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Telehealth and Telecare

The UK's elderly population is growing and with it the number of people with long-term health problems. This is putting pressure on the health and social care systems. Increased use of technology such as telehealth and telecare may help to improve quality of care and reduce costs. This note describes current UK telehealth and telecare initiatives and the role they may play in delivering future care.

Overview

- Telehealth (remote monitoring) and telecare (remote collection of patient data) are increasingly used in the care of the elderly and those with long-term health problems.
- The Government has supported initiatives to assess the benefits of integrated care supported by telehealth and telecare.
- The largest of these showed a potential reduction in deaths among patients, but found that telehealth and telecare did not reduce use of social or health care.
- Evidence to date suggests that to be cost-effective, telehealth and telecare would need to be implemented at a large scale.
- The success of telehealth and telecare will depend on doctors, patients and workers across a wide range of sectors.

Background

Patients with long term conditions are high users of health services. They account for 55% of all GP and 68% of all outpatient and A&E appointments in the UK.[1] At the same time, demographics are changing and people are living longer.[2] A 2013 report from the House of Lords Public Service and Demographic Change Committee identified increasing use of technology and eHealth (Box 1) as a potential way of reducing pressure on the UK health and social care systems including:

- **Telecare** which involves a home hub connected to a service centre that uses personal and environmental sensors to detect events such as epileptic fits, falls, bed occupancy, fires, smoke or gas leaks.[3]
- **Telehealth** which is the remote collection of patient data. Applications include devices to monitor blood pressure, blood glucose, weight or pace-maker performance in a patient's own home. Data are transmitted to a remote centre, monitored and trigger action where needed.

This briefing describes current use of telecare and telehealth in the UK, looks at likely future developments in the technology and examines the regulatory and policy issues raised by its implementation. Issues raised by data sharing such as consent, confidentiality and security are beyond the scope of this paper, but will be covered by forthcoming notes on big data.

Box 1. Elements of eHealth

eHealth is a term that covers all aspects of the intersection of health and IT. As well as telehealth and telecare it encompasses:

- **Telecoaching**, a preventative approach mainly focused on behavioural change but one that can also be used to aid recovery. It can be delivered via a website, app, texting or by phone.
- **Telemedicine**, conventional medicine delivered over a distance. Examples include video conference GP appointments and the use of specialists across multiple sites. For instance in the USA, intensive care units in a network of smaller hospitals may be supported by a central team of specialist consultants and nurses. A similar system is being trialled in London through Guy's and St Thomas' Hospital.
- **mHealth**, where medical and public health work is centred around a mobile device such as a phone or tablet computer.

Current UK Initiatives

In 2006, the Department of Health (DH) published a White Paper on health and social care for people with long term needs.[4] It proposed a series of demonstrator pilots to test whether telehealth and telecare could be used to redesign health systems. This led to several major UK initiatives:

- the Whole System Demonstrator in May 2008
- the '3millionlives' campaign
- the Assisted Living Innovation Platform.

Whole System Demonstrator

The Whole System Demonstrator (WSD) was funded by DH. It assessed telehealth and telecare in three areas, Cornwall, Kent and Newham, at a far larger scale (6,191 patients in 238 GP practices) than pilot studies had used previously (typically no more than 100 patients). It included:

- A telehealth trial involving more than 3,000 patients with chronic obstructive pulmonary disease (COPD), diabetes or heart failure. Around half the patients received telehealth and the rest received standard (non-telehealth) care. Telehealth interventions varied from site to site, but all included remote monitoring of blood oxygen levels in COPD patients (using a pulse oximeter), blood glucose levels in diabetic patients (using a glucometer) and weight in patients with heart failure. Patients in both groups were followed for one year. Full results of the telehealth trial were published in July 2012.[5] The main finding was of a significant reduction in patient deaths among those receiving telecare (see Box 2).
- A telecare trial involving more than 2,400 patients with social care needs followed over one year. Around half (1,190) received telecare and half (1,236) standard (non-telecare) care. Telecare varied from site to site but all included a base unit, an alarm and a range of devices to monitor events such as falls, bed or chair occupancy, property exit and gas leaks. The results of the telecare trial were published in February 2013 and showed no statistically significant reduction in health or social care use between the telecare and non-telecare groups.[6]
- An economic evaluation of some of the patients in the telehealth trial. Costs and outcomes were measured for 538 of the patients receiving telehealth and for 431 of those receiving standard care. The results of the telehealth economic evaluation were published in March 2013 and showed that telehealth was not cost-effective at the scale implemented in the trial (see Box 3).

