



**Evaluating and expanding your telecare service
A course for service providers
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1. How technology can help - a comprehensive framework

The CUHTec Advanced Telecare Users Group have developed a Telecare Services Model, this is summarised in Table 1. It takes a client oriented perspective focusing on the service to the client rather than the technology used to provide that service. The second column provides examples of the technology that may be used to provide these services. The first Reassurance/Safety/Response covers a number of objectives of telecare that have been put together as they are typically provided by the same technology via sensors, a "carephone" and a call centre. Security may be provided by the same infrastructure but different sensors. The next two groups consists of broadly medical and social services respectively. The final group of three services to provide assistance with activities of daily living; there are more of these but it can be argued that these three are the most common ones.

<i>Service to client</i>	<i>Examples</i>
Reassurance/Safety /Response	Pull cord, Pendant, Extreme Temperature
Security	Intruder detection, Bogus caller support
Automated remote diagnosis	Virtual visits, Respiration monitor
Remote treatment	Medication delivery & reminder, dialysis
Shopping and information	Online shopping service
Human contact	Telephone based friendship link
Mobility	Hoists, Stair lift
Remote Control	Entry system, Temperature, TV, Lights
Prompting	Bath level, Lost objects, Food preparation

TABLE 1: The telecare services model. The examples are a subset of all the possible technologies that are listed in the appendix.

Mobility, remote control and prompting

The number of inventions to assist people with activities of daily living is enormous. These may compensate for disabilities in: mobility, manual dexterity; sight, or hearing. There are also devices to compensate for cognitive disabilities such as forgetfulness (for example there are many devices to help you remember to take your medication). Many of these are tailored to the needs of particular clients and supplied by small workshops, often medical engineering departments in hospitals or volunteer enthusiasts. There are also one or two companies, notably Possum who specialise in providing this kind of technology. Some examples are given in Table 1. Useful websites for finding this sort of equipment are given in Table 2.

Device	Problem solved	Manufacturer
Door entry with video	reduced mobility, security	Videx security
Environmental control (e.g. lights, windows)	reduced mobility	Possum
Electric scooter	reduced mobility	Shoprider, Pride
Bath lifter	reduced mobility	Huntleigh Healthcare
Textphone	hearing loss	BT
Locator for lost objects	forgetfulness	Enable (BIME)
Cooker safeguard	forgetfulness	Condigi/televagt
Medication reminder	forgetfulness	e-pill

Table 1. A small sample of technologies for assistance with activities of daily living. Note many other manufacturers make these products and the selection of these manufacturers is not meant to imply endorsement of their products.

The market for this kind of technology is relatively small and so there are not, in general, the savings that come with mass markets. This problem has been addressed by a movement known as Inclusive Design, promoting the idea that all products should be suitable for the widest population. Often adaptations to make products suitable for older people with arthritis for example can be made so that they the product also appeal to younger people without these kinds of problem. Of course, some devices are only for people with specific problems.

BT Accessible Products: http://www.btplc.com/age_disability/

e-pill: <http://www.e-pill.com/>

Condigi/televagt: <http://jenka.dk/default.aspx?id=1>

Demand, voluntary sector one-off equipment manufacture

<http://www.demand.org.uk/>

Disabled Living Foundation <http://www.disabledliving.org.uk/>

Enable, products for persons with dementia: <http://www.enableproject.org/>

FAST - Foundation for Assistive Living: <http://www.fastuk.org/>

Inclusive design: <http://www.designcouncil.info/inclusivedesign/>

Huntleigh Healthcare: <http://www.nesbitevans.com/default.asp?subsidiary=UK>

Possum Controls: <http://www.possum.co.uk/>

Pride (electric scooters): <http://www.pridemobility.com>

Remap (like Demand) <http://www.remap.org.uk/>

Ricability, Which? like reports <http://www.ricability.org.uk/>

SHOPRIDER (electric scooters): <http://www.shoprider.com/>

Videx Security: <http://www.videx-security.com/>

Table 2. Some useful websites for technologies for assistance with activities of daily living. Note other manufacturers make these products and the selection of these manufacturers is not meant to imply endorsement of their products.

