digital health and care alliance
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Project 60343: Supporting carers with technology

Activity 1- Deliverable 1: Desk research outcomes report

Technology for families and carers: a review

Summary

This document summarises the different types of technology available to help families and carers manage their caring role and support the health and wellbeing of their loved ones. A recent survey showed that public awareness of the potential of technology to support care and caring remains very low, even though the proportion of the UK population needing care has continued to increase at the expense of those able to provide it.

Given that technology adoption elsewhere in society has been rapid, and the capabilities of assistive technologies have recently advanced in leaps and bounds, it is clear that one reason for the finding of this survey is a lack of awareness by carers, a lack that this document, as part of a significant awareness raising campaign, aims to reverse.

Perhaps an element of the poor adoption of technology by families and carers has been the perception that it refers to equipment such as wheelchairs and bath lifts, so a focus of this document is on what is new, beginning with health-related technologies. These are now able to deliver sophisticated *health monitoring*, *remote consultation* and *remote treatment and advice*, with little or no need to visit a GP surgery or hospital in many cases. For those with long term conditions, exacerbations can increasingly be predicted sufficiently far in advance for successful mitigation. Continuing rapid advances mean that patient outcomes will maintain a fast pace of improvement, particularly in remote GP access and treatment.

Environmental monitoring, also known as telecare, one of the previously more mature technology sectors has also taken on a new lease of life with increased integration arising from the growing use of open standards. Now help can be summoned from almost anywhere and targeted with pinpoint accuracy thanks to GPS technology. Monitoring of all sorts of activities is now cheap and easy whereas previously it was hard and costly.

Powering both these developments has been the reduced need for specialist kit as the 'hub' for much of these technologies is now the user's own mobile phone, tablet, smart watch or PC. This has also opened up a whole new area, referred to here as *socialising technologies*. These for example enable the role of families and carers to be shared efficiently across many people, a task that previously required frequent phone calls, handwritten notes, and more-than-occasional breakdowns in communication.

Finally, there is a class of technologies where perhaps the greatest changes will be seen in the next few years: robotics. This includes the simple cheap devices that already make such a difference like movement activated lights to reduce night-time falls. As the arrival of good speech recognition is

already providing the ability to control many aspects of home management and as manual labour-saving technologies already much used in industry enter the home, it will soon no longer be possible to accuse technology as only able to monitor, and not to provide care. As robotics are therefore one of the *home-based care technologies*, it is in this category that they have placed here.

It is important in such a review not to ignore families and carers themselves, as a heavy burden of caring can result in poor health outcomes, so the health and wellbeing of the carer is also covered. However, in the interests of brevity other areas, such as finances, are excluded.

Introduction

Carers UK has recently commissioned YouGov to do a study similar to that originally carried out in July 2013 to examine public attitudes to using technology to support caring for older and disabled loved ones[1]. In 2013, they found that fewer than 1 in 3 (30%) people used technology to support health and care, a figure that sadly has remained essentially the same in 2017 (29%). In 2013 43% of all respondents said that technology was the last thing they would consider as a source of support if caring affected them, a figure that has reduced a little though is still very high at 32%. So, even though attitudes elsewhere have changed and technology has become easier to use (as evidenced in the recent Local Government Association (LGA)/Oxford Brookes report generally on the use of information and technology to transform social care[2], and the NHS Technology Enabled Care Services (TECS Resource for Commissioners[3]), it seems that little has changed since a review of technology for carers[4] was produced in 2014 by the Association of Directors of Adult Social Services (ADASS). Clearly there remains a long way to go – hence this review, to inform a campaign to promote the use and benefits of health and care technologies to families and carers, and those they support.

Another important point is that the technology is in the midst of very rapid transition. Just ten years ago in the UK there were three principal suppliers of telecare equipment, and a similar number of telehealth suppliers, all working to proprietary protocols and interfaces. Now, including app developers, there are hundreds, mostly interoperable via increasingly open standards, so this summary of health and care technologies cannot capture the entirety of today's field nor, whilst we do our best to predict upcoming products and services, tomorrow's. This in turn creates classification issues: nowadays a telecare technology can detect a physical decline before the telehealth monitoring picks it up, and a telehealth app on a smartphone can include a falls detector.[5] Readers are therefore asked for forgiveness if they feel a technology has been placed on the wrong side of a dividing line. For the purposes of this report, division has been made into:

- Health monitoring ("telehealth")
- Remote consultation with a clinician ("telemedicine")
- Remote treatment and advice
- Environmental monitoring ("telecare")
- Socialising technologies
- Home-based care technologies

[1] https://www.carersuk.org/for-professionals/policy/policy-library/potential-for-change-transforming-public-awareness-and-demand-for-health-and-care-technology
[2] https://ipc.brookes.ac.uk/publications/LGA_report_on_information_and_technology.html
[3] https://www.england.nhs.uk/wp-content/uploads/2014/12/TECS_FinalDraft_0901.pdf
[4] http://uk.tunstall.com/Uploads/Documents/ADASS_Carers%20guide%20to%20technology.pdf
[5] An alternative classification under terms like "wearables" and "apps" was not considered appropriate as these are pervasive and crop up across the whole spectrum of care delivery.