Box 2. Results from the WSD Telehealth Trial

Findings from the WSD telehealth trial were first released as headline findings by the DH, with the detailed results published in a peer-reviewed journal some months later. The headline findings released in December 2011 reported reductions in patient deaths (45%), emergency (20%) and elective (14%) hospital admissions, A&E visits (15%), hospital bed days (14%) and NHS costs (8%) among telehealth patients compared with those on usual care. [7]

The full results were published in a peer-reviewed journal in July 2012. This more detailed analysis confirmed the 45% reduction in deaths for telehealth patients (4.6% mortality rate) compared to standard care patients (8.3%).[5] It also confirmed that there were fewer emergency hospital admissions in the telehealth group than in the standard treatment group, although the magnitude of the difference was smaller. The authors noted that this could be due at least in part to "short term increases in hospital use observed in the control group". They speculated that the trial recruitment process may have increased hospital use by patients in the control group, for example by identifying previously unmet needs. Headline findings of reductions in A&E visits, elective admissions and costs were not found to be statistically significant. Subsequently the largest single randomised control trial of telehealth for COPD[8] also found no statistically significant difference in admissions between the telehealth and control groups.

Box 3. Results from the Telehealth Economic Assessment

A commonly used measure for cost effectiveness is the Quality Adjusted Life Year or QALY. It estimates how many extra months or years of life of a reasonable quality a person might gain as a result of an intervention and is expressed as the cost taken to achieve each QALY. The National Institute of health and Care Excellence (NICE) has a rule of thumb threshold that interventions that cost less than £30,000 per QALY are likely to be cost-effective. The economic assessment of the telehealth trial estimated that telehealth costs were around £92,000 per QALY, significantly higher than the NICE threshold. The assessment also included analyses to test the sensitivity to falls in equipment costs and scaling up of use. The most optimistic scenario suggested that a programme running at full capacity with an 80% reduction in equipment costs would reduce the cost of telehealth to around £12,000 per QALY.

3millionlives

In January 2012, DH and key telehealth industry trade bodies announced the 3millionlives campaign. The announcement was made in the window between the headline findings being released and the full peer-reviewed results being published (Box 2). 3millionlives aims to increase the use of technological interventions to three million people by 2017.

3millionlives is a concordat between DH and the four main trade associations: the Telecare Services Association (TSA), Intellect, Association of British Healthcare Industries (ABHI), and Medilink UK.[9] Initially the campaign was led by a 3millionlives industry group, with companies paying a substantial fee to register. This approach was criticised by some, who described it as "pay to play".[10]

In April 2013, NHS England took over the lead and repositioned the campaign. It replaced the industry group with a stakeholder group, abolished registration fees to encourage participation of smaller companies and widened the focus to include technologies such as telecoaching and telemedicine (Box 1). It has set up four groups, each of which will inform an NHS England delivery plan to be published in March 2014:

- to develop commissioning skills and capability
- to improve procurement levers and frameworks
- to develop measurements and metrics
- to improve information governance.

Assisted Living Innovation Platform

Run by the Technology Strategy Board, the Assisted Living Innovation Platform aims to allow a larger proportion of the elderly and people with long-term health needs to live more independently. A key part of the platform is Dallas (delivering assisted living lifestyles at scale). It was announced in 2012 as a large-scale demonstration of a range of products and services, including telehealth and telecare approaches. Examples include use of online and mobile technologies (see Box 4) to establish informal care networks and to manage health data and health and social care needs. Dallas is jointly funded by the Technology Strategy Board, the National Institute for Health Research and the Scottish Government.