The issues with technology for assistance with activities of daily living are then finding someone to tailor the technology to the individual and their dwelling, and cost. When the equipment involves motors and other activators there is a need

for wiring and power sources and the cost of the equipment itself, installation and maintenance costs all quickly escalate. However, many people could not live independently without it. Getting replacement parts and maintenance may also be an issue. If you are not buying through the NHS you should probably check they are members of the British Healthcare Trades Association.

There are voluntary organisations that organise the building of one off appliances (see Remap and Demand in Table 2). There are also several good sources of information. FAST have a comprehensive list of 1500 sources of equipment. Ricability have Which? style reports on various kinds of domestic appliances, specialised telecoms equipment and textphones. The Disabled Living Foundation has a useful products guide, though you have to subscribe to get access to it.

Reassurance/Safety /Response and security

These systems link the client with a call centre. A sensor can send a signal to a carephone which then calls the call centre that deals with the potential emergency (see Figure 1). Table 3 lists some of the sensors commonly available. Some simply detect a single event, e.g., smoke, flood, extreme temperatures and gas escape. Others use more complex logics involving clocks. The detector depicted in Figure 1 is a bed occupancy detector. Many older people fall when going to the toilet in the night. This sensor can switch on lights when you leave the bed between certain preset hours and so help you get to the bathroom. It can also raise an alarm via the carephone if you don't get back into bed within another preset time limit. There are also fall detectors that sense a jolt with a change from vertical to horizontal. Finally, there are sensors that are triggered by client, the familiar pendant or pull cord, for example. These are also available to be worn on the wrist or mounted on the wall. A bogus caller button alerts the call centre that the client is unsure about someone at the door. The system can also be used in the same way as a conventional burglar alarm.

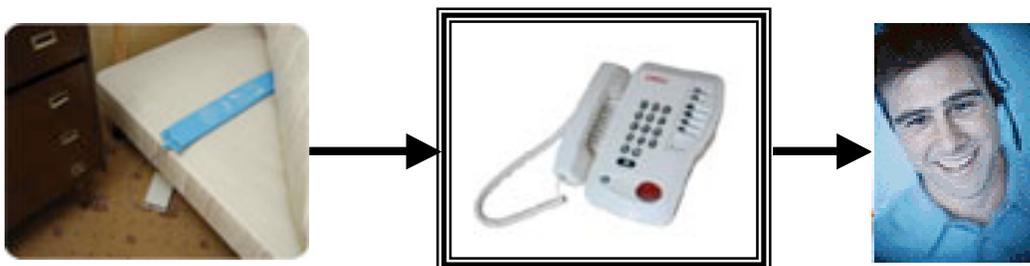


Figure 1. Monitoring system structure. A sensor communicates with a carephone that then alerts the call centre

Flood
 Extreme temperature
 Carbon monoxide
 Natural gas
 Smoke
 Fall detector
 Inactivity monitor
 Bed occupancy detector
 Pull cord
 Personal triggers (pendant, wrist or clip)
 Bogus caller
 Wandering client (senses if exit door has been opened or left open)

Table 3. Common sensors

There are a number of issues to consider with this technology. Perhaps the main problem is setting up a call centre, and its associated support organisations. This is the topic of a later session in this tutorial. In brief most organisations either upgrade an existing social alarm service (e.g, warden call service) or buy in from a service provider. This section of the notes is concerned with the equipment. This will be considered in terms of the different communication links required (see Table 4).

Sensor to carephone

Is the radio frequency used subject to interference?
 Will the call centre know precisely which sensor has raised the alarm?
 How often do the batteries have to be changed in the sensors?
 Can the carephone detect and report faulty sensors?

Carephone to call centre

What will be the cost of extra equipment at the call centre?
 Is the equipment compatible with what we have already?
 Is the equipment compatible with BT 21CN exchanges?
 Will the call centre software allow us to deal with calls in the way that we want to?

