

Telecare: Looking to the future

Julie Swann

A new age is emerging with regard to the type and range of care services being delivered. An explosion of technological advances, creatively applied to health and social care provision, can enhance the lives of people of all ages. With an increasing ageing population, the benefits of these developments could lead to better outcomes for people as well as being more affordable than the traditional models of care. These advances, however, do open up new ethical challenges that must be addressed.

This article will explore the opportunities and challenges involved in using telecare in today's health-care climate and provide examples of the types of products available.

Key words: smart houses, telecare, sensors, preventative technologies grant

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Over the next 50 years, the number of people over 65 will rise from 9.3 million to 16.8 million (Department of Health (DH) 2005a). The number of people aged 85 and over, is projected to quadruple from 1.1 million in 2004 (1.9% of the population) to 4.2 million (6.5% of the population) in 2056 (Laing and Buisson, 2006). People are living longer but are less likely to have the support of an extended family.

When the baby-boomer generation of the post-war era reach old age, they are expected to insist on a greater choice and quality of care; thus presenting a cohort of demanding social care users in the future (Wanless, 2006). This new generation have experienced the power of consumerism in their childhood and adult life; the future service users will naturally expect a social and health care service of a distinctly different shape to that experienced by their own parents.

Despite achieving healthier lifestyles, many people will still experience difficulties arising from physical conditions. In addition, people with dementia and enduring mental health problems will continue to require services from statutory and private organizations. Demand therefore is likely to substantially increase, matched by a drive for higher standards based upon individual needs and wants.

Coupled with this demographic change and the development of consumer choice is the massive growth in technology. The internet, mobile phones, MP3 players and computer technology are all standard features in daily life. It is hard to imagine life without them yet, they are relatively recent phenomenon. For people living in the 1980s, only 20 years ago, this real life phenomenon was the very stuff of science fiction. Furthermore, the rate of growth is still accelerating and the opportunities for new initiatives appear almost daily.

One of the challenges is to dovetail these trends; to maximize the new technologies and use them to benefit all people. By creating new opportunities, it is possible to provide a different type of experience for people who have problems as a result of disability or ageing. However, it is critical that this development of technology is an enhancement of care services rather than a replacement of direct personal contact with individual carers.

PREVENTATIVE TECHNOLOGIES

Telecare is not a new approach; it dates back nearly 30 years. However, the care sector has tended to focus on alarm systems in people's own homes, although its potential is much greater. In 2004 the UK government, aware of



Figure 1. A control centre in Stoke-on-Trent receiving information from telecare in peoples homes.

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the future challenge of elderly care, introduced a 'Preventative Technologies Grant' to English local authorities for telecare services. In 2006/7, £30 million was available and in 2007/8 this raised to £50 million; providing £80 million over a two-year period. The aim of the grant is to facilitate care in the person's home. The approach of the DH (2005a) is threefold:

- To provide initial investment
- To co-ordinate demand to ensure industry grows strong, as fast as possible
- To educate and build knowledge and awareness among those who will be commissioning telecare services and those who will benefit from them.

WHAT IS TELECARE?

Telecare is a service that brings health and social care directly to a user, generally in their own home, supported by information and communication technology. The DH (2005a) describe telecare as:

'A high tech system that can detect if someone has fallen over and needs help, if a pan has boiled over on the stove, or if there is a gas leak fire, smoke or flooding'.