Box 4. Mobile Health

Health Apps

There are currently a large number of health-based mobile phone apps available. For instance a recent report reviewed more than 40,000 apps on the iTunes apps store. These vary hugely in application and quality. Examples range from simple provision of health information, such as the NHS symptom checker app, to tracking the locations and severity of asthma attacks through a Bluetooth peripheral attached to an inhaler. Certain types of apps may be considered as medical devices under the EU Medical Devices Directive (see below). The NHS recently started to review health apps and has published a list of more than 70 apps that it deems "clinically safe". However, a recent editorial in the British Medical Journal raised questions about the effectiveness of some of the NHS approved apps and gave examples of other 'health' apps that appear to serve mainly as marketing tools rather than to collect medically useful information.[11]

Regulation of Mobile Apps

Mobile phone apps may be considered as medical devices under the EU Medical Devices Directive. The UK authority for medical devices is the Medicines and Healthcare products Regulatory Agency (MHRA). Whether or not an app is considered to be a medical device depends on what it does. Simple apps that merely store or retrieve health information are unlikely to be considered as medical devices; nor are apps that make simple calculations such as using a patient's height and weight to derive a body mass index score. However, apps that make more sophisticated calculations and interpret data for therapeutic or diagnostic purposes are more likely to be considered as medical devices. An example of such a device might be an app that calculated a recommended drug dosage based on patient information such as age or weight.

Technology Trends

Uptake of telehealth and telecare is projected to increase significantly in the next few years. It is possible that new systems will be developed over this time. Potential applications include:

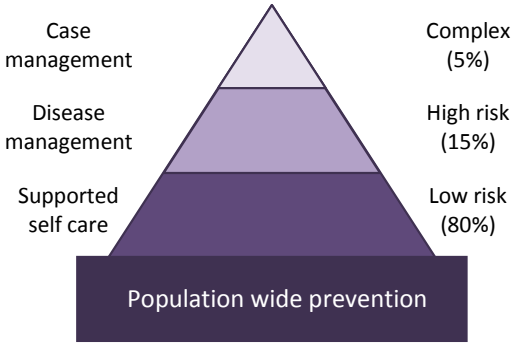
- smarter devices – for example more interactive devices that allow patients to better self-monitor and manage conditions such as diabetes
- better sensors – for example the development of flexible and stretchable organic electronics might extend the range of sensors available and make them virtually imperceptible to the wearer[12]
- smarter interpretive systems – for instance neural networks and computer learning, where software can understand what is normal for a person in terms of activity patterns and raise alerts for abnormalities.

However the technology develops, it is unlikely to deliver a silver bullet. Successful implementation of new technology will depend on the co-ordinated efforts of patients, clinicians and workers throughout the health and social care sectors.

Implementation

A 2012 report by the health think tank 2020health examined the world's largest telehealth programme, the Home Telehealth service.[13] It is run by the US Veterans Health Association (VHA) and provided telehealth services to 50,000 patients in 2011. The 2020health report highlighted a number of key lessons for the NHS from experiences in the VHA programme including the need for:

Figure 1. The Health Pyramid



- targeted patient selection
- a strong clinical evidence base
- integration of telehealth into a co-ordinated health and social care system
- scaling-up telehealth to achieve the staffing and logistical efficiencies seen in the VHA programme
- national oversight of the design of the system and over commissioning, procuring and funding its services
- training of patients and staff.

Patient selection

Within any given patient population there will be variation in the severity of symptoms suffered. This is illustrated by Figure 1, which shows the health pyramid. Most patients are near the bottom of the pyramid; they are at low risk and capable of managing their own condition. Interventions at this level are inexpensive and may involve approaches like telecoaching or telemedicine to manage patients. A smaller number of patients are at the top of the pyramid; they are often suffering from complex and multiple interacting conditions and need individual case management. It is important that all patients are comfortable with any new technology. For instance, some patients may resist use of a device if it acts as a reminder of a negative situation.[15]

Clinical Evidence Base

Experience from the VHA programme suggests that a good evidence base of clinical benefit is necessary to encourage clinician buy-in to telehealth and for patient recruitment. In addition to the WSD, many other studies have looked at the impact of various telehealth and telecare approaches on a range of clinical outcomes (Box 5). However, many of these studies involved too few people over too short a time to yield robust results.[14] Furthermore many studies measured soft outcomes such as blood pressure rather than hard outcomes such as illness and death. Overall, the available evidence for telehealth and telecare improving clinical outcomes is inconclusive. However the evidence is strongest in patients near the top of the health pyramid who suffer from complex conditions such as heart disease, COPD or diabetes.[14]