- Enhancement technologies

Many readers will recognise health and environmental monitoring, and remote consultation, as being mature technologies although recent advances have transformed the benefits delivered by all three. One area that has changed even more though is the development of technology-enabled treatment which, particularly in areas like stroke rehabilitation, has enabled the few qualified practitioners, for example in speech and language therapy, to treat a vastly increased number of people.

Another area is socialising technologies, where widespread use of mobile technology and PCs enables people to join together more easily to care for a loved one, and also to enable that loved one (and their carer) to have a more fulfilling and happy life.

Robotic technologies are currently sparse in the UK although evidence from Japan is that they are set to become hugely important in the mid-term, finally putting to rest the complaint that "technology only monitors: it does not actually deliver care".

Finally, some enhancement technologies have been with us for some time, most notably hearing aids, although others are now challenging more established home adaptions such as stair-lifts…

…which introduces one limitation: setting boundaries to ensure this report does not end up describing every piece of equipment or technology used in the process of caring. For this report therefore, the term 'technology' has been interpreted as covering relatively recent innovations that many people will be unaware of. A distinction has also been made between equipment and technology, with the former, such as bathing aids, hoists and stair lifts not covered in this report.

Likewise this report is restricted to the process of caring, and the wellbeing of the carer, so technology for, for example, identifying appropriate sources of financial assistance, is excluded.

The principal technologies

1. Health monitoring

This category, sometimes called *telehealth* or *digital health*, is important for carers because it enables the health of those they look after to be managed at home for longer and more effectively. This benefits both carers and those they care for by:

- Reducing the need for carers to accompany or provide transport for those they care for to see clinicians and other professionals;
- Avoiding hospital stays that, for example for those with early-stage dementia, can accelerate the progress of that condition;
- Converting episodic care into continuous care, reducing exacerbations and unplanned hospitalisation, so again reducing carer burden as well as improving patient outcomes.

In addition it can benefit the carer by enabling any health problems that they have to be managed at home, keeping them better able to cope, and reducing time they have to spend away from those they care for.

There are essentially two types of health monitoring – *discontinuous* and *continuous*. Discontinuous monitoring is typically done once a day unless a problem is identified (in which case it might be more frequent) and continuous where users either wear a monitor, or the area they are in monitors them via a camera or bed/chair they are in.

Where a technology is manifested as a distinct item, it is sometimes referred to as a *peripheral.* However as will be evident from the following, vital signs are increasingly being deduced from clever use of existing equipment, notably mobile phones and in some cases cameras.

Discontinuous monitoring technology includes:

Physical point of care testing (POCT) equipment

- Sphygmomanometers (blood pressure meters)
- Pulse oximeters (measures blood oxygen level)
- Spirometers (measures lung capacity &/or flexibility)
- ECG (measures heart function, can identify atrial fibrillation, a stroke precursor)
- Smart inhalers (measures inhalation type & frequency, and location of each inhalation)
- Weight scales

Increasingly apps downloaded on to smartphones are replacing physical equipment (apart from scales) – even spirometers.

In vitro[6] Point-Of-Care-Testing equipment

- Glucometers (measures blood glucose)
- Coagulometers (measures blood viscosity)

Again, apps on smartphones, together with a small piece of hardware, are increasingly being used to do the analytical side of these measurements – especially true of glucometers.

Continuous monitors

- Wearables such as bracelets and watches that measure (and in some cases report back to the users) step, heart rate and sometimes sleep quality – also continuous glucose meters (CGMs) which are rapidly becoming acceptable especially for those with Type I diabetes;
- So-called 'smart' clothing, another type of wearable, that can for example measure steps, pulse rate, respiration rate;
- Stick-on monitors (also technically wearables) that can measure sophisticated vital signs, typically only for short periods, for example post operatively;
- Implantables to measure for example heart function and blood glucose levels;
- Ingestibles to measure internal variables as they travel through the gut, as well as confirming medication delivery;
- Remote measurement using cameras (for example SpO2, heart rate, respiration rate);
- Remote measurement using chairs or beds (for example heart rate, respiration rate).

Control units or 'hubs'

These receive vital signs information from monitors, ask qualitative health questions and can in some cases offer advice on behaviour change for example via short videos (see (3) Remote treatment, below):

- A dedicated device for managing vital signs collection and patient response;
- One or more apps downloaded on to a carer's/user's mobile phone/tablet.