Telecare can warn against many household risks by the use of alarms, detectors and similar warning devices. A list of telecare definitions is given in *Table 1*. Telecare can monitor in a person's home and transmit information to call centres (*Figure 1*) that are

TABLE 1 DEFINITIONS AND EXPLANATIONS (ADAPTED FROM DEPARTMENT OF HEALTH, 2005B)

Term	Definition/explanation
Active sensor	'Intelligent' sensors that actively detect alerts and trigger a response automatically
Assistive technology	Any equipment or system that assists people who have difficulties owing to age or disability in carrying out every day activities, e.g. walking stick or helping hand
Bed occupancy monitor /mattress sensor	A trigger that detects whether a bed is occupied – this could be set within time limits
Camera	Small cameras (still or video) for room monitoring/Video cameras for direct conversation/Video phones
Carbon monoxide monitor	A monitor that detects excess gas in the air from cookers, heaters, etc.
Chair monitor	Detects chair occupancy
Community alarm	Telephone handset (and pendant) linked to control centre using standard telephone lines. There may be a charge.
Control/call centre	Computerized control/call centre with round the clock operators responding to triggers/alerts from handsets/pendants in users' homes – details about the caller, trigger and the response arrangements are displayed. Action is then taken, e.g. visit
Electronic tracking	Using GPS or ETDOA and mobile phones to detect user location where wandering
ETDOA	Estimated Time Difference On Arrival - coordinates that can locate a person to 5 metres if they are holding a device
Extra care housing	Purpose designed retirement housing with access to 24-hour on-site care and support
Falls Monitor	A monitor that triggers a call to a control/call centre when a user has fallen to the floor
Flood detector	A detector that senses water where there should not be egg overflow of sink, bath or washing machine
Heat Extremes detector	Detects low temperature, high temperature and rapid rise in temperature, (indicating a fire). This is especially useful in a kitchen where a smoke detector is liable to false alarm
Intermediate care	Services provided in the community (up to 6 weeks) to support hospital discharges and alternatives to admissions
Motion detector	Monitor that detects movement of a user during set times (similar to burglar detector in a room)
Panic button	A push button at an appropriate place to alert the call centre to a problem e.g. bogus caller at door
Pressure pads	Pads under a doormat, for instance, which may indicate that someone is leaving their home
Smart house	A dwelling incorporating a communications network that connects the key electrical appliances and services and allows them to be remotely controlled, monitored and assessed for demonstration purposes
Smoke detector	Monitor for smoke in a home, which sends a trigger message or could provide a link to cutting off an electrical supply
Tablet/pill dispenser	A device for monitoring tablets to be taken at appropriate times (Note liability issues)
Telemedicine/telehealth	The practice of medical care using interactive audiovisual and data communications, this includes the delivery of medical care, diagnosis, consultation and treatment, as well as health education and the transfer of medical data (WHO)
Temperature detector	A monitor that detects high or low temperatures
Video	Two way video contact between user and care
Water detector	See 'Flood Detector'



Figure 2. Specific sensors: (a) Chair occupancy sensor; (b) flood alert device; both from Stoke-on-Trent's smart house.

