Chapter 9
Location Information Services of Automated External Defibrillators (AEDs)

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ABSTRACT

Cardiovascular diseases are a leading death cause in the world. Cardiac arrest is one of the most usual, and very quickly fatal, especially in out-of-hospital environments. Defibrillation, aside with cardiopulmonary resuscitation, is an effective means to restart blood circulation and heart operation, even though even these forms of treatment can help just in sadly few situations. Defibrillation was invented and first demonstrated already year 1899, but first in the 2000s portable defibrillators with good automatic functions started to penetrate daily environments of people, especially in urban settings. Nowadays the starting point is that every citizen with normal human functionality should be able to use automated defibrillators. The chapter discusses how modern information and communication technology, especially mobiles services, internet, and location services based on them, could help citizens in the first crucial step in implementing their safety competence in emergency situations by using automatic defibrillators if they could only find them.

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INTRODUCTION

Cardiovascular diseases are a leading death cause in the world. Of them, cardiac arrest is one of the most usual, and very fast fatal, especially in out-of-hospital environments, where most cardiac arrests happen. World Health Organization (WHO) gives following facts about cardiovascular diseases (CVDs) (World Health Organisation, 2020):

- CVDs are the number 1 cause of death globally: more people die annually from CVDs than from any other cause.
- An estimated 17.9 million people died from CVDs in 2016, representing 31% of all global deaths. Of these deaths, 85% are due to heart attack and stroke.
- Over three quarters of CVD deaths take place in low- and middle-income countries.
- Out of the 17 million premature deaths (under the age of 70) due to non-communicable diseases in 2015, 82% are in low- and middle-income countries, and 37% is caused by CVDs.

Cardiac arrest can hit anyone, even though risk usually grows with age. Alarmingly, the study of Ringh & al (2009) found that there was a decreasing median age (form 68 to 64 years) in their study of out-of-hospital cardiac arrest patients in Sweden. In their Japan-wide study of SCAs in years 2013-2015 (Kobayashi et al., 2020) found 4863 out-of-hospital cardiac arrest patients less than 18 years of age. As SCA hits the core of critical body functions, hearth, fast response is needed.

Defibrillation, aside with cardiopulmonary resuscitation, is an effective means to restart blood circulation and heart operation, even though even these forms of treatment can help just in sadly few situations. Not all blood circulation or heart –related traumas are treatable with automated external defibrillators. Especially, asystole, a state with flat line –pattern, telling that the hearth has no electrical activity, and also causes no blood circulation, is not shockable with an AED.

Defibrillation was invented and first demonstrated already year 1899, but first in the 2000s portable automated external defibrillators (AEDs) with good automatic functions started to penetrate daily environments of people, especially in urban settings. Nowadays the starting point is that everyone with normal human functionality should be able to use automated defibrillators, and is expected to do so. The fast and right response is symbolized in the chain of survival: finding the patient/victim as early as possible, immediately started cardiopulmonary resuscitation (CPR), immediately started defibrillation with AEDs devices, and fast advanced cardiac life support in hospital settings. AED use should start within 5 minutes from the hearth stop, and before that taken cardiopulmonary resuscitation strongly improves the changes of survival.

Despite much activity, automatic external defibrillators are still scarce, and even if they would be available, they very seldom end up to productive use. This article studies the reasons for the rather low effectiveness of the heavy AED investments. The effectiveness of the AED investments has been already widely discussed, as for example in (Ringh et al., 2009) and (Walker, Sirel, Marsden, Cobbe, & Pell, 2003). Especially, this article discusses how modern information and communication technology, especially mobiles services, Internet and location services based on them could help citizens in the first crucial step in use of automatic defibrillators, the finding of them. Even when a defibrillator is found in time, there is sadly ample evidence, that they do not end up to use, or the use cannot help the victim. However, willingness to act, and knowledge and skills to execute needed operations in using AEDs should be a part of citizens' safety competence that could be enhanced by digital mobile applications.