[6] The term 'in vitro' in this context means measurement from a bodily fluid (including exhaled air)

Monitoring service

This receives information, remotely, from the control equipment or, occasionally directly from the measuring device:

- Currently this is mainly delivered via a dedicated nurse-driven service that receives vital signs, contacts the responsible clinician and/or the patient's carer and if in direct contact with the patient's carer may instruct them to administer a rescue medicine;
- Increasingly monitoring is using algorithms to reduce human monitoring costs – ultimately this may result in eliminating the need for regular human monitoring.

Systems vary significantly in sophistication, from those that rely on the carer reporting key health facts about the person they care for by SMS messaging, including transcribing vital signs readings, through to fully wired or (now more often) Bluetoothed connectivity between sensing equipment and control equipment.

Originally the focus of health monitoring was Chronic Obstructive Pulmonary Disease (COPD) and Congestive Heart Failure (CHF) both because these conditions lead to many exacerbations if managed poorly, and because early warning signs are relatively easy to spot via changes in blood oxygen levels and through sudden weight increases respectively. These systems required daily monitoring of the relevant vital signs, supplemented by qualitative questions.

Now health monitoring is used to assist in the management of a wide range of medical conditions including (especially) diabetes (Types I & II), mental health, chronic kidney disease, urinary tract infection and so on. Some devices, such as cardiac implantables can also provide pacemaking, defibrillation and resynchronisation. As caring can place a major strain, particularly on a person's mental health, health monitoring is particularly relevant for carers too.

Innovation in sensor technology is also transforming the collection of vital signs, with a chip expected shortly to be delivered that will enable a mobile phone to monitor all commonly-required vital signs apart from weight without the need for any peripherals.

Particularly as increasingly sophisticated algorithms are developed, the impact of vital signs monitoring is set to become far more effective than it currently is, anticipating health problems and advising on treatment. Though not a perfect analogy, pointers to what is achievable are the monitoring systems on jet engines – and increasingly on road vehicle engines, that have substantially improved their reliability.

2. Remote consultation

Remote consultation, otherwise known as *telemedicine* is the practice of medicine at a distance – instead of being physically present in a clinician's consulting room, a patient and their carer can communicate from where they want to be – typically at the patient's home – with the clinician. The difference between health monitoring as described in the last section, is that in health monitoring, the readings are looked at by a clinician sometime after they were taken (what is technically called 'asynchronous communication'), whereas telemedicine is 'synchronous' in that doctor and patient communicate interactively, in real time.

Remote consultation offers significant advantages for carers (and patients) including:

- No need to travel/take significant time out of work
- Typically faster clinical attention
- Easier to record the event

- Clinicians can check more easily through short monitoring consultations.

Technology

- Telephones have been used for over a century already although the practice is still little used;
- Skype provides an image too, as well as the ability to read a sphygmomanometer, thermometer or other measuring device (and to see a patient take a pill);
- More secure video communications systems exist, though for those whose health is unlikely to be of interest to those outside their family circle, the security of Skype-type communications should suffice;
- In the US, where telemedicine sessions are charged for, there is an increasing tendency to lock users in to a single service with an app downloaded onto their mobile phones – this is now also evident in the private telemedicine services offered in the UK.

Remote consultation can be as appropriate for a one-off consultation for a minor condition, as for managing a major condition.

One future for remote consultation is clearly very much of a coming together with health monitoring (described at (1) above) and ADL monitoring (described in (4) below), with apps recording vital signs data and then alerting patients and their carers to impending problems. A pointer to this are the remote consultation services that increasingly use so called "artificial intelligence" (AI) built into sophisticated computer services to triage users prior to directing them to the appropriate clinician to deliver and monitor their treatment plan. Increasingly one of the clinician options is an AI machine that raises the prospect of entirely automated treatment, at least of minor conditions.

3. Remote care and advice

Providing remote care and advice[7] enables a patient to be treated without the need to attend a clinic often, or on occasions, at all. As such they offer significant benefit to a carer (and patient):

- Reduced need to contact/visit clinicians;
- Reduced need to travel/take significant time out of work;
- The opportunity to engage in more intensive rehabilitation, resulting in much-improved patient outcomes;
- Access to treatment not otherwise available (for example there are not enough therapists in the UK to provide the amount of treatment to enable all stroke victims to recover their speech and language abilities fully, whereas computers can do much of the 'heavy lifting').

There are similarities here with the benefits of telemedicine described earlier. Whilst it is important to recognise that there are two importantly different elements – the doctor online, and the delivery of machine-based care – there is a continuum between them.

Technology

Examples of remote **advice** include:

- The wealth of advice available on NHS Choices (www.nhs.uk);
- Other online patient medical information service;
- Symptom checkers that identify common illnesses and conditions and suggest care plans for them

[7] Remote advice is sometimes called 'telecoaching'.