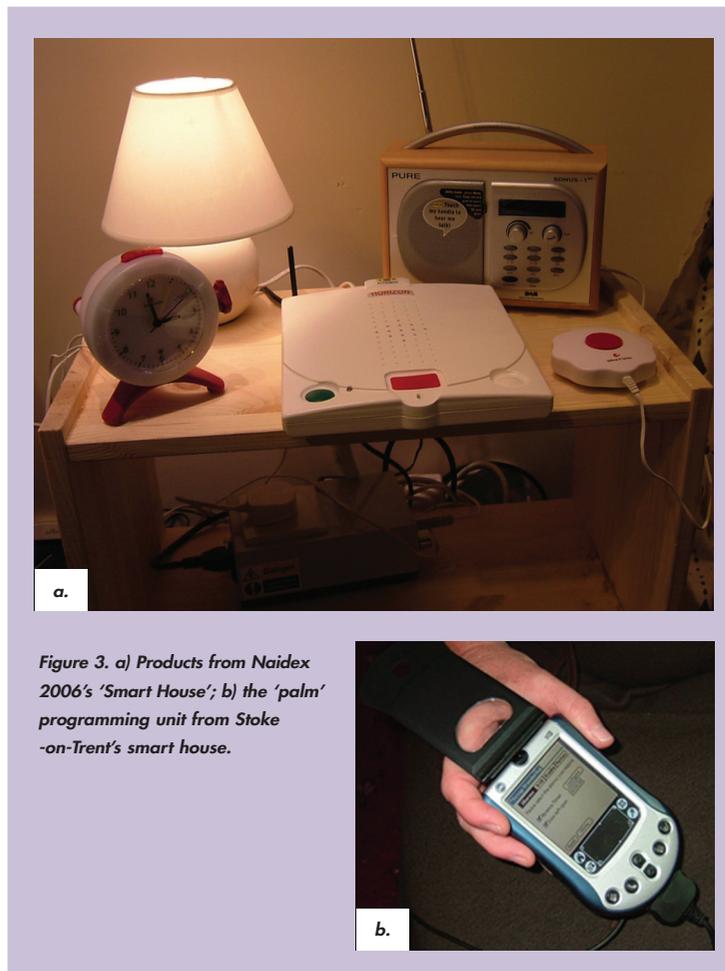


Figure 3. a) Products from Naidex 2006's 'Smart House'; b) the 'palm' programming unit from Stoke-on-Trent's smart house.

staffed 24 hours a day. Some call centres monitor all local authority emergency calls, including 999 calls and calls from people on witness protection schemes.

USE OF TELECARE

People generally prefer to receive care at or close to home supported by respite care, day care and community-based services. The DH (2005a) states that:

'An estimated 90% of older people want to live in their own home'

Telecare supports people at home, and helps to postpone or prevent the need for hospitalization or care home placement. Care, support, help or simply reassurance is available over a 24-hour period. Telecare consists of two components: specific sensors and a lifestyle package.

Specific sensors

Sensors target one particular aspect of activity, e.g. falling, movement in a doorway and occupancy of a bed or chair (Figure 2a). Alternatively, sensors can monitor a specific area, such as pressure or passive infrared (PIR) sensors which detect movement. Other examples include flood detectors (Figure 2b), extreme temperature sensors, carbon monoxide monitors, automatic lighting when getting out of bed and epilepsy sensors.

A lifestyle-monitoring package

Lifestyle monitors are several sensors that collectively monitor a person's level of activity in the home. This is of particular use for people who are frail or suffer from dementia. Movement of items in daily use are monitored by sophisticated technology that notes any changes in activity in various daily living routines. Technology may include sensors on doors, beds, chairs and electrical items (e.g. fridge, kettle, toaster, television). Smart homes are dwellings that use communications networks to connect these key electrical appliances and services (Figure 3a), and allow them to be remotely controlled, monitored and assessed (Integrated Care Network, 2003). The programming unit of the lifestyle monitoring package can be custom set (Figure 3b).

Other products

Mobile phones

Prompts can be set on mobile phones including alarm reminders. Although mobile phones are an excellent method of facilitating communication, many older or disabled people have difficulty operating the small buttons. To help those who might need to call the emergency services or to locate 'wanderers', the location-tracking device (RICA, 2003) was developed. This has a single

button that alerts a call centre which then relays the messages to pre-programmed contacts.

Reminders

Digital devices can be set to provide prompts for daily tasks such as taking medication. Special tablet dispensers are available that prompt users to take pre-measured medication (*Figure 4*).

Telemedicine

Telemedicine is the use of sensors and electronic communication to transmit information from one site to another for the purpose of improving health care. Telemedicine includes consultation, diagnostic and treatment services. Regular medical check-ups, monitoring of some conditions, diagnosis and alerting of medical emergencies are all possible via the internet using telemedicine. For example, spirometric (volume of air entering and leaving the lungs) and cardiac readings can be taken in the comfort of a person's home to detect acute

episodes early, thereby minimizing or eliminating the need for hospitalization. This system is currently in place for chronic obstructive pulmonary disease, cardiac and pulmonary patients in certain areas of the UK.