Call centre to client

How does the call centre contact the client?
 Is it possible to talk to them if they are on the floor?

General

Is the carephone easy for a client to operate?
 Who could reprogram the carephone settings (is an engineer needed)?
 Who could install or remove sensors (is an engineer needed)?
 Who could change the batteries in the sensors (is an engineer needed)?
 Is the carephone compatible with other makes of sensor?

Table 4. Questions to ask when setting up monitoring technology

The first communication link is between sensor and carephone. This is now typically done by radio and not wired, this reduces installation costs very considerably but leaves the system open to radio interference unless it is done properly. Questions to ask here concern: the radio frequencies used, battery life, what information the sensor transmits to the carephone (i.e., will the carephone be able to identify what sensor has raised the alarm so as to be able to pass this on to the call centre). You might also ask whether the carephone can detect faulty sensors automatically and how easy it is to replace or add new sensors.

The next communication link is between carephone and call centre. This currently uses the normal telephone network but in the future may use DSL ("broadband"). Questions to ask here are about the cost of the equipment needed and the suitability of the software supplied. You may need a special board to decode the signals from the carephone. You may be trapped into using call centre software that does not fit in with the way you wish to run the call centre.

Finally, it must be possible for the call centre personnel to talk to the client in order to deal with accidentally triggered alarms. Many carephones can be put into a speaker phone mode by the call centre operative so that they can reassure them that help is on the way if they are lying on the floor. Table 4 also contains some questions to ask about installation, maintenance, compatibility and usability.

The Telcare Services Association (TSA was Association of Social Alarm Providers) are a useful source of reference, both for equipment and service providers. There is also a Which? style report on community alarms from Ricability, much of which is useful for more advanced sensor systems.

BT: <http://www.bt.com/>

Ricability, Which? like reports <http://www.ricability.org.uk/>

TSA - Telecare Services Association: <http://www.asap-uk.org/>

Tunstall Group (supplier): http://www.tunstall.co.uk/4_1_2_1telecare.htm

Tyntec (supplier): <http://www.tynetec.co.uk/>

Table 5. Useful urls for monitoring systems. Note other manufacturers make supply monitoring systems and the selection of these manufacturers is not meant to imply endorsement of their products.

Automated remote diagnosis and Remote Treatment

One of the costs of keeping people in their own homes is the time taken by care professionals travelling from patient to patient. For this reason there have been a number of proposals to allow remote treatment and diagnosis. Patients can monitor their own blood pressure and so on, reporting the results to a medical professional via the equipment or simple self reporting. Home dialysis and other

treatments are also available. These systems may be supplemented by video and audio links between the patient and the care professional.

One of the main problems with this equipment is that it was probably originally designed for use in a hospital and make no allowance for the aesthetic constraints of the home. With good reason, people are very loath to have their homes looking like hospital wards. These services are covered further later in the course.

Shopping and information; human contact,

This far the priority has been to make it possible for someone to live independently in some degree of safety. As this becomes more and more feasible it is possible to think more about quality of life issues such as socialising and fun. Age Concern identifies isolation as one of the major problems for older people some of whom feel a crippling sense of loneliness. This is recognised in the many "friendship" schemes organised for older people by local authorities and voluntary organisations. The telephone is a powerful, yet under used, technology in this regard. Hackney Borough Council use telephone conferences to link up groups of isolated older people as a part of their Friendship Link scheme. The RNIB has an extensive service for visually impaired people who wish to socialise in groups on the phone.

The Net Neighbours service, run by Age Concern York, links up volunteers with older people in order to get their shopping done while they are unable to do it themselves. The volunteer rings the older person for a chat once or twice a week and at the same time orders shopping for them using an online service. In the future, one can imagine all sorts of applications of entertainment and communication media to facilitate socialising between friends and family. Future generations may be less tolerant of services that deliver safety without the more social and psychological components of quality of life. They may also be more confident with electronic technologies.