Examples of remote **treatment** include:

- Stroke rehabilitation for example using computer-based SALT (speech and language therapy) routines (which are especially appropriate for technology delivery as computers can identify tiny improvements in speech) or using connected fitness equipment (so a therapist can run a physical movement class remotely, receiving signals for example from connected static bicycles of the state of each patient's abilities;
- Telecoaching, alluded to under vital signs monitoring ((1) above) whereby the controller delivers advice and guidance, either autonomously, or with greater or lesser human health coaching engagement, to secure a desired behaviour change;
- Worth a specific mention is mental health where many practitioners claim a better online cure rate than for face-to-face consultations[8];
- Apps that train users no longer to be affected by physical symptoms such as severe pain;
- Electronic game playing which has been shown to be effective for treating a wide range of conditions including smoking cessation, depression and weight loss.

Examples of remote advice and treatment include:

- Online GP services which use a computer front end to triage patients and to provide advice and then can either complete the consultation electronically or transfer the patient to a doctor online; they can even dispense prescriptions.

Note that virtually all the above are accessible or downloadable on to a PC, tablet and/or mobile phone.

4. Physical environment monitoring

This category, often referred to as telecare, represents a very wide range of technologies with just one common theme: an ability to monitor and protect people. As a result telecare offers an almost limitless range of options in order to tailor it specifically to an individual carer's or user's needs.

The principal benefit to a carer is to reduce the amount of monitoring they need to do of the person they care for. An extreme example is of a child, one of whose parents needed always to sleep with them to respond immediately to a fit. In this case the immediate benefit is an increase in quality of life as the carer no longer needs to be in the same room as the person cared for, clearly benefiting the privacy of both. In other cases it may enable the carer to continue working, offering significant benefits both in financial and emotional terms.

Monitoring

As with telehealth, signals from these technologies are often initially collected by a controller which used to be a discrete item, often now referred to as *a base unit*, or *control box* (previously called a *dispersed alarm unit*), that was wired into the telephone network in order to send alerts to a monitoring centre that then decided what action to take, often after calling the user back to check that the alert was not a false alarm. Mobile phones now are often used in the place of these units though care should be taken as the reliability of mobile networks remains lower than wired connections, so emergency calls for example from activated smoke detectors have a slightly lower chance of not being received (this issue is being worked on actively by national standards bodies). However the mobile phone enables the user to raise an alert when remote from their house, so avoiding the imprisoning effect that a house-only system can cause.

[8] Due apparently to lack of facial cues and the ability to repeat recorded sessions

Where an alert goes to an external monitoring organisation it is said to be *remotely terminated*, typically essential for example for all smoke/extreme temperature alerts to ensure instant response. However other alerts are more appropriate for *local termination* – for example in the carer's mobile phone or pager – where a speedy local reaction is needed, for example in the case of the fit mentioned in the last paragraph, or a wet bed.

Technology – remote responding

The different technologies that are particularly relevant to enable remote termination include:

- Falls detection;
- Smoke detection – the classic fire detecting system;
- Extreme temperature – usable both to detect very low & very high temperatures, to identify when heating is not on, on cold nights, and fires where smoke detectors might be triggered in error (for example in a kitchen, close to a bathroom where smoke from cooking or steam could confuse a smoke detector);
- Property exit sensors – raise an alert if a person has left their dwelling for more than a preprogramed time;
- Passive infra-red (PIR)/activity monitoring – to detect room occupancy/person up and active, or trespass;
- Flood detection (from taps left on);
- Medication management – reminders, and alerts where medication is not taken;
- Natural gas detectors – used where a person may leave a gas appliance on without lighting it, and there is no automatic shut-off on the appliance (It is possible to link a detector to a lockable mains gas shutoff valve if there is a serious safety concern);
- Carbon monoxide detector – should be used where the potential source of CO cannot be replaced by a safe device;
- GPS sensing – a discrete device like a (lockable) bracelet, or the system in a user's mobile phone or digital watch that enables a carer to track the person they care for, perhaps if they have mild dementia to check that they are following their usual route, or for more serious cases to find them/guide them home if they are lost;
- Bed occupancy – typically programmed only for the time when the bed is expected to be occupied, with a delay allowing a time out of bed before an alarm is triggered;
- Panic button/bogus caller alarm – installed close to the door to the property;
- Activities of daily living (ADL) monitoring – typically involving PIRs (see above) plus door contacts on the fridge or smart plugs that tell you how often the kettle is used; if privacy issues can be overcome, smart meter hourly output of water, electricity and gas used will be an excellent monitoring system at no cost to the user;
- Personal alarm/Pendant/pull cord – a user-operated alarm system that was the origin of telecare and has now been greatly updated as an app on a digital watch or mobile phone, or a modern watch or decorative brooch.

Technology – local responding

The different technologies that are particularly relevant to enable local termination include:

- Door/window opening – particularly appropriate where the cared for person may wander without the knowledge of the carer (for example if suffering from dementia);
- Bed occupancy – often deployed alongside a door sensor to give early warning of potential wandering;

- Fits;
- Enuresis – a wet bed requiring attention to prevent sores/ulcers.

