Tele-Cardiology Services in the UK Improve Patient Care and Save Costs

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The growth of the aging population increases the pressure on traditional healthcare systems that suffer from increased costs and diminishing resources. Recent advances in biosensor and communications technologies enable the design of advanced and cost-effective telehealth monitoring solutions that promise to improve the level of care and quality of life for patients, and to expedite the shift in healthcare delivery from hospitals to the community. A recent pilot study made in the UK demonstrates significant improvements in the quality of care as well as huge potential cost savings.

The Growing Burden of Healthcare Services

In Europe, the number of people over 65 will rise nearly 40 percent between 2010 and 2030 and the number of people over 80 will have doubled by 2050 [1]. Similar scenarios are facing the rest of the Industrialized World. Associated with this ageing demography, the costs of healthcare are rapidly increasing as people over the age of 65 receive four times the number of medical tests as others. [2]

Additionally, greater numbers of people are suffering from chronic conditions. In the US, 85 percent of all hospital costs and 69 percent of all physician costs are spent on treating chronic diseases. In Europe, chronic diseases are estimated to amount to over 70 percent of healthcare costs.

With an aging population comes hypertension and cardiovascular diseases (CVD), which are major epidemics that significantly reduce quality of life and life expectancy, afflicting more half of all people older than 60 around the world and are now becoming common in the younger generations. Hypertension is the main cause of cardiovascular disease which is today the number one killer in the Western world. This is the cause of an ever-growing burden on national healthcare systems, which already suffer from increasing costs and chronic shortage of resources.

Most people want to remain independent and live in their homes for as long as possible. It is often necessary to monitor patients on a regular basis in order to manage their disease and avoid emergencies, while it is desired to reduce to a minimum the burden on the patient and his family and on the healthcare system and to allow the patients to live as close to normal life as possible. In addition, there is a large population in remote areas, or in developing regions, without immediate access to modem healthcare services [3].

Telehealth - A Paradigm Shift in Healthcare Delivery

As healthcare providers and national governments have been searching for cheaper and more responsive ways of delivering services, this has brought about a significant growth in telemedicine, telehealth and homecare services that enable people with chronic conditions to take greater control of their own health, and to be treated at home rather than keeping them in the hospital.

Although different definitions may be found for Telemedicine and Telehealth, and while the differences between them are a source of constant debate, a commonly accepted definition was proposed by the WHO [4]: "Telemedicine is the delivery of healthcare services, where distance is a critical factor, using information and communication technologies for the exchange of information for diagnosis, treatment and prevention of disease". Telehealth is widely perceived as a more broader term that encompasses remote care delivery or remote monitoring between a health care provider and a patient outside of a clinical facility, for example in the home.

Market analysts agree that in order to reduce the rising costs of healthcare while delivering services with a higher level of quality, telehealth services as well as shifting care to the home provide the obvious solutions. Research sponsored by the European Commission reports that telehealth and homecare, are set for explosive growth, driven by the need to face the health-related challenges and to take advantage of burgeoning new medical information and communication technologies. [1]

Telehealth attempts to lower the rising cost of healthcare while increasing service and expanding to new segments and populations. It encourages patient compliance, promotes follow-up tests and improves the process of curing and quality of life. It is already fast becoming a predominant form of delivering care for chronic disease management and is increasingly recognized as a valuable tool for enhancing care quality and deliver new savings for both patients and providers. [5],[6]

Tele-Cardiology in the Forefront of New Telehealth Services

Both cardiac prevention and rehabilitation are now fully integrated into the comprehensive approach of heart disease therapy [7]. The effectiveness of home telehealth programs in improving care of heart patients, improving rehabilitation and reducing hospital re-admissions has been demonstrated by several research studies. [8],[9]

Recent advances in mobile and wireless technologies, as well as in miniaturization of physiological biosensors are expected to have a profound impact on future healthcare delivery and already enable the introduction of highly usable telehealth devices to enhance cardiac care. The practical implementation of such technologies offer patients the possibility of faster and more effective return to normal life in the community without compromising medical supervision. [10]-[12]

A report published by the American Telemedicine Association (ATA) has revealed that management of heart failure as well as other chronic diseases by using home health services already saves lives and resources. [13]

The Case of Tele-Cardiology in the UK

A recent pilot study report of a new tele-cardiology service, commissioned by the UK's National Health Service (NHS) [14], provides valuable insight into the potential benefits of telehealth and in particular, tele-cardiology.

The Study Objectives

The study objective was to evaluate the ease of use and effectiveness of cardiac telemedicine diagnostics in a primary care setting. One of the main goals was to assess the way that tele-cardiology can support ECG interpretation and assist clinical staff with diagnosis and decision making.

The Technology Used

The pilot used Aerotel Medical Systems (Holon, Israel) HeartView series of handheld 12-lead electrocardiogram (ECG) recorder/transmitter devices. These are used in an identical manner as conventional ECG machines, except that they can record the ECG and then transmit it wirelessly from a patient's home or a primary care clinic to a remote tele-cardiology consultation center, where it is captured and displayed on screen. The transmission can be achieved either acoustically via a fixed phone line, or using Bluetooth technology, via a mobile phone or via a PC workstation connected to the Internet.

Figure 1. shows a typical tele-cardiology scenario, using various transmission channels. During the NHS pilot the ECG readings were transmitted from primary care clinics along a fixed phone line to a monitoring centre where a team of clinically trained staff are available 24 hours a day to interpret the results. During transmission, the team are in constant communication with the patient's doctor or nurse and, according to the clinical situation, are able to provide an accurate interpretation and an immediate professional advice.

