then expectedly promote an increased survival rate from cardiac arrest thanks to the activation of the closest and accessible AED by the operators of the Emergency Dispatch Centers who could quickly indicate to the callers their location and by concurrently providing the CPR with the pre-arrival instructions (telephone guided CPR).

Also by knowing the location of mobile AEDs such as those assigned to police cars, fire fighters, taxi drivers, Coast Guard boats, and any other vehicle, the likelihood of early arrival of a defibrillator to the scene may be further increased (19).

European countries have different ways of handling public AEDs...

5.2. How can AED mapping be implemented?

Pre-requisite is the definition of the items to be requested to the AED owner/users to create a database. The dataset could be constituted as described in the appendix. These forms should be transmitted or made available in a website and downloaded by anyone who has an AED (owner or custodian). The information filled and returned to the dispatch center would feed the database. Then the data have to appear on a screen map where the AED icons will be highlighted indicating their precise location and accessibility.

5.3. Current Legislation

Presently the European Countries have different ways of handling the public AEDs (20). National legislations vary from absence of any restriction to strict regulations establishing that only those who successfully accomplished a BLS course are allowed to use an AED. The EENA AED working group aims to propose to the European Parliament the removal of every restriction on the use of an AED from the National laws, regardless of the successful completion of a BLS course. Indeed the correct use of these defibrillators would be guaranteed both by the vocal prompts of the devices and by the dispatchers who will instruct the users on their correct deployment.

What caveats & pre-requisites must be considered for the implementation of AED mapping?

5.4. Caveats & Pre-requisites

There are some caveats and pre-requisites that need to be considered when looking to the implementation of an AED Mapping. Some of them result more from a technical perspective, some of them are more operationally driven.

Technical caveats:

Integration with the EDC software: The software has to be structured so as not to interfere with the software used to receive the emergency calls and to activate the emergency means.

Information highlighted: It has to provide information regarding the AED location in the shortest time possible.

The software deployed for AED mapping has to provide information about the status of the AEDs and of the batteries and paddles.

Organisation, information and communication caveats

Protocol and operative Instructions: There must be a detailed protocol within an EDC whereby each operator can guide the caller as quickly as possible. The path, distance and time to achieve the AED must be carefully described. The location must be precisely indicated as seconds are crucial to ensure the AED arrival to the patient as quickly as possible.

Awareness: Public authorities, population, political institutions, associations, sport societies and any other AED owners/users have to be aware and informed about the importance of providing the AED related information to the dispatch centers. Indeed each one can be active part of an emergency process and can help to save a life. The major concerns are related to

medical and legal issues which, so far, seem to be the major limitation hampering the availability of the information to the dispatch centers. As some owners could not keep in mind the expiration of the batteries and paddles, the software should automatically warn of the expiration date. Services should be set up to provide assistance for the replacement of the expiring materials.

Label and visibility: Although the AEDs are commonly identified by a green label with the text "AED" (according to the languages), it is important to share a common decision of the kind of label (i.e. the term "AED" should always be written and the acronyms in the own language should also appear to facilitate the comprehension to the non-English speaking people).

Gold standard or minimum acceptable criteria: To facilitate the wide spread diffusion of the AEDs and their recognition, EENA proposes to achieve a minimum standard based on the presence of a system within the EDCs able to indicate to the callers the closest and accessible AED.

Data acquisition and analysis: The Organization (EMS) has to be responsible of the data collection and analysis such as to share them in further meetings and symposia. AED mapping should also provide reports (tables, graphs).

5.4. AED Mapping in real life scenarios

Before activating an AED in the real life, the system has to be tested to make sure the full functionality and crashes must not occur.

6. EENA Recommendations

Many of the recommendations listed below are outcomes of the EENA Members Workshop 2017¹, which contained a session about AED Mapping.