Note that most of the technologies mentioned in the previous section can of course also be relevant depending on how closely the carer and cared-for live and how frequently the carer is away.

5. Socialising technologies

There is a new class of technologies using existing PCs, tablets and apps on mobile phones to enable carers more efficiently to manage care. These offer carers the benefits of:

- Reduced load on a single carer by enabling shared responsibility
- Carer scheduling, including calendaring for example for hospital visits
- Shows contact details of all carers
- Visibility of all tasks requiring completion to ensure none are missed or duplicated
- More eyes and ears to spot problems, or deterioration suggesting the need to anticipate impending problems

Some apps combine all or part of the above with more user-centred functions such as:

- Remembrance – photos, music etc. to stimulate memory for those with mild dementia;
- Simple emailing to enable the user to send and receive messages from loved ones;
- A 'walled garden' of apps to use that eliminate for example the ability to make financial commitments.

Also worth mentioning under this heading is the issue of loneliness which can affect both carer and the person they care for. A lack of socialising can result in loneliness which in turn leads to depression and a wide range of issues – such as smoking, excessive alcohol consumption, lack of exercise, and phantom pains – that in turn cause or exacerbate many conditions, as well as simply making life miserable. Much work is underway to alleviate this though at present there are no specific well-recommended technologies other than those commonly used by everyone such as the telephone, Skype, email, websites, chatrooms and social media like Facebook and Twitter. For example, local websites giving details of appropriate community events ideally combined with dial-a-ride type services are enormously valuable here.

6. Home-based care technologies

Home-based care (previously referred to as "domiciliary care") has been a longstanding support for carers. It can be provided by local authorities, or private companies (and effectively because of the nature of the caring provided, arguably by some NHS community care trusts). More recently, more progressive providers have embraced technology, primarily to manage carer workers and provide lone worker protection. This has been extended for example to enable workers to check on things like oxygen pressures in home cylinders. Now these organisations are beginning to integrate with environmental and with health sensing technologies services ((4) & (1) above respectively) to provide a lower cost more responsive service to support carers and those they care for alike. Fitting under this sub-category too are local online repair services, some offered by councils.

There is also a rapidly emerging class of *robotic* technologies, pioneered in Japan[9] that potentially offers considerable assistance to carers (particularly, though all will benefit) delivering some form of 'intelligent' assistance with minimal or no human involvement. Current examples of this are:

- Amazon's Echo, which understands spoken voice even from far away and can access/control a wide range of connected items, such as home heating and lighting, as well as ordering taxis (Uber), delivering wake-up calls etc. – as Amazon upgrades the programming and as people work out how best to use it, there is little doubt that technologies like this will in time be a means of delivering the much discussed "intelligent home", controlling the delivery of many of the other topics mentioned earlier, such as vital signs and environmental monitoring, and responding to situations that arise.
- Robotic vacuum cleaners and, for those with significant lawns, robotic lawnmowers – as robots able to help with reaching and lifting are already available in Japan, this class of physical assistance robots is set to grow rapidly, and of course to include self-drive cars in due course.
- Devices for managing remote door entry, curtain closing and a wide range of tasks for those with very limited muscular strength; there are even apps that can speak for you in your own voice if you have lost the power to speak yourself.
- Medication reminders (though note that research shows that many people who do not take medicines as prescribed do so on purpose – addressing those reasons is essential otherwise reminders will be ineffective).
- Much more trivial, though immensely valuable if correctly deployed are the current fast-boil kettles, good at reducing dehydration, movement sensitive lights, good for avoiding falls at night, and movement sensitive pre-recorded voice messages to help people especially with dementia – however many of these may in time be taken over by the Echo-type technology.

Exoskeletons – mechanical devices that fit on to parts of people or whole people to add strength are another technology shortly to become a practical option.

Finally, many local councils now provide online "marketplaces" where those seeking care and those offering to provide it can be matched. Local social services or local council website are likely to be the best places to find out about such services.

7. Enhancement technologies

Although none of these technologies are carer-specific, they could on occasion be very relevant to carers, as, for example, a loved one who is hard of hearing or very weak places a particular burden on their carer.

Hearing aids – increasingly being referred to as *hearables* these are set for a dramatic reduction in price and improvement in functionality as they become fashion items and combine vital signs measurement (especially temperature, heart rate, respiration rate, blood oxygen) and personal stereo with the original function.

Memory – a wide range of 'brain training' apps exist, to help improve memory though many offer little evidence of benefit.

Strength and durability – a very wide range of fitness apps now exist both to improve muscle strength and to enhance staying power. Many of these, such as the Seven Minute Workout

[9] E.g. see http://undiscovered-japan.ft.com/articles/automation-and-ageing/

(https://7minuteworkout.jnj.com/) require just a mobile phone and appropriate apparel and location.

