Chapter 41

M-Health in Prehospital Emergency Medicine:
Experiences From the EU Funded Project LiveCity

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ABSTRACT

Prehospital emergency medicine strives to treat (potentially) life-threatening conditions as early as possible and thus reduce preventable disabilities and deaths. MHealth enables the transfer of knowledge to the emergency site. The purpose of this chapter is to display different approaches. Knowledge can be brought to the emergency site e.g. by smart phone applications allowing retrieval of data or by real-time communication with a remote medical expert. High definition video communication in real time offers the highest amount of mHealth communication currently available in prehospital emergency medicine. Projects, using such a video communication are discussed. In the European Union funded project LiveCity a special video camera was developed and tested. After having encountered simulated emergency scenarios, emergency doctors and paramedics rated the video connection as helpful, an improvement of the quality of patient care and could imagine working with such a video consultation. MHealth has huge potential for the application in prehospital emergency medicine.

INTRODUCTION

Prehospital emergency medicine is an essential part of all health care systems worldwide. The goal of prehospital emergency medicine is to treat time-critical diseases and conditions as early as at the emergency site and thus reduce preventable disabilities and deaths. MHealth offers the opportunity to balance existing healthcare disparities by using mobile information and communication technologies. It

has huge advantages in emergency medicine, where the transfer of knowledge in a short time is critical and potentially lifesaving (Amadi-Obi, Gilligan, Owens, & O'Donnell, 2014).

The purpose of this chapter is to display different approaches, how mHealth might be beneficial in prehospital emergency medicine.

After introducing the role of paramedics and emergency doctors in the prehospital emergency medicine, the three key emergency cases myocardial infarction, stroke, and trauma are described. These life-threatening diseases belong to the leading causes of death worldwide and have a high economic impact. MHealth offers a possibility to increase the quality of treatment starting at the emergency site to potentially save lives. There are two main ways of applying mHealth in prehospital emergency medicine. One is to retrieve data, e.g. by using smart phone applications. Multiple uses of applications will be presented. The other way to use mHealth is a real-time communication with a medical expert. This communication could be the transmission of audio, vital signs, photos or video. Three projects using high-definition real-time video communication from the emergency site to a remote emergency doctor will be presented and discussed. Experiences in mHealth in the field of prehospital emergency medicine gained in the European Union FP7-funded project LiveCity (Grant Agreement No. 297291) will be described. Within the project a video camera was developed and tested in a medical simulation center. Key findings of this study will be presented and issues and problems, which arose, will be analyzed and possible solutions discussed. Future research is expected to solve some remaining technical challenges, making mHealth in prehospital emergency medicine very promising.

BACKGROUND

Prehospital Emergency Medicine

Prehospital emergency medicine summarizes all efforts made by medical professionals to treat acute illnesses, life-threatening conditions and pain at the emergency site and to transport the patient – if needed – to a hospital. Prehospital emergency medicine varies between countries (Roudsari et al., 2007). Most developed countries have an advanced life support system, which can be divided into the Anglo-American model and the Franco-German model. In the Anglo-American model, the prehospital emergency medicine is done by paramedics. The Franco-German model is similar to the Anglo-American model, but differs in life-threatening conditions. In those cases additionally to paramedics, there are also emergency physicians sent to the emergency site (Dick, 2003).

Three Key Emergencies: Myocardial Infarction, Stroke, Trauma

Medical emergencies, which happen outside a hospital, contribute immensely to the global morbidity and mortality. The World Health Organization published a factsheet about "the top 10 causes of death", where ischaemic heart disease and stroke are the two leading causes of death worldwide (WHO, 2014). Myocardial infarction, as the acute and life-threatening form of ischaemic heart disease, is a very frequent reason to alert the prehospital emergency system. The European Society of Cardiology emphasizes the importance of the prehospital phase because this is the most critical phase for the occurrence of cardiac

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