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Telemonitoring – Telemedicine Applications with New Concepts

At least 35% of men aged 60 years and over suffer from two or more long-term illnesses. In addition, secondary conditions associated with long-term illness increase with age, a tendency that is even more pronounced in women1 . In Denmark, for example, long-term illness affects an estimated 40% of the population. Non-communicable diseases, along with their side effects and complications, impact significantly on health and social systems throughout Europe. Studies show that long-term conditions already consume between 70% and 80% of health expenditure in Europe. In the United Kingdom, research indicates that they account for eight of the eleven most common reasons for hospital admission and that 5% of inpatients, many of whom have chronic illnesses, are responsible for 42% of bed days in acute hospitals2.

Managing

increasing numbers of patients with long-term conditions requires that the limited resources available to healthcare services are spent in a more focused way, without impinging on the need to ensure high quality care. Having in place appropriate infrastructure is an indispensable condition of managing patients with long-term conditions. This extends along the continuum of admission and registration through to planning and reviewing each step in the treatment process and on to patient monitoring.

Patient monitoring, with its systematic documentation protocols, enhances therapy outcomes by offering patients a convenient approach to treatment that improves their quality of life. It also gives care providers active support in the management of patient care. A TEN-HMS clinical trial (Trans-European Telecommunications Networks European Home Care Management System) carried out in 2000 and 2004 produced some very promising results. The trial compared two disease management programmes, one based on home telemonitoring services, while the second involved a conventional approach based on nurse telephone support. Patients in the telemonitoring programme spent less time in hospital (hospital days per patient fell by 26% and length of stay per hospitalisation declined by 34%) and the programme delivered savings of 10% in the cost of medical care. Return on investment in the telemonitoring service in comparison to the nurse support programme was calculated at 2.1.

Interactive

Communication Platforms Remote monitoring services support health services in providing care for people with long-term conditions. Exchanging personalised information remotely is an effective and efficient approach which empowers patients to engage in self-care in the home setting.

Telemonitoring systems allow patients to take daily readings of vital signs at home using wireless monitoring devices. All data is automatically transmitted to the care centre where care managers can intervene immediately in the event of a crisis.

New generations of remote monitoring devices also offer interactive communications platforms. Information is transmitted directly to specialist personnel or a telemonitoring centre using a secure web server (with broadband connection) and care managers can send instructions directly to the patient at home.

These monitoring solutions function as “virtual nurses”, offering customised information on the current health status of each patient. For instance, they:

_ Provide information on the patient’s condition and possible treatments.

_ Offer motivational advice and support on diet and encouragement to engage in sporting activities.

_ Issue reminders to take medication at the right time and record patient information.

In the event of problems, the patient can communicate directly with a medical specialist and seek information or assistance. A set top box installed for this purpose in the patient’s home is operated by means of a remote control device specifically designed for ease of use for older users. The box is the hub for transmitting vital sign data and the communications centre that connects care managers and patients.

The care manager uses clinical software to collect, record and manage the vital sign measurements and survey data. This data and any discernible trends can then be used for analysis and reporting purposes. As soon as certain values are reached, the programme responds automatically and identifies the patient who may require immediate attention.

New: Telephone Transmission

The University Hospital of Bonn, the first institution to transmit electrocardiograms live by telephone, is leading a Europewide telemonitoring study on this novel form of telemedicine, which can be integrated in the most modern cardiology settings. Never before used in Europe, the treatment involves implanting electric shock devices in patients. The patient's doctor can request the patient's real time heart data by telephone and this immediately appears online and ready for analysis on the doctor's monitor.

The new technique allows patients to transmit real time heart data to the hospital at any time and from any location. The patient places his telephone receiver in a box shaped transmitter which is attached to the defibrillator. The ECG results are then transmitted via the telephone line and displayed online on the healthcare provider's monitor.

It is vital, of course, that a hospital's internal information system is made compatible with the technical standards required to operate the system. The technology has the added benefit of reducing the number of emergency call-outs and cutting hospital admissions.

Key Issues

The emergence of telemedicine has generated high expectations among policymakers, service providers and, not least, patients. For this reason, it is vital that doubts about this groundbreaking technology are taken seriously and addressed on the basis of fundamental scientific principles. The two key areas of concern are data protection and the integration of the technologies in current reimbursement systems. It is also imperative to ensure telemonitoring systems are reliable and do not expose patients to danger. Furthermore, it must be possible to control quality using defined work processes and routines. The results of the ongoing study will be decisive in determining whether these conditions can be met.

Components of Telemonitoring

A telemonitoring system consists of medical sensors for measuring vital parameters, a base station in the patient's home for recording the measurement data, a transmission system, and a server for storing and evaluating the data in an electronic patient file. The sensors are located either in or on the body and communicate with each other via a network.

They also communicate with receiving terminals located within transmission range, including computers located in medical centres and the base station in the patient's home. The base station may be a wireless communications device (PDA or smart phone) or a stationary device connected to the telephone network. It is connected to the medical centre, hospital or clinician via a mobile telephony device (GSM, GPRS or UMTS) or fixed line network (ISDN or DSL).

The European Dimension

Telemedicine has generated interest at European Union level. A new transnational research programme is planned as part of the European Union's Seventh Framework Programme for Research and Technology 2007 to 2013 (FP7 – see the article on securing funds under the FP7). An initiative entitled "Ambient Assisted Living" (AAL: www.aal169.org) aims to use ICT – information and communications technologies – and remote services to develop novel approaches to the increased demands our ageing populations place on health services.

AAL is one of the first initiatives under Article 169 of the EC treaty. Introduced as a funding instrument within the Research Framework Programme, the article allows the Commission to participate in research programmes and their outcomes carried out by two or more Member States. This funding mechanism is unique as it facilitates Community participation in research programmes established by Member States rather than the EU itself.

The AAL programme encompasses much more than technology – for instance, integrating "Smart Home" applications within consumer friendly interfaces, telemedicine or communications media – it covers a broad spectrum of political, social and economic issues. Calls for projects are expected to issue in late 2007. (HH)

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