Acquiring the technology

Advice

The sheer breadth of technology and the fact that many technologies have multiple uses means that, especially for environmental monitoring, it is important to make a holistic assessment. Currently this complexity defeats most automated systems designed to help users and carers to choose. This in turn means that if possible, expert advice should be sought especially if a person has complex needs.

Cost

The following pages list websites that provide both general information and specific information. Some offer technology from many suppliers, others from just one.

Whether a carer – or their loved one – has to pay for technology is complex. It can depend very much on the nature of the technology concerned, whether they have a personal budget with unspent funds, and whether their financial position is above or below a means-tested threshold

Before making any purchase commitments, carers – or those they care for – should:

- For social care-related technologies (for example telecare), contact their local council to ask what services they provide, whether they can provide them for the carer/the person cared for, and whether any help is available with the cost;
- For health related technologies, the first point of call should be a GP surgery or local Clinical Commissioning Group (CCG) – to find a local CCG people can visit http://www.nhs.uk/Service-Search/Clinical%20Commissioning%20Group/LocationSearch/1; all health services, if available on the NHS and appropriate for the individual, should be free at the point of care.

If a carer or user has to pay for the technology or service, most UK suppliers should be able to zero rate purchases for VAT if the user or carer meets at least one of the following requirements:

- A physical or mental impairment which has a long-term and substantial adverse effect upon your ability to carry out everyday activities.
- A condition that the medical profession treats as a long-term illness, such as diabetes or heart disease.
- Being terminally ill.

Zero rating should reduce the cost by approximately 16.7%. HMRC are of course the ultimate advisors on VAT-related issues and should be consulted if in doubt.

Note that for learning disability there is better access to funding for life-long support from school age, including when the same people grow older.

Sites believed to be offering impartial information and advice and/or access to products and services

Age UK has a short guide to telecare & telehealth at http://www.ageuk.org.uk/home-and-care/adapting-your-home/telecare/telecare-and-telehealth/ (note it still refers to pager alerts)

Alvolution offers a range of technologies and has a comparison site: http://www.alvolution.co.uk/safety/telecare-equipment-and-products

ATDementia is a charity providing online information on assistive technologies for use by people with dementia, carers and professionals https://www.atdementia.org.uk/

ATHome is a collaboration amongst the 14 Local Authorities covering the West Midlands http://www.athome.uk.com/

British Healthcare Trade Association (BHTA) http://www.bhta.net/ operates a code of practice to ensure the products sold by its 500+ members can be trusted. They offer leaflets giving purchasing advice on a range of equipment at http://www.bhta.net/home/get-wise.htm.

Carers UK, the organisation that best represent carers' interests in the UK, is at https://www.carersuk.org/ - they have an Upfront guide that introduces caring and webpages dedicated to technology solutions that can support caring. They also provide a care co-ordination app, Jointly (https://www.jointlyapp.com/)

The Disabled Living Foundation (DLF) provides impartial information and advice on around 11,000 products and services for disabled and older people on the **Living Made Easy** site at http://www.livingmadeeasy.org.uk/. This provides links through to national suppliers so that people can go through to make a purchase. To enable people to try before they buy, the site lists centres around the country where carers and those they care for can have hands-on experience of equipment at http://www.livingmadeeasy.org.uk/contacts_edc.php. For those who don't know what equipment is available, the free **AskSara** online questionnaire http://asksara.dlf.org.uk enables the public to create a personalised report including signposting, equipment information and specific product advice. To support the public and practitioners to undertake more in-depth research, the DLF also have factsheets www.dlf.org.uk/content/full-list-factsheets that highlight the issues to consider before purchase.

Dementia Friendly Technology: gives people with dementia and their carers information on how to access technology. It also provides guidance to health, housing and social care professionals on how to make technology work for people based on their individual needs. https://www.alzheimers.org.uk/info/20115/making_your_community_more_dementia-friendly/347/dementia_friendly_technology

Designability: engineering and design experts with a passion for creating life-changing assistive technologies; they conduct original research and develop commercial products that meet real needs. http://www.designability.org.uk/

Evergreen Life has a useful summary of technology to support carers at https://evergreen-life.co.uk/technology-and-carers/ and also offers a free app to enable people to keep a full health & care record.

Everyday Life at http://everyday-life.co.uk/. This is an online assessment tool run by the West Midlands Academic Health Science Network to help people locate the technology that can assist them.