'Smart' clothing

Clothing containing electronic devices can act as an interface between our bodies and our surroundings. This smart clothing is not a new development, but its potential use for people who are currently benefiting from conventional telecare has not yet been realized. A smart shirt containing a computerized biosensor layer could, for example, monitor bodily systems, thus providing feedback and controlling the temperature of the wearer's body. This technology could help to assess the overall health of individuals. It also avoids the need for hands-on monitoring by staff, although direct observation would still be required. Anderson (2005) describes how clothing could perform various functions according to individual needs and could adapt to the environment. This new era of clothing could give simple prompts reminding the wearer to take medication or to perform an activity.



Figure 4. Medicine dispenser

ROLE OF TELECARE

Telecare systems are useful for a range of people (*Table 2*) but may particularly benefit those with dementia or cognitive problems, especially people who may wander, are at risk of falling or have recently been discharged from hospital. Telecare therefore has a vital role to play in maintaining people in their own homes and care homes. The DH

TABLE 2. USERS WHO MAY BENEFIT FROM TELECARE (DH, 2005B)

User types/carer situation	Examples of benefits
Older people recently discharged from hospital with concerns about going home	<ul style="list-style-type: none"> ■ increased confidence to live at home
People living in local authority/housing authority dwellings	<ul style="list-style-type: none"> ■ Warden and home care support ■ Extra care housing (Information and advice from the Housing LIN in the Change Agent Team at www.changeagentteam.org.uk/housing)
People with a history of falls	<ul style="list-style-type: none"> ■ Increased confidence to live at home ■ Rapid response to fall decreasing likelihood of hypothermia, fear and complications ■ Development of a falls register
People with mild dementia	<ul style="list-style-type: none"> ■ Carer confidence where user exits his/her home and may be at risk
People with shortness of breath with Accident and Emergency visits (e.g. COPD, heart failure, angina.)	<ul style="list-style-type: none"> ■ Telemedicine vital sign monitoring
People with epilepsy	<ul style="list-style-type: none"> ■ Telecare monitors with infrared camera backup as an alternative for night sitter services
Fear of violence or intrusion	<ul style="list-style-type: none"> ■ Increased confidence to live at home

(2005a) outline the benefits of telecare as being to:

- Reduce the need for residential/nursing care
- Unlock resources and redirect them elsewhere in the system
- Increase choice and independence for services users
- Reduce the burden placed on carers and provide them with more personal freedom
- Contribute to care and support for people with long-term health conditions
- Reduce acute hospital admissions
- Reduce accidents and falls in the home
- Support hospital discharge and intermediate care
- Contribute to the development of a range of preventative services
- Help those who wish to die at home, to do so with dignity.

Approximately 160,000 older people receive telecare in the UK, such as the patient described in *Table 3*. In some areas of the UK, telecare is part of an intermediate care service (DH, 2005a) and people's homes can be fitted with a basic telecare package on discharge from hospital or care homes. This care package will often include installing pull cords for users to alert services when in need. It is important to ensure that pull cords are sited in strategic places, that they extend to 100mm above floor level, that they are reachable and are not tied back. Many housing authorities are replacing pull cords with pendants. Pendants and wrist alerts have the advantage that they are worn by the user and thus always accessible (*Figure 5*). Without a pendant, if a person falls between two pull cords they may not be able to reach and call for help. The use of a pendant can also reassure people who live alone and fear bogus callers, as staff will immediately respond to an alert.

Telecare in care homes

The use of technology is not however, restricted to use in an individual's own home; telecare developments can be of assistance in a care home or group home setting. Sensors can detect when a fall or an episode of incontinence occurs. Pressure pads and door sensors can alert staff if residents wander

