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Telecare, telehealth and assistive technologies – do we know what we’re talking about?

Abstract

The development of telecare services across the UK has been supported by grants from the respective governments of Scotland and Wales, and by the DH in England. New services are being established to sometimes operate alongside existing community equipment services and community alarm services. Elsewhere they are embracing a wider range of services including rehabilitation, intermediate care and health services designed to reduce the use of unscheduled care services. This paper discusses the difficulties in understanding the scope of telecare services, and the definitions of services that will need to be confirmed so that service users can choose appropriately if offered direct payments. Two different service models are offered, one of which uses telehealth as an umbrella term to cover all telecare, e-care and m-care, and telemedicine where the former includes all such services offered in the service user’s home, including those of a medical nature. The second model views telecare alongside assistive technologies and telemedicine as one of three different technology groups designed to make people more independent or to bring care closer to home. There is significant overlap between the three groups, which justifies the introduction of a new term – ARTS (assistive and remote technology services) – to describe this area of support.

Key words

Telecare; telehealth; assistive technologies; telemedicine; e-care; m-care.

Introduction

The increasing cost of care in residential or nursing homes, and the need for choice in the location of care for most vulnerable people, has led to an increasing interest in new methods of supporting people in their own homes. Whilst the significance of good domiciliary care services may be evident, it is also clear that an ageing population will involve an increasing number of people competing for the services of a decreasing number of carers. Indeed, the dependency ratio (defined as the number of people of working age to those who are retired) is likely to fall from 4:1 to only 2.5:1 in much of the developed world within the next 40 years.

There is therefore renewed interest in the role that may be played by community services that are based on technologies that support independence ie. assistive technologies. Traditional forms of assistive

technology include low-tech portable devices such as walking sticks, spectacles and tap turners, to more expensive fixed systems such as stair-lifts, ramps and level-access showers (that are essentially adaptations to the home). Their value in enabling people to stay put in their own homes is well documented though the time taken to plan, fund and install such technologies can be frustratingly long, with the result that some people are forced to move out of their homes before the improvements can be made.

Several new items of assistive technology have appeared during the past 20 years, many depending on electronic, computing and telecommunication innovations. Systems such as environmental controllers have enabled profoundly disabled people to operate electrical appliances, motorised door and window openers and other electrical equipment through a personal interface arrangement. They have

significantly improved the quality of life of many users and have enabled others to maximise their degree of independence. Other modular devices are available which have application to other groups including those with mobility, sensory or cognitive problems. Of particular significance have been alarms that offer a rapid response in the event of an emergency. These may be based on the popular social or community alarm model operated successfully for half a century in the UK, and which have traditionally supported people who live in sheltered housing and, increasingly, those who lived in dispersed housing situations. This has been described as the starting point for a much more focused approach to supporting independence in the home known as telecare, which literally means 'care at a distance'.

Electronic prevention and support services

The introduction of a preventative technology grant (PTG), and similar capital grants in Wales and Scotland, has led to increased interest in operating services to support independence using electronic aids. Although the devices and systems that were being proposed, and whose cost-effective use was supported by an increasing amount of evidence, could be termed 'electronic assistive technologies', this was not considered to be an entirely appropriate name. This was partly because it involved three words (one of which was 'technology' – a turn-off to many people), and partly because the term has been used specifically to describe a fairly narrow range of expensive environmental controllers and speech synthesisers in recent years. Such systems are available through the NHS for a relatively small number of profoundly disabled people, and are accessed through a team of highly knowledgeable clinical scientists and engineers who assess needs and, subsequently, recommend an individually tailored package of electronic assistive technology for the user. The term 'telecare' was selected to cover all electronic technologies of a preventive or supportive nature because it had the necessary 'buzz' and because it implied a modular approach and a need for a developing telecommunications infrastructure.

Not surprisingly, this has led to considerable debate on what is and isn't included in the general telecare definition. Devolution of health and social care budgets and agendas could potentially lead to different meanings in different parts of the UK. The situation has been compounded by the introduction of medical devices for the monitoring of physiological parameters in the home environment, and the

subsequent transmission of data to a remote location for analysis and intervention. Although the fundamental purpose of the technology is to avoid unscheduled care incidents and, in particular, the management of long-term conditions, it can support independence because it is capable of overcoming the need for people to move prematurely into a nursing home environment. Such technology would appear to be a medical application of telecare, which would be consistent with the new definition of telecare described above. However, remote and regular (but not continuous) vital signs monitoring may be fundamentally different to existing UK telecare systems because the purpose is to collect data rather than offer an automated alarm. This allows decisions to be taken by clinicians rather than by smart sensors.