Purchasing equipment

The NHS Purchasing and Supply Agency (PASA) published a "national framework agreement" for telecare equipment, installation, maintenance, monitoring and response services (supplied with these notes). Telecare is broadly defined to include most of the categories of the service to client in our telecare services model. The PASA service includes a "searchable catalogue covering hundreds of telecare items with pictures, descriptions, prices and supplier website links". This should solve the tendering and legal problems faced by small organisations wishing to purchase telecare equipment or services. Of course, it will not help them decide what sort of service to provide. This depends on local factors of a political and organisational nature that are the topic of later sections in this tutorial.

Conclusions

Technology is already allowing thousands of people to live independently. Without it they would have to be in residential care at great cost to the state or their relatives. As in most cases they are much happier living in their own homes everybody benefits. Given the high cost of residential care the economic case is not difficult to make. The main barriers to realising the benefits of telecare are organisational, who is going to pay for it, how is it to be administered. Again, this is the topic of later sections of the tutorial.

The future

This industry is set to change radically in the next few years. Intel, Philips and twenty other large companies supplying IT, health and domestic products have formed the Continua Alliance to ensure the international connectivity of this potentially massive market. Many people predict that next three or four years will see sophisticated telecare products available in the high street. Even within the statutory sector there are changes afoot with the government's published intention to tender for a single company or organisation to provide integrated equipment services throughout England.

2. The DH guidelines and cost models

Background

Technology for Preventative Purposes Fund (Chancellor's Spending Review) will allocate a total of £80 million in 2006-8 to English Social Services departments to spend on telecare equipment in order to help people to stay in their own homes. The Department of Health established a Policy Collaborative to discuss the allocation of this money and a further £60 million which is available for up to 20 local authorities who successfully bid for funds to integrate initiatives such as falls management strategies (POPP - Partnership for Older People Pilots).

The collaborative was an experimental improvement programme for policy teams and stakeholders to develop better policies, and more quickly, than before. The collaborative's work was part of the Department's change management programme and was carried out in conjunction with the NHS Modernisation Agency. It has now reported and the resulting guidelines are available from <http://www.changeagentteam.org.uk/index.cfm?pid=219> and <http://www.icesdoh.org/doc.asp?ID=22>. This session is to provide a guide to these documents regarding the use of these funds.

Telecare technology and services are used to enable disabled and elderly people to live independently in their own homes when they might not otherwise be able to do so. Information and communication technology (ICT) can: raise alarms when a person falls; compensate for sensory and mobility deficits; and provide easier, more continuous communication with friends, family and carers. Such developments have clear advantages for disabled and elderly people who prefer to live at home, for their relatives, and for the communities facing an increasing burden in funding state provided care.

Telecare is the use of Information and Communication Technologies to deliver or to manage the delivery of all types of healthcare services to the home. It is part of two currently separate agendas which need to be integrated in order to provide seamless services to vulnerable clients:

1. Telecare is a sub-set of Telehealth which includes various forms of telemedicine such as teleconsultations, and a range of services (e.g. teleradiology and Teledermatology) which allow experts to discuss cases through shared images such as x-rays or MRI scans. Vital signs monitoring between GP or a community hospital, and a consultant at a District General Hospital or Centre of Excellence would be known as telemedicine whereas similar services from the home is telecare.
2. Telecare can promote independence by helping to manage some of the risks associated with living in the community without formal carers being present on a 24/7 basis. It is therefore an Assistive Technology.

The telecare implementation guide

The benefits of telecare - this section outlines the stakeholder that could benefit from telecare ranging from the older people themselves to local authorities and the NHS. Getting the support and involvement of all these people is crucial when developing your service.

Managing telecare implementation and overcoming barriers - this section outlines the advantages (benefits) and barriers (costs) to specific stakeholders such as care managers, OTs etc. This would be a useful starting point for the discussions you will need to have with all these stakeholders.

Funding for telecare and sustaining the new preventative approach (see also 4. Housing and Telecare) - sources of additional funding.