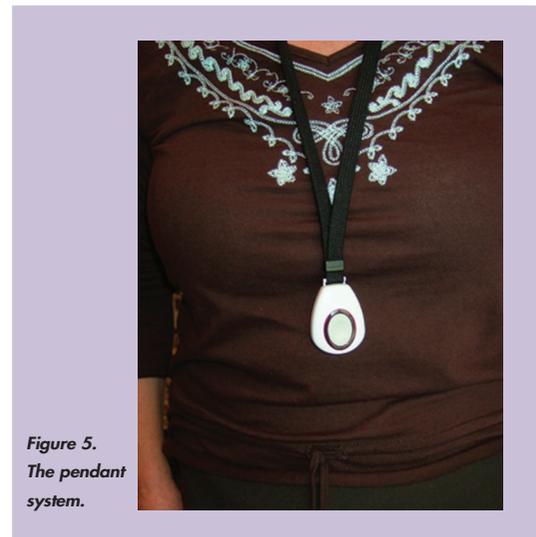


Figure 5.
The pendant system.

nocturnally. The device needs to be suited to the person for whom it is installed to help; for example, wanderers who are not confused will quickly learn to step over a pressure pad on the floor and therefore a bed alert or door sensor would be more suited to alerting carers.

There is potential for care homes to expand their services to provide a 'call out' service in an emergency to local residents, by fitting homes with 'smart technology'. This could be an expansion of services already provided to the community in the form of care in a person's home or day attendance at the care home.

ETHICAL ISSUES

As telecare can be used to monitor people within their own homes, it can be construed as intrusive. There are concerns about a 'big brother' approach associated with telecare (DH, 2005a). Some people do not like the idea of being monitored in their own home and see it as an invasion of privacy. In addition, some monitoring areas cover essentially private functions like going to the toilet, bathing or going to bed. In these circumstances, it is essential for providers to ensure that individuals are fully informed about the impact of the technology and that choice on the options available is provided. The DH (2005a) suggests that:

'The individual, or their advocate or carer where informed consent is not possible, should understand the implications of the information that may be generated from a telecare package. They will have access to that information and what conclusions may be drawn from the data generated'.

TABLE 3. CASE STUDY

Mrs A has dementia. She started to forget to turn off the gas when cooking. She had a gas detector installed, with an automatic shut off valve. This enabled Mrs A to cook for herself. Later, a movement detector was added that differentiated between her opening the door to retrieve the milk delivery or greet the postman and when she opens the door and left the flat. The call centre intervened, if appropriate, and alerted help if she left the house on her own. (Adapted from DH, 2005a)

CONCLUSIONS

Technology is progressing at a rapid rate, providing benefits for people living in the community and in care homes. Tools are available to monitor people at risk of falling and wandering and to support vulnerable people, those with dementia or long-term conditions and those who are at risk. Without this technology, some people would require residential care and constant staff input, which, apart from the additional cost that would be involved, may be contrary to personal wishes.

The rate of development of new products is accelerating and provides real opportunities to help people, ranging from those requiring minimum assistance to those with complex needs. Yet, with all developments, there are ethical issues that need consideration and working through. However, telecare has the potential to transform the health and social care world and to more effectively meet the needs of vulnerable people. The implications for care provision, and for expanding on services within the community in general, are wide reaching and still developing. **IJTR**

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KEY POINTS

- Technology is progressing at a rapid rate.
- Smart technology will be increasingly used to care for vulnerable people.
- Telecare can help within the community and care home setting.
- Some potential users may feel that telecare is too intrusive.

TELECARE ASSOCIATIONS

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Foundation for Assistive Technology (FAST)	Address: 12 City Forum, 250 City Road, London, EC1V 8AF Tel: +44 (0)20 7253 3303 Fax: +44 (0)20 7253 5990 Email: info@fastuk.org Website: http://www.fastuk.org/services/events.php?pg=2 <i>Gives details of forthcoming telecare events</i>
The Telecare Services Association (TSA)	Address: 10 Railway Street , Chatham, ME4 4JL Tel: +44 (0)121 568 8999 Fax: (0)121 568 8868 Email: admin@telecare.org.uk Website: http://www.asap-uk.org/ <i>Representative body for the telecare industry within the UK; formally known as The Association of Social Alarm Providers (ASAP)</i>