Foundations HIA is appointed by the Department of Communities and Local Government to oversee a national network of nearly 200 home improvement agencies (HIAs) and handyperson providers across England http://www.foundations.uk.com/

Home Farm Trust (hft) is a national charity, providing services for people with learning disabilities throughout England http://www.hft.org.uk/

Medequip http://www.medequip-uk.com/ provides services and equipment to local authorities and the NHS across the UK in delivering a wide range of equipment and support to people in their own homes. **Manage At Home** http://www.manageathome.co.uk/ is their online retail store

MindTech is a repository of applied research in the mental health and dementia tech area http://www.mindtech.org.uk/

NHS Choices has a relatively short guide to telecare with a few links at http://www.nhs.uk/Conditions/social-care-and-support-guide/Pages/telecare-alarms.aspx which includes a link to needs assessment information at http://www.nhs.uk/Conditions/social-care-and-support-guide/Pages/assessment-care-needs.aspx

Rica is a consumer research site for older & disabled people: it both gathers and purveys research data at https://www.rica.org.uk

The **Royal College of General Practitioners** has an eLearning course aimed primarily at professionals for those keen to learn much more about the whole area at http://elearning.rcgp.org.uk/course/info.php?popup=0&id=177

Show me the access has a wide range of links for people with impairments: http://www.showmetheaccess.co.uk/

Spring Chicken has great information and many products for sale to help people struggling with activities of daily living http://www.springchicken.co.uk/

Sterling University has produced an eBook entitled "Telecare and dementia: using telecare effectively in the support of people with dementia" http://www.dementiashop.co.uk/node/287

Stroke4Carers has a summary page with links: http://www.stroke4carers.org/?p

Telecare Services Association has a short summary of equipment available at https://www.tsa-voice.org.uk/consumer-services/telecare-and-telehealth.

They also have a link to a free training course on fire safety aimed at carers (and housing providers) at https://www.tsa-voice.org.uk/news/new-free-online-training-for-carers-and-housing-providers-launching-through-new-partnership

Telesson provides custom eLearning packages for telecare: https://www.telesson.co/

Unforgettable provides advice and technology for people suffering from dementia at: https://www.unforgettable.org

Which? has regular reviews of telecare and assisted living options, for example http://www.which.co.uk/reviews/assistive-technology/article/assistive-technology-at-home/telecare-and-gps-tracking-devices

A selection of commercial suppliers

Telecare & ADLs

As mentioned earlier, in addition to the following almost every council with social service responsibilities has a site providing telecare service advice locally. One example of this is the **Argenti** consortium, delivering telecare on behalf of Hampshire County Council (http://argenti.zserver.co.uk/)

Full service/multi-supplier

Appello: offers a range of services http://www.appello.co.uk/consumer/products

Bendigo: a dementia-focused start-up http://bendigosystems.co.uk/ or http://bendigo.eu/

Brain in hand: help for people with autism http://braininhand.co.uk/

Centra Group: primarily a monitoring organisation http://www.centragroup.org.uk/centra_services_and_products/telecare/

Good Samaritan (includes a cook stop): http://www.goodsamaritantelecare.com/products/

Hanover Scotland: primarily a telecare supplier https://www.hanover.scot/support-at-home/

Medvivo: currently primarily a monitoring organisation http://www.medvivo.com/

Millbrook: sells a multitude of assistive technologies http://www.millbrook-healthcare.co.uk/ includes a self-assessment system

More than mobility: a wide range of independent living products http://www.morethanmobility.com/

Nottingham Rehab Supplies (NRS) offers a wide range of products at: https://www.nrshealthcare.co.uk/ They are also now selling via Amazon and Argos.

Tell Me Now: https://www.telmenow.com/ has a similar structure to the DLF (above) including a personal shopping guide ("Angie") https://www.telmenow.com/askmenow though it appears less extensive and more commercial

The Unlimited Company, trading as **Simply Health,** offers a free home assessment service and some technology advice though principal focus seems to be on mobility aids http://www.theunlimitedcompany.co.uk/

Therapybox: has a wide range of technologies to help people who have difficulty communicating including those who have lost their voice https://www.therapy-box.co.uk/

Tunstall: offers a wide range of technologies and services https://www.telecarechoice.co.uk or http://www.tunstall.co.uk/

Tynetec: primarily a telecare supplier www.tynetec.co.uk/telecare-devices

Welbeing: primarily a monitoring organisation http://www.welbeing.org.uk/products-services/gps-personal-locator-devices/

A selection of other suppliers

11health: ostomy alerts http://www.11health.com/

Alcove: "pioneering independent living" https://www.youralcove.com/

Buddi: the "go anywhere, anytime personal emergency response service" https://www.buddi.co.uk/

Callalert: "24/7 Help at the touch of a button" https://www.callalert.co.uk

Canary Care: "help your loved ones continue to live in their own homes for longer" https://www.canarycare.co.uk/

Caretech: "24 hr help when you need it" http://www.call24hour.com/shop/index.php

Caring Cloud: "help your loved one remain confident and independent at home" http://caringcloud.org.uk/tag/telecare-products/

Cera: is an online homebased care provider, at https://www.joincera.com/

Chubb: a significant telecare supplier http://www.chubbfiresecurity.com/en/uk/products/community-care/

Doro: easy to use mobile phones http://www.independence-telecare.com/doro/

Easylink: "assistive technologies to enable independent living" http://www.easylinkuk.co.uk/page9.html

