Chapter 27
Real–Time Biomedical Telemetry System for Ambulances

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ABSTRACT

This chapter discusses the development and implementation methodology of a real-time biomedical telemetry system for ambulances. Comparable systems, together with their authors' claimed improvements, are evaluated and analysed in this chapter. The authors start by providing an overview of the most relevant systems, and then introduce the reader to the methodology used to develop and implement a real-time communications system that allows low-cost data transmission from a medical monitor and haematology analyser installed in an ambulance. This system was evaluated in terms of how well it can provide health assistance within a 50 km radius of the Torrecardenas Hospital (part of the public health-care system in southern Spain). Results have been technically and medically validated, and encourage further implementation of this technology, since it was proved to be reliable, while the transmitted data allow a correct and thorough patient evaluation throughout the patient's transportation to the hospital.

INTRODUCTION

For many years, advances in medicine have been accompanied by similar developments in technology. Over recent decades, the development of electronic equipment-based biomedical systems has allowed remarkable improvements in research, diagnostic, and patient treatment techniques, as confirmed by Meystre (2005).

The use of information and telecommunication technologies, as well as electronics applied to medicine may go beyond the medical techniques, and provide support for other processes associated with healthcare. The overall goal is to

improve the process of providing healthcare, to improve information and communication between healthcare workers, and to speed up the internal administrative processes of the system (Figure 1).

Recent advances in the electronics industry have been applied to telecommunications, leading to the development of innovative solutions that use microprocessor-based systems, and integrating mobile communications into our everyday life. Modern society recognizes that telemedicine can provide solutions that enable healthcare services to be brought to remote and/or isolated places that would have been unthinkable 20 years ago. New wireless sensors offer low-cost telemedicine and versatile methods for supervising chronic patients, regardless of their location, so increasing the demand for efficient and practical telemedicine systems. This opens up an arena for new ideas that focus on improving the user's well-being

(Yu Hu, 2010; Ren-Guey, 2007). There are many examples of such applications. For instance, primary-healthcare monitoring of patients in remote areas suffering from diseases that require constant monitoring of medical parameters, monitoring of therapeutic procedures (Sánchez-Tato, 2010) or applications whereby a doctor in a hospital can monitor a patient's rehabilitation process in his/her home (Varshney 2006).

Information and communication technologies therefore open up a range of possibilities to enhance patient-doctor and doctor-patient interaction and so ease access to healthcare services, bringing patients more freedom, and improving the quality of their overall healthcare. Accordingly, there are many examples of telemedicine systems that have been already developed and deployed in rural and domestic environments, as described by Kyriacou (2009). However, few of these systems

Figure 1. Interaction of the three sectors that define telemedicine (Adapted from Ministerio, 2000)
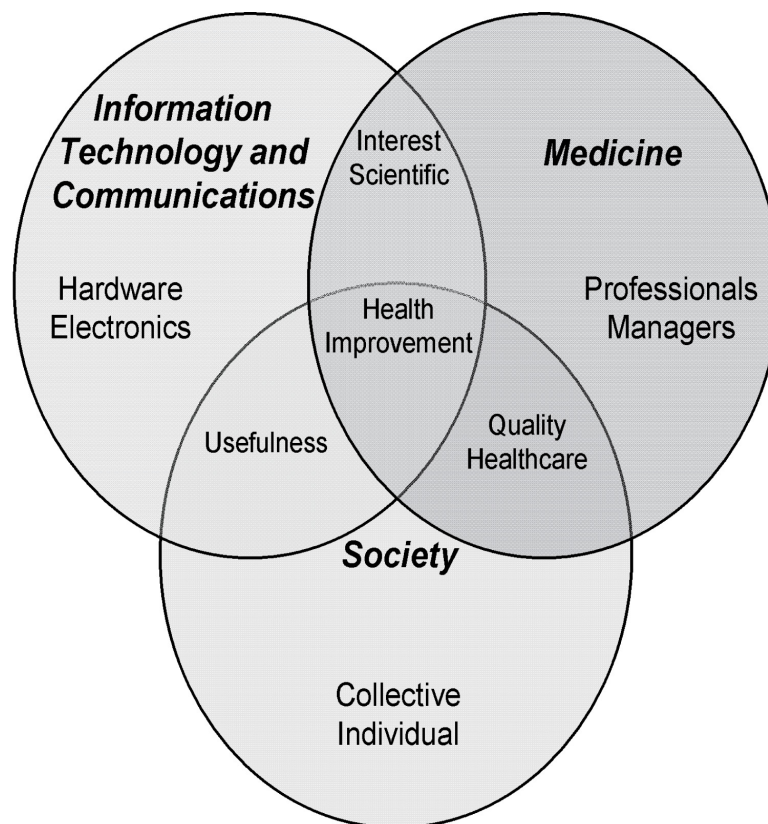
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