

# Chapter 86

## Mobile Technologies in the Emergency Department: Towards a Model for Guiding Future Research

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### ABSTRACT

*Hand-held and mobile technology is steadily expanding in popularity throughout the world. Mobile technologies (e.g. mobile phones, tablets, and smart phones) are increasingly being used in Emergency Departments (ED) around the world. As part of this international trend towards introducing mobile technologies into the ED, health professionals (e.g. physicians, nurses) are now being afforded opportunities to access patient information and decision supports anywhere and anytime in the ED. In this chapter, the authors present a model that describes the current state of the research involving mobile device use in the ED, and they identify key future directions where mobile technology use is concerned.*

### INTRODUCTION

Mobile technologies are increasingly being used in regional health authorities, health care systems, hospitals, and clinics throughout the world. Mobile technologies have afforded healthcare providers (e.g. physicians, nurses, therapists) the ability and opportunity to access patient information anytime and almost anywhere in and outside of health care organizations (i.e. in the hospital and in the com-

munity). This rapid access to patient information has made mobile technologies a valuable tool and provided health professionals with an aid in supporting patient care related decision making. When first implemented in health care organizations, mobile technologies provided limited access to health information on the World Wide Web. They were a significant contrast to desktop computers that provided access to electronic health records in hospitals. Electronic health records (EHRs) were

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accessed via desktop computers that were located in specific areas of the health care organization (e.g. at the nursing station, at the end of a hallway). Desktop computers could not be easily moved from one location to another. With the development of varying types of mobile technologies, EHRs and their components including provider order entry, medication administration systems, laboratory information systems, and others can now be accessed anytime and anywhere.

There is a need to understand how these technologies are being used in EDs. Therefore, the researchers will present the findings of a scoping review addressing the current literature focusing on the use of mobile devices in the ED environment. In this chapter, we outline the current state of the research in using mobile devices and identify future research directions. We will also present a model. We will begin by providing background information about the ED, EHRs and Decision Support Systems (DSS) followed by information about mobile device technologies and software use in the ED.

## **BACKGROUND**

### **The Emergency Department**

The emergency department (ED) see patients needing critical or urgent care. Visits range from life-threatening to minor and non-acute complaints. From 1996-2006, ED visits increased by 3% annually (Pitts, Niska, Xu, & Burt, 2008) and utilization rate increased by 18% (Pitts, et al., 2008). The majority of visits occur in community EDs. A dedicated ED includes access to a wide-variety of specialists. The ED plays an important role in addressing, treating, and stabilizing life-threatening conditions. To address the unique needs of providing patient care there is a need to identify technologies that would best support health professional work in these settings. These technologies include EHRs, DSS and mobile technologies.

### **Electronic Health Records and Decision Support Systems**

Approximately 55% of hospitals have a comprehensive HER (Jamoom et al., 2012); 46% of EDs have EHRs (Geisler, Schuur, & Pallin, 2010) 34.3% have Computerized Provider Order Entry and 26.7% have clinical guideline support (Nakamura, Ferris, DesRoches, & Jha, 2010). Children's hospitals have a smaller rate of EHR implementation with approximately 2.8% of children's hospitals have a comprehensive EHR with 17.9% having some form of basic system (Nakamura, et al., 2010). However, EHRs are increasingly implemented in hospitals, with the adoption of EHRs doubling over the last two years (U.S. Department of Health & Human Services (HHS), 2011). EHRs are replacing paper-based processes and records. Computer-based decision support is provided to healthcare providers to support clinical decision making and standardize care. Decision support systems are integrated with EHRs to guide treatment decisions and to aid the decision-making process at the point of care. Decision support can be delivered in a variety of ways, such as suggesting medications, medication warnings, providing guideline recommendations, alerting about abnormal values, and many other suggestions.

Fifty-five percent of U.S. healthcare institutions have EHRs (Jamoom, et al., 2012); decision support is frequently part of implementation and is defined as "any program designed to help health-care professionals make clinical decisions (Musen, Shakar, & Shortliffe, 2006)." It can cover many aspects of care including patient-specific recommendations (Slagle et al., 2010), information management (Chute, Beck, Fisk, & Mohr, 2010), and guideline compliance (Bell et al., 2010). The framework for decision support (Miller, Waitman, Chen, & Rosenbloom, 2005) outlines the types of support and the options for ideal workflow integration. Decision support should be provided at the right place, to the right person, at the right

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