Integration into Existing Systems

A recent review noted that effective implementation of telehealth or telecare "often requires organisational redesign which may exacerbate or reform existing system inefficiencies and uncover new ones".[14] Assessing its effectiveness may be complicated by difficulties in disentangling "the effects of the technology

Box 5. Different Measures of Success

Systematic reviews of telehealth and telecare have used a range of assessment measures. These include:[14]

- Clinical endpoints. These can be hard outcomes such as rates of patient death and illness or soft outcomes such as measures of blood pressure. Soft outcomes have the advantage of allowing shorter trials but may be less clinically relevant.
- Use of health services. A reduction in hospital admissions or use of other hospital services is generally considered to be an indication of increased efficiency or quality of care.
- Quality of life and patient satisfaction. Studies attempting to assess patient satisfaction and quality of life have yielded mixed results.
- Costs and cost-effectiveness. Relatively few studies have included formal evaluations of cost-effectiveness, and those that do tend to focus on the health service provider's perspective rather than taking account of broader social and economic benefits.

from the human and organisational processes that surround it".[14] Telehealth and telecare are only a small part of the wider UK health and social care system. A fully functional system involves recruiting eligible users, educating them to use the technology, procuring hardware, peripherals and apps and monitoring the devices. It also involves setting thresholds for different interventions such as advising a user to discuss their condition with a nurse on the next visit, advising them to contact their GP, or calling an ambulance. It may also involve extending the system to include care stakeholders.

There may also be a need to adapt interventions to a patient's circumstances. Evidence suggests that this may be achieved through the support of someone in the patient's personal care network, often a young relative.[15] For instance, the best interventions in telecare support existing care provided by family and friends and are "responsive and adaptable to the local health and social care system".[16]

Scale and Economics

The VHA programme achieves economies of scale by implementing care pathways at a national level using a limited range of equipment, resulting in staffing and logistical efficiencies. However, a recent National Institute for Health Research Centre for Reviews and Dissemination (CRD) briefing has questioned whether these economies of scale can be replicated in the NHS. It noted that some of the conditions that have favoured the successful large-scale implementation of telehealth in other settings – such as remote populations and centralised infrastructure and decision-making − are not replicated in the NHS.[17]

Another economic consideration is whether telehealth equipment should be bought up-front, or devices provided as part of complete service on a leased basis so that the risk is shared between the NHS and device manufacturers. For instance, the CRD briefing was commissioned by the Vale of York Clinical Commissioning Group which had inherited a telehealth service using devices that had been bought up-front from a private company. Deployment of the devices was lower than expected resulting in financial losses.[18] The National Audit Office recently looked at benefits and drawbacks of the delivery of public services in general by private companies.[18] A key challenge identified in the report was how commissioners of services know that contractors are delivering to high standards.

National Oversight of Telehealth

Another key aspect of the 2020health report based on VHA's experience was the need for national oversight of telehealth systems. It recommended that such systems should be designed at a national level by a body such as NICE, and that national oversight was needed of the commissioning, procurement and funding of its services.[13] However the CRD briefing noted that the VHA has a shared electronic health record for each patient that allows clinicians ready access to a patient's details.[17] No such system exists across the NHS with different health providers using different systems few of which are interoperable. It is widely accepted that there is a need to establish common standards across the NHS for the sharing and governance of data. There is also "hope from both suppliers and service providers that an open source platform would be developed, enabling devices to be mixed and matched. This was felt to be essential for the growth of a self-pay 'elective' remote care market".[19]

Staff Training

One issue identified by the WSD was that temporary staff were often brought in to introduce a new system and then left once the study was over. This creates a loss of institutional knowledge and makes it difficult to continue to offer a service and recruit patients.[16] Provision may have to be made to support permanent staff to acquire any necessary additional skills needed to implement telecare or telehealth.

Endnotes

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