

## Chapter 3.2

# Use of Telemedicine Systems and Devices for Patient Monitoring

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### **ABSTRACT**

Today's health standards demand a high quality and efficiency as a major characteristic of every health service provided to the public, even in cases where patients have to be treated from a distance. The combination of medicine and information technology (telecommunications) led to the introduction of the term telemedicine. Telemedicine services are used in assisting remote patients. Interaction and feedback through patient monitoring systems and devices allow the health providers interfere when necessary, so medical maintenance can be guaranteed. This chapter deals with the different kinds of such systems and devices. The contribution of old and new

telecommunication technologies is currently being discussed. The individual needs of every remote patient are taken into account, thus, several devices and systems are used for telemonitoring. This chapter indicates characteristics and features of the various kinds of patient monitoring systems and devices.

### **INTRODUCTION**

Due to the technological revolution and the entry of informatics in our everyday lives, the expansion of telecommunications became a reality. Challenging telecommunication applications such as cellular telephony, communications through the

intervention of satellites, the Internet, and so forth, support the extensive exchange of information. Several scientific areas have become related to telecommunication applications, including the field of health in which the term telemedicine was first introduced.

Telemedicine involves the transfer of medical information for use in diagnosis, treatment, and education over distances and brings medical services directly to the point of need.

A monitoring system adapts to the needs of each and every patient, care unit, and hospital equipped with hardware and software designed to give maximum functionality, flexibility, and responsiveness. Concerning the monitoring devices, several types are available, including pulse oximeters, spirometers, glucose monitors, and so forth (Demiris, 2004).

## **TELEMEDICINE SYSTEMS FOR PATIENT MONITORING**

There was a big demand for devices for patient monitoring, especially for people who are far away from health providers. The population is growing old, and the high health standards of nowadays claim that patients should be cared for and rehabilitated at their homes. Several tele-monitoring systems were developed. The primary aim of such systems is to maintain the autonomy, independence, and quality of life for the frail elderly, disabled persons, remote patients, and their informal family caregivers by the application of telematic technology. For example, home health tele-assistance systems could provide a large range of services that would permit the user or patient to remain in his or her normal environment:

- Emergency alarm systems (tele-alarms),
- Post-hospital treatment monitoring,
- Social assistance (24-hour tele-assistance) and so forth (Linkous, 2003).

Remote medical services can also be used in other areas as medical care is provided to prisons, on board commercial aircraft and ships, in the military, and even at the South Pole.

## **TELEMEDICINE SYSTEMS AND TELEHOMECARE**

The most common utilization of telemedicine for patients' monitoring is telehomecare. With more technologies moving into home care, and more and sicker patients being treated outside of the hospital environment, the home-care approach to health care is here to stay. Telehomecare is viewed as a method that uses telecommunication and videoconferencing technologies to enable a health-care provider at the clinical site to communicate with patients at their homes. It is one of the brightest examples of the new frontier of health care. These telehomecare solutions are low cost compared to the classic way of monitoring (Linkous, 2003).

## **TELEMEDICINE SYSTEMS AND INTERACTION**

The telemedicine systems permit monitoring devices to interact with doctors' displaying systems. Such an interaction is called a virtual visit. These devices collect information and signs from the patient, and the resulting data can then be transferred through telephone lines (regular, ISDN, DSL, or T1), the Internet, or the wires of a LAN (local area network) or WAN (wide area network) to the doctor or other health scientists (Kyriacou, Voskarides, Pattichis, Istepanian, Pattichis, & Schizas, 2002). Recent technologies such as Bluetooth might also be used (Roke Manor Research Limited, <http://www.roke.co.uk>). The diffused data, in many cases, has the potential of updating the doctor's displaying devices in real time. Whenever there is a need (urgent case), the

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