Wilho – a New Concept of Wireless Management of Healthcare Processes

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Introduction

Globally, Finland is a leader in the development of data networks and wireless technology. The strong development of technology in recent years has introduced new opportunities for enhancing hospital process. Finland’s healthcare system is going through great technological changes and search for new solutions. Wilho was created when high-tech companies, researchers and service providers in Oulu began developing wireless hospital technology and operation models. The objective was to create a plan for a wireless hospital aimed at boosting the care of patients for domestic as well as export markets. Thus was born the Wilho Consortium and the Wilho Program [1], whose key objective is to make the internal processes of a hospital more efficient by wireless solutions. Partners of the Wilho Consortium (Oulu University Hospital, ODL Health Oy, University of Oulu and Whealth Oy) started an initial survey in 2003. Now the Wilho Program is proceeding as four Wilho Projects in the participating hospitals, university and company.

The Wilho Concept

The Wilho Concept can be divided into three parts: wireless network, wireless applications and integration, which combines the first two. The heart of the concept of a wireless hospital is the wireless network itself, which can be connected to data systems as well as the various applications of the hospital processes. In the direction of data systems, the wireless network can be seen through standardized data transmission protocols, and in the direction of the applications with standardized RF interfaces. The WLAN base stations (Wireless Local Area Network) connect wireless devices to the fixed infrastructure network. Room-specific base stations can be based on ZigBee [2] or UWB (Ultra Wideband) [3, 4] technology and they link measuring and location data elsewhere on the data network. UWB technology uses a frequency range of 3.1-10.6 GHz at low power levels, which enables data transfer of up to 600 Mb/s in a small coverage area. In tracking and data transmission, either WLAN or UWB technology is used depending on the application and its requirements.

Integration in the Wilho Concept means 1) wireless support for the top level of hospital management (e.g. strategy planning and cost accounting), 2) wireless support for hospital information systems and 3) wireless integration of medical, clinical and diagnostic data. One of the main goals of the Wilho Program is the enhancement and streamlining of the internal processes of hospitals. When care progresses more quickly, the amount of labour required for caring an individual patient is reduced and there is enough time to perform essential working phases. Our vision is to develop an Enterprise Resource Planning (ERP) system for hospitals supported by wireless logistics.

Wireless applications mean 1) wireless tracking of patients, staff, equipment and materials i.e. wireless logistics for the optimization and management of clinical workflow, 2) continuous wireless monitoring of the vital parameters of patients, 3) continuous wireless connection to optimal specialists and 4) wireless access to all
medical and clinical data needed. Wireless networks make data available in real time in follow-up care locations as soon as the patient arrives. Wireless networks and applications also enable the continuous, unbroken monitoring of a patient’s condition. UWB technology is able to localize with a precision of a few centimeters. The precision of current WLAN tracking methods is a few meters.

**Benefits of using wireless technology in hospitals**

Wireless technologies are assumed to provide unique and novel ways to optimize and enhance hospital processes. By using an electronic patient record and wireless communication medical doctors can save 15 % of their time [5] and nurses over 10 %. In addition, wireless technology saves time in ordering medicine and other supplies. According to our studies, in one ward (26 beds) 13 hours are spent for ordering and 21.5 hours for handling of deliveries. In surgical departments ordering and handling of deliveries may take up to 167 hours per week and 147 hours per week, respectively. Use of wireless technologies together with electronic patient records will really create huge savings on the hospital level.

**References**