Policy context - further ammunition to support your proposed scheme.

Service design and implementation (see also 8 Service Models) - this section is brief but gives some useful practical advice. Further sessions in this course will flesh some of this out.

Reviewing and evaluating telecare programmes – the evidence base for telecare (see also *managing telecare performance*) - It is in everyone's interest to ensure that there is a convincing evidence base to justify future schemes and so the DoH is putting an obligation on scheme organisers to have clear objectives and evidence that they have been achieved. This topic is covered in more detail in a later session in this course.

Associated initiatives

A number of pilot projects and services based on the existing social or community alarm systems have been running over the past four years. This have shown the potential for using technology to overcome many of the challenges of ageing and disability using new community-based models. The most extensive and innovative of these approaches is in West Lothian where generic health workers deliver modernised services using technology in people's own homes, in new Extracare developments, and in a call centre.

http://www.ecarescotland.gov.uk/partnerships/edinburgh_lothians/west_lothian/west_lothian_smart_support_at_home.htm

Policy makers and government in England have recognised this potential but are concerned that the basic social alarm infrastructure is not capable of delivering it. The 1st Generation of Telecare must be extended into 2nd and even 3rd generations in order to exploit the possible gains of technology. A number of initiatives have been launched to rectify the situation. These were initially focused

on the Intermediate Care agenda which arose out of the need to help avoid delayed transfers of care when people were in hospital but no longer needed the nursing care provided in an acute setting but needed some support and rehabilitation or reablement to give them the confidence to return home.

ICES - <http://www.icesdoh.org/> Integrated Community Equipment Services are designed to centralise the provision of assistive technology in a region so that health and social services personnel can draw on the same central resource. Requirements have been put on local authorities. For example, service management was to be in place by April 2004. The Department of Health and ICES web-sites now provide help for local services through the publication of a “start-up” kit for telecare, listing the items that might be included in a local inventory of equipment. Of course, this equipment will only be of use if a service is available to assess for it, to install it and to respond appropriate when an alarm is generated.

The above initiative is relevant only to England. In Scotland, Wales and Northern Ireland there is no formal arrangement to provide such a service. However, most local authorities are providing such services. In Scotland, there has been no specific focus for telecare, perhaps because local authorities were already more pro-active in establishing telecare services. In Wales, telecare services have been slower to appear though there is now funding available for modernisation strategies using ICT at a local level using Wanless funding and Capacity grants.

DoH Extra Care Housing Fund- <http://www.changeagentteam.org.uk/housing> Under the Access and Systems Capacity Grant Programme, £40m has been allocated for 2005/6 demonstrating an increasing acceptance of the role of housing on healthcare. There is no central provision in Wales and Scotland though a number of developments are currently taking place.

3. Measuring the benefits

Measuring the financial benefit

Financial benefits will most likely be demonstrated by looking at the change in costs over time, i.e., comparing overall costs for a particular group of clients before and after the introduction of telecare. To make this possible it is obviously important to get good estimates of current costs (the before case). It also means that if you are going to contract someone else to do an independent evaluation of your service they need to be engaged before the service goes live, and not at the end of the trial period.

The Department of Health have provided spreadsheets for estimating potential benefits of telecare and the same models will probably be used to evaluate telecare after the event.

DH Models - <http://www.icesdoh.org/doc.asp?ID=22>

DH Balance of Care Planning Model

This is a "snap shot" model for working out the savings possible from telecare given your assumptions about reductions in the cost of care needed.

DH Strategic Business Case Models - This is a more complex dynamic model looking at the change in costs over a period of years.

Measuring other benefits

Many people believe that the real benefits from telecare are in terms of quality of life and this may be as much for the informal carer as the client themselves. There may also be benefits in terms of longevity, and general health. There are also potential intangible costs, such as the loss of dignity, distress from a change of routine or reduced human contact.