How Were the ECGs Interpreted?

The NHS commissioned Broomwell Healthwatch (Manchester, UK) to supply the telemedicine ECG machines and the expert interpretation of ECGs by experienced cardiology-trained clinicians. GP surgeries using the service would send ECGs to the interpreting centre by telephone and receive back a verbal report with a full written

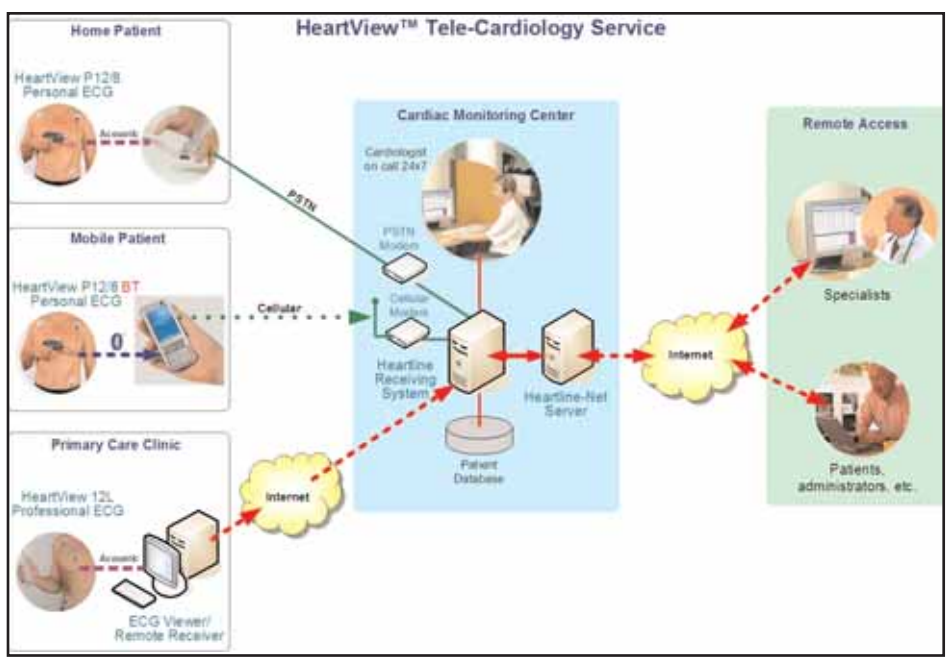

Figure 1. Typical Tele-Cardiology Scenario

Figure 2. Taking ECG with HeartView

Figure 3. Acoustic transmission of ECG via phone

interpretation within minutes by email or fax for inclusion in the patient record. The quality of the ECG trace received is extremely high. If the ECG showed any acute changes, immediate action could be taken.

Pilot Outcomes

Practice staff and patients alike were overwhelmingly positive about the advent of tele-cardiology equipment in primary care. The report recommended that administrators should consider the use of telemedicine technology in cardiac care in a wide scale due to its significant benefits. It also became evident that as physicians gained confidence in the new technology it became an important tool for supporting clinical decision making to the extent that inappropriate referrals to A&E departments were being prevented. The NHS study summarized the benefits and drawbacks of the tele-cardiology service.

Benefits of the Tele-Cardiology Service

- The telemetric ECG equipment was found to be very user-friendly. Furthermore, staff said that it works very well and reported no technical problems whatsoever.
- Patients were unanimously positive about the equipment, and said they trusted the technology.
- Portability of the equipment was found to be one of the main benefits. As the equipment is hand-held it opens up the possibilities of conducting ECGs whilst on home visits.
- Clinical staff requested to be able to transmit the ECG down a mobile telephone line, a solution which is already available.
- The service eliminated the need for some patients to visit A&E (Accident and Emergency departments). However, more commonly it has resulted in increased quality of patient information if the patient did have to go to hospital.
- Most clinicians were pleased that they usually receive the ECG report within about ten minutes of transmitting it.
- The financial savings potential was calculated and found to me huge.

Drawbacks

The main drawbacks of the tele-cardiology service, according to staff was having to wait in some cases 20 to 30 minutes for the report. The perceived cost of the equipment seemed as a barrier among practice staff, even though the actual price was significantly less than perceived.

Economical Benefits of Tele-Cardiology

The potential economical benefits of telehealth could be huge. The NHS study [15] showed significant cost saving potential for the tele-cardiology service. The savings calculated showed a surprisingly short 3.5 months pay-back time for the investment in the technology. The financial savings where calculated and the estimate made by the NHS suggested that when extrapolated to England as a whole the potential financial savings could be a minimum of approximately $90 million per annum.

This should come as no surprise, as another independent research study report published in the US by the Center for Information Technology Leadership (CITL) [15] projects that a national rollout of telehealth systems in the US could save almost $4.3 billion annually, by reducing face-to-face visits, redundant and unnecessary tests as well as reduction in patient travel from mileage costs.

Conclusions

The practical implementation of new wireless technologies offers heart patients and their caregivers enhanced quality of life, peace of mind and cost savings. Many experts believe that eventually the huge benefits of telehealth, as demonstrated by recent research, will overcome the barriers and it will become the foundation for future healthcare systems. As stakeholder becomes more convinced of the potential benefits of new tele-cardiology services, it is likely that these benefits will become a reality even faster than previously imagined.

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