In the USA (where there is currently little use made of the UK model of telecare), remote vital signs monitoring systems are known as telehealth systems. The term 'telehealth' has therefore been imported into the UK with little thought of how it co-exists alongside the telecare agenda. More perversely, in Europe telehealth has for many years been the umbrella term used for a broad range of technologies which includes telemedicine (the sharing of medical data, including scans and visual images), e-care or m-care (which involves data transfer on a mobile basis) and telecare. The result is that, under the previous model, telecare is a sub-set of telehealth technologies, whilst in the new model, apparently supported by equipment vendors and other bodies, telehealth is a sub-set of telecare.

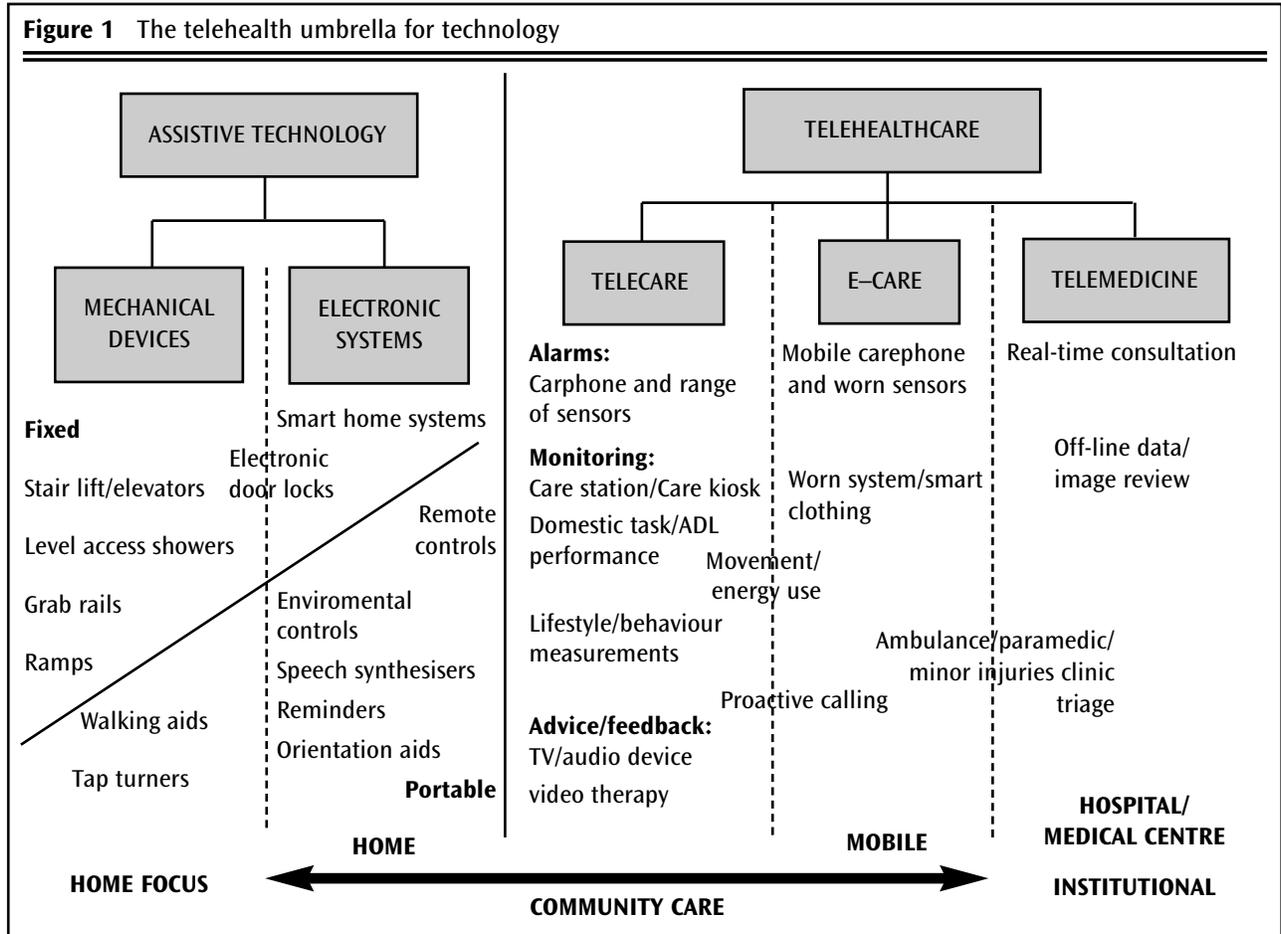
In a world in which definitions need to change frequently to cater for new and emerging technologies, it may be appropriate to allow terms to be used interchangeably. However, as telecare services move into a commissioning stage, it may be necessary to ensure that appropriate terminologies are in place to avoid uncertainties in the scope of new services, and to ensure that services are offered in an integrated manner that enables the service user to take control wherever possible in using their personalised or individualised budgets. In addition, as an increasing proportion of new home technologies are designed and manufactured elsewhere in the world, and a retail model is introduced for many items of community equipment (perhaps using direct payments), it may be essential to clarify definitions to ensure that imported products are fit for purpose and conform with the claims made for their use. The two telecare models defined above are discussed below and are offered as alternatives for adoption or rejection.