Measuring quality of life and judging whether any benefit it is cost effective is hard. There are various scales designed for use with Assistive Technology. One simple to use one is the PIADS scale. Clients are invited to judge whether their happiness, competence etc. has changed for the better or worse since the equipment was introduced. There are 24 questions which together yield scores for Competence, Adaptability and Self-esteem. The problem is that we are talking about populations whose quality of life is expected to decrease rapidly in the foreseeable future and so the answers to questions changes over time have to be viewed against this background. If a questionnaire like PIADS shows benefits for a large sample of clients over a 6-month period, say, one could be very pleased with the result. If it does not one does not know whether there would have been an even larger decrease without the intervention (see also Quality in Later Life tool (QUILL) from King's College London).

Quality of Life Adjusted Years (QALYs) have been developed for use in evaluating medical interventions. These depend on measuring the "utility" of some state (e.g., being bed ridden) compared with the ideal state (perfect health). These utilities have yet to be estimated for the different states involved here (living independently, living in extracare), neither do we have any knowledge of the effects of telecare on the likelihoods one is in one of these states. It may be some time before this kind of rigor can be applied to the measurement of the quality of life benefits of telecare.

Appendix 1: Full telecare model

1. Reassurance / Safety / Response

Pull cord, Pendant, Wrist button
Extreme temperature, Smoke
Methane, CO detector
Flood detector
Fall detector
Telemedical sensors (vital signs)
Absence from bed detector
Fall prevention (automatic lighting etc.)
Inactivity detector
Other detectors

Incident response within home (e.g., water/gas turned off, sprinkler system)
Incident response via named contacts
Incident response via call centre
Other response modes

2. Security

Intruder detector
Bogus caller support
Door open detector
Entry systems
Other detectors

Incident response within home (e.g., Alarm, Prompting to close doors)
Incident response via named contacts
Incident response via call centre
Other response modes

3. Remote or self diagnosis and condition monitoring

Virtual visit
Respiration monitor
Blood pressure monitor
Fall risk assessment
Deterioration detector
Data communicated automatically
Data communicated by client/patient (telephone)
Data communicated by client/patient (video & audio)
Other

4. Remote or self treatment

Medication delivery and reminder systems
Dialysis
Instructions communicated automatically
Instructions communicated through telephone
Instructions communicated through video & audio
Other

6. Shopping and information

Online shopping service
Online information services
Other

7. Human contact

Telephone based friendship link
Reassurance calls from call centre
Other

8. Mobility

Hoists
Stair lift
Internal Door openers
Electronically controlled wheel chair
Entry system
Other

9. Remote control

Entry system
Temperature
TV
Lights
Other

10. Prompting

Bath water
Lost objects
Food preparation
Other

This model is described in:

Baxter, G. Bayliss, C., Daniels, J., Doughty, K., Jones, M., Little, J. Lowe, C. McAllister, L., Mills, P., Monk, A., Taylor, B. and Ward, D. Making the case for telecare services, Poster presented at the Accessible Design in the Digital World Conference, held in Dundee, Scotland, 23-25 August 2005.

**Appendix 2:
Guideline costs from DH Balance of care Model,
2005**

Service Description	Unit	Unit Cost, 2005	Annual Unit	Conversion Factor (p.a.)
Community nurse	Hrs	£25.00	WTE	1500
Physiotherapist	Hrs	£25.00	WTE	1500
Care Assistant	Hrs	£13.84	WTE	1500
OT	Hrs	£25.00	WTE	1500
Geriatrician	Hrs	£90.00	WTE	1500
Rehab asst	Hrs	£15.00	WTE	1500
Care home EMH	Wks	£410.00	Places	52
Care home (non-EMH)	Wks	£364.00	Places	52
Acute bed	Days	£400.00	Beds	365
Comm hospital bed	Days	£200.00	Beds	365
Telecare	Wks	£15.00	Packages	52
CPN	Hrs	£25.00	WTE	1500
Night sitter	Nts	£50.00	WTE	200
Extra care housing	Wks	£150.00	Places	52
Day care	Attends	£21.96	Places	250