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Challenges of Healthcare and Health ICT

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Modern hospitals offer a wide variety of services within a broad field of clinical care, specialties and research, as well as medical support services. Diagnosis, treatment and care therefore, tend to consist of complex processes involving multiple individuals, technologies, procedures, and application of knowledge and expertise.

The development of knowledge, technology and skills has been explosive, and makes modern healthcare dependent on teamwork with complementary professional expertise. The reliability, quality and precision of such complex teamwork need real-time and unobstructed flow of data and information to the point-of-care for optimal results. Meanwhile, the existing volume of published research and knowledge in medicine is, for practical purposes, much too large for paper-based handling. Moreover, the growth of knowledge is exponential.

Rising Healthcare Costs: The Role of ICT

The cost of healthcare has been growing fast over the last couple of decades. In the period 1990-2004, healthcare spending has outstripped GDP growth in every member country of the Organisation for Economic Cooperation and Development (OECD) except Finland. With personnel accounting for 65-75 percent of hospital costs, healthcare spending is closely connected with the need for professionals. The complexity of services and the need for emergency capacity within a multitude of specialties – on a round-the-clock basis – explain the rising need for professionals, and thus the high cost.

Hospital ICT expenditure, on the other hand, is lower than it is in other economic sectors – typically within 1-3 per cent of budgets. Despite efforts and political will to improve healthcare, the overall picture in many healthcare organisations today is one of insufficiency and inefficiency – with long waiting times and queuing by patients.

Historically, expectations of return of investments (ROI) and real benefits linked to healthcare ICT projects have often not been met. The failure of ROI is often connected with too narrow a focus on the ICT project. It is therefore a growing priority to restructure work processes and workflow for professionals to remove waste and increase value. To optimise ROI, what is required is real-time flow of information to support professional operations in restructured workflows, both within and between departments, hospitals and primary healthcare.

To obtain a lasting effect from such restructuring, what is imperative are close management involvement and focused processes involving healthcare workers. So far, ICT solutions have, to a large degree, focused on documentation rather than workflow and work processes, and have usually failed to support mobility and point-of-care operations. The paucity of universal standards and architecture supporting integration has usually led to islands of information rather than easy information flow.

Next-Generation ICT Infrastructure

The key elements for a good cost-benefit profile are investments in infrastructure to support broad realtime data acquisition, alongside adequate database and storage capacity. The ICT infrastructure needs to include wireless access by IP-enabled, handheld digital devices to support mobile professionals and point-of-care operations. The systems, applications and equipment need to be integrated to support flows of information in parallel to the clinical workflow.

Given increasing demand for clinical decision support and knowledge extraction at the point-of-care, investments in pervasive ICT infrastructure and integration must be combined with careful re-engineering of work processes and planning of detailed workflow. These, in turn, will add a positive value stream for the patient through the entire pathway of care, and provide the backbone for extracting systemic performance indicators to support management and clinical governance.

Most hospital laboratories and imaging departments have implemented laboratory information systems and picture archiving and communications systems with radiology information systems. Electronic patient records and computerized physician order entry systems are also under increasing implementation. Such individual systems are important to improve patient safety and increase efficiency. However, the basic ICT infrastructure will determine how such systems can be extended to support workflow and mobile professionals, at the point-of-care.

The Pervasive Digital Hospital

Two large University Hospitals in Norway, St. Olav's Hospital in Trondheim and Nye AHUS near Oslo, have chosen a major IT infrastructural overhaul which lays the foundation for a true, pervasive digital hospital. Under the leadership of Telenor, St. Olav's is already operating the departments of the first phase, and has started construction on the second phase. Nye AHUS is under construction and will open in 2008. Using network appliances from Cisco Systems and middleware from Norway's Cardiac, HP built a highly distributed network which exploits the latest mobile and wireless technology.

A major part of the project focuses on Nurse Call - a patient monitoring application that allows nurses to receive direct alerts via PDA, PC or IP phone, on their patients' status. Innovative patient terminals developed by Cardiac deliver hospital services, nurse calling, Internet, entertainment and telephone service to the patient's bedside, while also giving clinicians secure access to electronic patient records and other data, information and support.

Nurses and other clinicians are also able to communicate directly with their patients via the patient terminal, and with colleagues, no matter where they are. If there is no response within seconds, the patient's request automatically routes to another nurse until someone responds. An intelligent system for location based services is able to track physicians, nurses and porters by their IP-enabled devices throughout the hospital, so they can be found at a moment's notice in an emergency. The system also allows tracking of assets by the same system utilizing RFID or ultrasonic tags.

The new revolution in healthcare is not only about medicine, but also about using technology to deliver real-time information which drives safe and efficient patient-centric care. Integrating a hospital's medical devices, instruments and data/information systems to steadfast and immediate communications underscores the hospital of tomorrow.

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