Model 1 – telehealth umbrella model

The original definition of telehealthcare effectively based its sub-sections on the location of the care that was being delivered remotely ie. the home, some community locations, and a medical facility. In each case, it was assumed that the management or monitoring of the remote recipients of care would be performed by doctors. This was also true for telecare where the assumption was that medical data from patients in their own homes would be viewed and analysed by their physicians either in primary care (ie. their GP) or in secondary or tertiary care (ie. their consultant). In practice, many of the routine monitoring tasks associated with patients in the community are now performed by nurses rather than doctors, and sometimes by others who are trained in very specific areas, using clinically prepared guidelines for triage. Indeed, many of the problems faced by frail patients, especially older ones, in their own homes in the community are of a social or therapeutic nature, where medical interventions are not appropriate. Telecare should therefore cover a much wider range of applications.

The use of the community/social alarm system to support independent living as a form of telecare was both natural, as a consequence of changes in community care, but also radical in that it produced a valuable service that did not have doctors and nurses as the gatekeepers. As the evidence for the advantages of telecare improves in quality and in quantity, it follows that the situation may soon turn full circle as GPs may have the power to prescribe such technologies using practiced-based commissioning. Recent growth in the use of personal emergency response systems (PERS) in the USA demonstrates that the potential for low level telecare exists outside the UK too.

Telecommunication technologies have matured quickly in the 21st Century. The bandwidth and processing problems which made videophones that used the plain old telephone system (POTS) so unpopular with users may become irrelevant as ADSL and broadband are employed more effectively, especially when used with a television as the viewing platform. Similarly, the memory, bandwidth and cost problems that were associated with the transmission



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of images and scans are no longer an issue. Similarly, information systems and the embedded intelligence in devices have become progressively more sophisticated, enabling them to be included in relatively low-cost equipment for the home. This yields a host of new services as shown in *Figure 1*.

Alongside the three components of telehealth are shown a growing range of assistive technologies which, though not requiring any connection to a remote care manager, nevertheless perform a valuable role in helping to overcome unmet needs. They include a number of relatively expensive fixed assistive technologies such as stairlifts and level access showers, which are effectively adaptations to existing properties. These may be funded through disabled facility grants but the process of application and approval may be lengthy. Subsequent removal when the service user moves on is then difficult with the result that the investment is left in the property inappropriately. It follows that we should be encouraging more architects to follow lifetime homes or barrier-free access standards in the design of new properties. These issues do not arise in the case of portable devices including tap turners, kettle pourers and shower stools. They are generally low cost and can be quickly moved. Such aids to daily living are ideally suited to a retail model for community equipment.