Future Care: "an innovative and disruptive provider of health and wellbeing solutions in the UK and abroad": http://futurecareuk.com/

Geemarc: assistive technology products primarily for the hard of hearing http://www.geemarc.com/index.php

Jointly: an app to enable joint caring https://www.jointlyapp.com/

Just Checking: telecare based on activities of daily living (ADL) monitoring http://www.justchecking.co.uk/

Konnektis: a carer coordination app: http://www.konnektis.com/

Monitorgo: "like a pendant but works everywhere and does much more" http://www.monitorgo.com/

MySOSfamily: "Turn any phone into a personal safety device"**:** http://www.mysosfamily.com/onetouch-alert

Oysta: "Comprehensive 24-hour support for vulnerable people" www.oysta-technology.com

Possum: assisted living services particularly appropriate for those with limited movement/dexterity http://www.possum.co.uk/products-and-services/telecare-assisted-living

Rally Round Me: an app to enable joint caring https://rallyroundme.com/

Sirona: "helps people who wish to stay independent and in their own home" https://www.sirona-cic.org.uk/services/telecare-service/

SuperCarers: is a marketplace for careworkers https://supercarers.com/

Vida: an integrated careworker delivery service https://vida.co.uk/

Yecco: is an app allowing carers and patients to manage and coordinate care and *support* www.yecco.com

Health

All health services, if available on the NHS and appropriate for the individual, should be free at the point of care. The first point of call therefore should be your GP surgery or local Clinical Commissioning Group (CCG) – to find your local CCG go to http://www.nhs.uk/Service-Search/Clinical%20Commissioning%20Group/LocationSearch/1

Health-related technology suppliers that you may need to pay for if the NHS does not provide them include:

Babylon Health is an online GP service increasingly using AI in place of humans https://www.babylonhealth.com/

Baywater offers a full telehealth service including monitoring at https://www.baywater.co.uk/patient-carer/our-therapies/telehealth

Big White Wall offers a range of therapies for mental health management at https://www.bigwhitewall.com

Dignio: https://www.dignio.com/ is a Norwegian company offering remote care "healthcare moves home"

Docobo has a range of telehealth offerings at http://www.docobo.co.uk/docobo-telehealth-solutions.html

Dr Morton's is an online GP service that provides "direct speedy access to experienced UK doctors for inexpensive confidential reassurance or advice" https://www.drmortons.co.uk/

Dr Now is an online GP service combined with an online pharmacy http://www.drnow.com/

Florence is a simple telehealth service using SMS messaging with a website at https://www.getflorence.co.uk/; the Health Foundation is running a promotion only for this service at http://www.health.org.uk/flo

Ieso's mental health services are available via NHS Choices at http://www.nhs.uk/Conditions/online-mental-health-services/Pages/ieso-digital-health.aspx The services are free in some areas (see link)

Kardia/AliveCor – the device syncs with a smartphone to give an ECG reading of your heart function. Using the free app, it can detect atrial fibrillation, which is a precursor to a blood clot that could cause a stroke or thrombosis. Also available as a strap for an Apple watch. Buy either at https://alivecor-uk.myshopify.com/

Lloyds Pharmacy has an online doctor service at https://onlinedoctor.lloydspharmacy.com/

My Inhealthcare: www.inhealthcare.co.uk – "which can be used for a number of conditions including obesity, AF, hypertension etc. The app enables the carer to enter dosing instructions on behalf of the patient and receive new dosages from the GP."

Patient is an EMIS site that offers health-related advice http://patient.info/

Pharmacy2U fulfils prescriptions by post – requesting repeat prescriptions is very simple https://www.pharmacy2u.co.uk/

Pixie pads enable your smartphone to detect a UTI infection in an incontinent person https://www.pixiescientific.com/

The Scottish Centre for Telehealth & Telecare is a useful resource for users in Scotland at https://sctt.org.uk/

Telehealth Solutions offer services, including monitoring at: https://www.thsl.co.uk/ and https://www.microtechsupport.co.uk/telehealth

Tunstall offers services, including monitoring at: http://www.tunstall.co.uk/what-we-do/telehealth

WebMD's UK site in association with **Boots** gives health advice at http://www.webmd.boots.com/ and offer a symptom checker at http://symptoms.webmd.com/symptomchecker

Note that a number of the companies mentioned in the previous list also provide a range of health-related services, including Appello, Medvivo, Tynetec and Welbeing

A vote of thanks

The following have kindly read drafts of this document and make especially helpful comments to improve it

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Charles Henderson – Digital care consultant
Dr Peter Jarritt – Deputy Director of the Brain Injury HTC, NIHR
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Kieran McCausland – Business Development Manager, Tynetec
Madeleine Starr – Director of Business Development and Innovation, Carers UK
Nathan Downing – NDI Consulting

This report has been produced with the support of:

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