Automated external defibrillators

Automated External Defibrillators are field defibrillation devices for the general public and professionals alike. They are included as the third step in the four-point survival chain issued by the European Resuscitation Council (ERC) in the first aid. Today, AEDs are widely used in the so-called First Responder system. The system is used mainly in places with weaker emergency coverage, in these places AEDs are equipped with, for example, volunteer fire brigades or city police.

History

Since 1888, when physician Mac William was the first to believe that ventricular fibrillation may be the reason for circulatory arrest, experts have sought to develop and refine approaches to restoring cardiac circulation with electric shocks. Since 1990, the need for early defibrillation has shifted from professionals to non-physicians thanks to AEDs.

- 1888 − Clinician Mac William came up with the theory of ventricular fibrillation as the cause of cardiac arrest and subsequent death.
- 1932 − Dr. William Bennett Kouwenhoven developed the first device to defibrillate the heart with an electric shock.
- 1947 − Surgeon Claude Beck first successfully defibrillated the heart on an open chest during surgery.
- 1956 − Paul Maurice Zoll was the first to perform successful external defibrillation.
- 1990 − In the light of new findings, the first AED programs for early public access to defibrillation have begun to be implemented in the United States.
- 2005 − The European Resuscitation Council is issuing new resuscitation best practices, which now include the use of AEDs.[1]

Survival chain

Survival chain

The main effort in providing first aid is to ventricular fibrillation or ventricular tachycardia, which are the cause of about 40% [2] cardiac arrest, did not pass in asystole. Therefore, the idea of automated external defibrillators was created, which allows performing defibrillation in the shortest possible time. With every minute, the probability of the resumption of circulation decreases by 7 to 10%[3] depending on insufficient oxygenation of the heart. European Resuscitation Council every 5 years[4] updates resuscitation best practices. The basic chain of survival includes all the activities needed to effectively perform first aid and recovery. The so-called **chain of survival**, first published in 1991[1] by The American Society of Cardiology (AHA) contains:

1. Early pledge recognition and call for help.
2. Early cardiopulmonary resuscitation.
3. Early defibrillation.
4. Early post-resuscitation care.

The original three-point system was extended by early post-resuscitation care by Dr. Richard Cummins.


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Electrode placement

The electrodes must be properly stuck to the dry chest in the area of the right subclave in the 2nd intercostal space to the right of the sternum and to the left in level 4. − 5. intercostal space in the mid-axillary line[3]. Heavy hair increases the chest impedance and impairs electrode adhesion, which is why manufacturers add razors to AEDs. However, the goal is not a perfect shave, but the removal of as much hair as possible in the shortest possible time without injuring the victim. If the victim is in a wet place, we will quickly and gently move him to a dry place and wipe his chest before gluing the electrodes, especially in the area of their gluing. If the affected person has an implanted permanent pacemaker, we place the electrodes at least 8 cm from him, or we use an alternative placement of the electrodes anteroposteriorly or biaxilarly.

Devices

There are more than 20 types of AEDs and they vary in the size of the electric shock, the number of discharges, the weight and dimensions of the device, or the type of battery. These devices have a programmed algorithm that accurately guides the user by voice or written instructions and, after the electrodes are glued, evaluates the heart rhythm thanks to the diagnostic system. They are located in places with a large concentration of people with the

occurrence of pledge for at least 1 in 2 years[5], such as shopping centers, stadiums, airports, etc. The official AED register does not exist, but for example, the Záchranka mobile application contains a map of the AED in the Czech Republic. There are several million AEDs around the world and the places are marked with an international brand.

Providing first aid with AED

We first assess the unconscious person's condition, clear the airways, and check if the person is breathing. Then we call the ambulance at 155. We start performing CPR in a ratio of 30:2, or just compress the chest 100 times per minute and continue until the AED is brought. It is important not to interrupt the chest compressions unnecessarily, so we continue to massage while sticking the electrodes and charging the device. On the contrary, it is necessary not to move the victim during the heart rhythm analysis! If the device recommends a shock, it warns those present not to touch the victim and performs a biphasic shock itself (automatic) or after pressing a button (semi-automatic, automated, the most common in the Czech Republic). Immediately thereafter, CPR should be continued until further AED analysis, circulatory recovery (active breathing, patient defense), or emergency services.

The symbol indicating the presence of an AED

Resources

Linked articles

- Defibrillation
- Electrical cardioversion
- Ventricular fibrillation
- CPR

Literature

- KLEMENTA, Bronislav – KLEMENTOVÁ, Olga. *Resuscitace.* 2. edition. Olomouc : Epava, 2014. ISBN 9788086297477.

References

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2. [online]. [feeling. 2015-11-17]. Available from: https://www.erc.edu/
3. KOLÁŘ, Jiří. *Kardiologie pro sestry intenzivní péče.* 4. edition. Praha : Galén, 2009. ISBN 978-80-7262-604-5.
4. [online]. [cit. 2015-11-17]. Available from: http://www.resuscitace.cz/?page_id=42
5. KAPOUNOVÁ, Gabriela. *Ošetřovatelství v intenzivní péči.* 1. edition. Praha : Grada, 2007. 350 pp. ISBN 978-80-247-1830-9.

External source

- AED (English wikipedia)
- CPR (Czech wikipedia)
- AED (Czech wikipedia)