EENA

Recommendations

Emergency Services

AED location:

- Provide data to public authorities on locations with relatively high incidences of cardiac arrest (based on figures they have and/or thanks to mathematical models that can be used to optimise the placement of AEDs)

Caller location:

- Make sure to have the most accurate caller location as possible (so that the closest accessible AED can be used)

Use of AED:

- Ability to explain to the caller on how to use the AED and how to perform CPR
- Need to build a community of volunteers (Good Samaritan) able to reach very quickly the scene of incident and knowing how to use an AED/how to perform CPR

AED map:

- Integration of AED mapping in the GIS/CAD or Access to cloud based AED map
- Feed the AED map

Public Authorities

Legislation:

- Make sure that anyone is allowed to use AEDs

AED provision:

- Make AED provision mandatory in public locations, both in highly populated as well as in remote isolated areas
- Clarify who pays what (e.g. battery when AED has been used)

AED location:

- Define guidelines on how to optimize AED placement, based on emergency services data related to cardiac arrests locations and/or based on mathematical models
- Create and maintain a public database where AED owners and emergency services can share the location of AEDs
- Make provision of AED location information into a public database

mandatory for AED owners

AED maintenance:

- Define strict guidelines for maintenance of AEDs
- Make sure AED owners keep emergency services informed on availability of their AEDs and their good functioning
- Future development of AED maintenance could involve private companies who could be responsible of a free-of-charge service on behalf of Authorities and/or of the owners

Use of AED:

- Promote the ability for anyone to use AEDs

¹<http://www.eena.org/events/eena-members-workshop-meet-your-mep-2017>

All AEDs should be able to geo-locate themselves...

6. EENA Recommendations continued...

AED Mapping Companies / Apps

Sourcing:

- Provide reliable AED mapping
- Allow emergency services to feed the map

Supervision:

- Provide a mapping (location, AED working) that is always up-to-date (reliability)
- Make the map dynamic so that emergency services can update the map when AED has been used or an AED is missing

AED Owners

AED location:

- Make the location of their AEDs public (online database accessible by emergency services at least)

AED availability:

- Make sure their AEDs are always operational and current
- Keep emergency services informed on when their AEDs are available.
- Keep emergency services informed on the good functioning of their AED

AED Manufacturers

Location:

- All AEDs to be able to geo-locate themselves and share their location with the online database accessible by emergency services

Supervision:

- AEDs to provide status of the machine (operational, need of maintenance... etc)
- Manufacturers to follow guidelines defined by public authorities

Providing an AED mapping to the Emergency Dispatch Centers is a necessity...

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Appendix: Form

Type of Information	Explanatory Notes
Authority	
Owner	State name or denomination of the AED owner
Maintainance responsibility	Write the name and phone number of the person(s) committed to the AED control/maintenance
Municipality	Write the municipality where the AED is located
Address of location	Write the complete Address (Street, Square, civic number, zip code) of the building where the AED is located
Location	Write the precise place where the AED is located (floor, room, corridor, etc.)
Geographic coordinates (optional)	Indicate the geographical coordinates (i.e. Latitude, Longitude - Lat 45.91, Long. 13.72)
Availability	Indicate time and days of the week when the AED can be activated
Fixed location or mobile	Specify whether the AED remains permanently in the location above described or whether is temporarily placed in a mobile vehicle at certain situations (i.e. during racing or other events)
Phone	Write the phone number(s) required to activate the AED
AED	
AED name and model	Write the name, model, and Company of the AED
Reference number	Write the reference/serial number of the AED
Date of battery expiration	Write the date of battery expiration
Date of expiration of adult paddle	Write the date of adult paddle expiration
Date of expiration of pediatric paddle	Write the date of pediatric paddle expiration
Date of expiration of spare paddles	Write date of expiration of any (adult, pediatric) spare paddles
Number of subject authorized to the AED use (if established by national, regional or local law/policy)	Write the number of subjects authorized to the AED use (if established by law/policy)
Trainer Authority	Write the name of the Trainer Authority that performed the BLS course

Form from: *Database of the Emergency Dispatch Center (SOES, Sala Operativa Regionale Emergenza Sanitaria, Friuli Venezia Giulia, ITALY)* by the Regional AED Working Group