

## Chapter XXXII

# Collaborative Environments for the Health Monitoring of Chronically Ill Children

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### ABSTRACT

*A revolution is taking place in the healthcare field with information technology (IT) playing an increasingly important role in its delivery. Healthcare providers are exploring IT opportunities in reducing the overall costs of healthcare delivery while improving the quality of its provision to citizens. Healthcare services have accumulated great benefits from the application of information technologies, telecommunications and management tools. Internet, wireless, and handheld technologies have the capability to affect healthcare by improving quality, efficiency, and cost-effectiveness of work. Healthcare information systems include a wide range of applications ranging from diagnostic tools to health management applications and from inpatient to outpatient monitoring services. Home-care systems address patients and their families and provide the means to manage their health status related to a specific health problem. Home-care systems include a wide variety of offered services such as: (a) directory services (hospital location, doctor specialties), (b) computer patient records (CPR) along with interfaces for interoperability, (c) certified medical information provision, (d) interfacing to specialized medical monitoring devices, and (e) synchronous and asynchronous collaboration services. All these services are offered, most of the time, through secure and seamless networks.*

## INTRODUCTION

A revolution is taking place in the healthcare field with information technology playing an increasingly important role in its delivery. Further exponential growth is expected as the healthcare industry implements electronic medical records, upgrades hospital information systems, sets up intranets for sharing information among related participants, and uses public networks to distribute health-related information and provide remote diagnostics via telemedicine (Directorate-General Information Society & Immarsat Ltd, 1999). Today's healthcare providers, faced with an unprecedented era of competition, are exploring IT opportunities in reducing the overall costs of healthcare delivery while improving the quality of its provision to citizens.

Healthcare services have accumulated great benefits from the application of information technologies, telecommunications, and management tools. The Internet and wireless and handheld technologies have the capability to affect health care by improving the quality, efficiency, and cost effectiveness of work (Eder & Darter, 1998). By integrating data from disparate sources—various medical departments, billing systems, insurers, and other medical information resources—into a single point of reference and making them available at anytime and anyplace via the Internet and wireless technology on a handheld computer, health-care professionals are able to provide the most effective patient care at the point of care.

Healthcare information systems include a wide range of applications ranging from diagnostic tools to health-management applications, and from inpatient to outpatient monitoring services. During the last few years, advances in telecommunications, Internet technologies, and specialized lightweight medical devices have

advanced development in healthcare, enabling the deployment of healthcare systems for children who are chronically ill and need continuous monitoring of their health conditions (Southall et al., 2000). Asthma, diabetes, and chronic heart problems are among those that raised the demand for continuous monitoring systems, and several services and products became available powered by different technologies.

Asthma is defined as a chronic inflammatory disease of the airways; this inflammation is responsible for the appearance of symptoms associated with reversible airway obstruction, both spontaneous as well as following treatment, and is a determining factor of concomitant airway hyperresponsiveness. The clinical situation of acute asthma may be classified as mild, moderate, or severe. Moderate asthma is accompanied by tachypnoea, the use of accessory muscles for respiration, and the inhibition of physical activity. In severe asthma, wheezing may no longer be audible, cyanosis and shortness of breath are present with the contraction of the thoracic muscles, and the patient is compelled to stay in bed; the heart rate exceeds 120 beats per minute, and PEF and FEV1 are lower than 50% (Lung Association, n.d.).

Diabetes mellitus is a condition in which the amount of glucose (sugar) in the blood is too high because the body cannot use it properly. Glucose comes from the digestion of starchy foods such as bread, rice, potatoes, chapatis, yams, and plantain, from the digestion of sugar and other sweet foods; and from the liver, which makes glucose. There are two main types of diabetes. Type 1 diabetes, also known as insulin-dependent diabetes, develops if the body is unable to produce any insulin. This type of diabetes usually appears before the age of 40. Type 2 diabetes, also known as non-insulin-dependent diabetes, develops when the body can still make some insulin, but not enough, or

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