Model 2 – telecare umbrella model

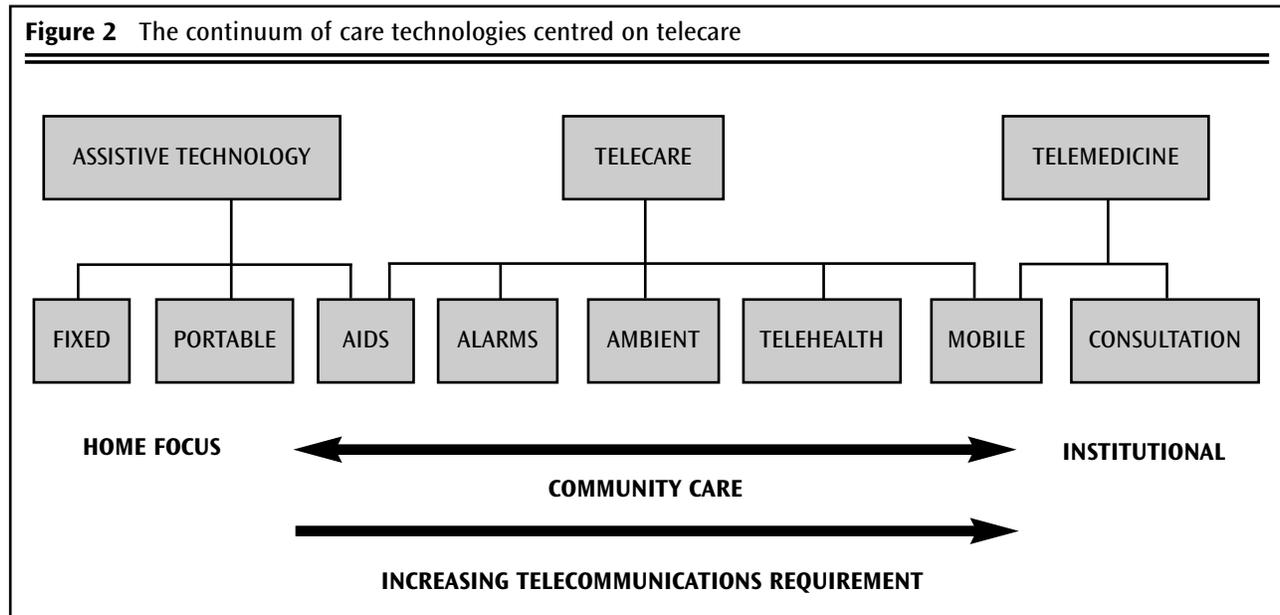
Telecare has become a term used for all preventive technologies that involve the use of electronics, telecommunications and information systems. It can therefore cover the spectrum of applications from

alarms through to monitoring of vital signs and activities both in the home and on the move. Thus, if terms such as telehealth were to include all forms of medical monitoring and information, including health coaching, then a broader form of telecare could extend across from environmental through to medical applications. It follows that some electronic aids to daily living, such as prompts, reminders and local alarms, might also be considered to be examples of telecare (as well as being assistive technologies).

In the same way, mobile applications of worn or embedded medical devices (such as cardiac arrhythmia monitors) could be considered to be telecare when used in the home but telemedicine if data or alerts are directed to a consultant in a hospital. *Figure 2* offers an alternative map of services where telecare becomes the umbrella term with assistive technologies and telemedicine covering a much smaller group of modalities that are associated with housing adaptations and hospital services respectively.

Discussion and conclusions

Terms and definitions are likely to evolve as services based on technology continue to develop. At the same time the size and intelligence of sensors will change and devices may be increasingly embedded within items of furniture, electrical appliances and clothing as well as inside the body. They will amalgamate into networks that communicate with each other before sharing information with smaller ubiquitous computers inside our mobile telephony devices. Effectively, they will have to compete with



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other applications of these devices including entertainment and information. We therefore need to understand the difference between having a technology that we want as part of 21st century living, and technologies that we need in order to maximise our quality of life and well-being, which often includes independence and choice. The fact that we are all different in terms of needs, risks and outlook, increases the importance of providing personalised solutions, but doesn't necessarily help us to understand the differences between telehealth and telecare. Perhaps telehealth is a more important concept because everyone needs their health but not everyone will need care. If we used the term 'telehealthcare' then perhaps we could avoid confusion because it clearly incorporates both telehealth and telecare. But it doesn't necessarily include traditional forms of assistive technologies.

Amid the debate, there remains the thought that individual provision of services is required based on a holistic assessment. This is the only way of assuring that the solution is person-centred. As we are discussing equipment and services based on technology, maybe the term PROCESS Technologies (PeRsOn-Centred Equipment & Support Services) could be employed as the umbrella term. Alternatively, the coming together of assistive technologies and ICT (Information and Communication Technologies) might yield a hybrid term such as ARTS (Assistive & Remote Technology Services) which may be acceptable to all. In each case, it may be appropriate to separate the individual elements into their respective roles.

1. **Functional support** – replacing or improving an individual's ability to perform one or more activities of daily living with devices (including robots), which can compensate for the user's physical, sensory or intellectual/cognitive deficiencies.
2. **Alerts and alarms** – sensors or combinations of sensors which detect situations where the individual's safety and security (and increasingly health and well-being also) may be at risk.
3. **Monitoring** – methods of providing an on-going assessment (or analysis) of an individual's medical, psychological, well-being, performance or behavioural state so that interventions can be offered before an emergency arises.

4. **Interactive and virtual services** – systems that overcome the problems of distance and isolation in advising, empowering and, hence, enabling people to become partners in the process of improving their quality of life.

Service providers of the future may need to offer all these services in order to meet the aims of commissioners. Those which reject individual service elements must be clear in advertising what they can and can't do in order that everyone understands their limitations and/or specialities. Whilst a vision of the future potential for these technologies may be a prerequisite for service development, the adoption of standard definitions will greatly simplify the process of establishing best practice and improving service delivery and integration.

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