



Public
Policy
Projects

Public Policy Institute

Connecting Services, Transforming Lives

The Benefits of Technology-
Enabled Care Services

In partnership with Tunstall Healthcare

Tunstall

About Public Policy Projects

Public Policy Projects (PPP) is a subscription-based organisation which offers practical policy analysis and development in health, care, and other public services. Alongside Executive Chair Rt Hon Stephen Dorrell, The Baroness Blackwood of North Oxford chairs the Health, Care and Life Sciences Policy Board. PPP is independent and cross-party, bringing together public- and private-sector leaders, investors, policymakers and commentators with a common interest in the future of local public policy. PPP offers policy analysis and a secure environment for the discussion of ideas.

Foreword:

Rt. Hon. Stephen Dorrell, Chair, Public Policy Projects

Technology is reshaping our lives. Every sector in the economy – from banking to shopping to socialising – is incorporating technology into its offering to enhance the experience for customers.

Healthcare is lagging behind. Reasons for this are complex and intertwined, including fragmented health and care structures, limited resources, and reluctance to change. Yet digital health has the potential to transform our lives and could make a significant contribution towards the ultimate goal of preventative healthcare.

Many healthcare innovations are now mainstream; with millions of people using technology to count steps, calories, or hours of sleep. Voice-activated assistants, smart doorbells or Wi-Fi-enabled household appliances are also widespread in UK homes. During the recent Covid-19 pandemic many people used video-conferencing platforms for work, entertainment or socialising.

We do not think of these innovations as Technology-Enabled Care Services (TECS). Yet for many that is what they are: innovations that provide remote monitoring, teleconsultation or environmental sensors are vital in enabling people to live independently for longer, reducing the pressure on family, friends and the health and care sector. These technologies are rarely integrated with the health or care systems, and we are still grappling with the introduction of a Personal Care Record, where the information from these devices, as well as other interactions with the NHS or care sector, can be held together.

The better application of technology to the reshaping of the health and care sector as a whole is one of the key challenges that the UK faces. Doing so would deliver significant benefits; most importantly in improving patient outcomes and service-user experiences, but also in reducing the strain on staff and carers, and potentially delivering cost savings or cost avoidance.

The NHS doesn't have an innovation problem; it has a replication problem: successful projects are rarely reproduced elsewhere in the system. This report highlights dozens of case studies in which TECS have been used very successfully and I hope it will encourage swift replication and adoption.

This report also outlines many of the barriers to uptake of TECS in the UK and makes recommendations on actions that could be taken to speed the uptake and adoption of TECS more widely. Technology-enabled health and care is the service of the future, and we must act swiftly to position the UK as a world-leader in this sector.

Foreword:

Gavin Bashar, Managing Director, Tunstall Healthcare UK & Ireland

Established over 60 years ago, Tunstall was the first to create emergency alarm systems for older people, and has led the market ever since, creating a range of technology-enabled solutions to help people live independently for as long as possible. We work with social care providers, healthcare services, housing and retirement living providers and charities in 38 countries, improving the lives of millions of people, including those living with dementia, learning disabilities, physical disabilities and long-term health conditions. Our products and services help to mitigate the risks of many common challenges, such as falls, deteriorating health and social isolation, and help to transform services to deliver better outcomes and become more sustainable.

The last decade has seen an exponential rise in the use of technology in the home, with smart speakers, heating and lighting systems now commonplace. And yet this increased adoption has not been mirrored in health and care provision. The NHS is still using fax machines, and domiciliary care workers continue to fill in paperwork in folders to record care visits. The current Covid-19 pandemic has starkly illustrated why this has to change. Technology connects people, it enables integrated care provision and empowers people to manage their own health and wellbeing. It must play a pivotal role in the way we remodel services in a post-Covid-19 world to create a true 'healthcare' system.

Tunstall's solutions have come a long way from that first alarm system, and our latest generation of technology has moved from just enabling people to get help in an emergency, to providing proactive support tailored to individual needs which can support people in the community for much longer than would otherwise be the case. We continue to pioneer, and the next phase of our innovation and development roadmap is focused on a cognitive care model, which gives providers intelligent data-driven insight to enable them to optimise their Population Health Management programmes by providing personalised and anticipatory care.

Tunstall is delighted to support the production of this report, which provides some excellent examples of the ways technology is being used to improve services and change lives, and its ability to help us create care and health services fit for the future.

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Executive Summary & Recommendations

This report explores how TECS can be used for the benefit of patients, carers and the health and care sector, and makes recommendations about how the UK can be at the forefront of use of TECS, particularly in an era of Covid-19.

Section 1 establishes the types of TECS, including telehealth, telecare, telemedicine, and assistive technologies. TECS operate at a range of levels, from reactively responding to users' needs through to predictive technologies which can identify an incident before it occurs.

Section 2 explores how TECS are currently used in the UK, including the citizens' appetite for such technology. It also quantifies the market potential of TECS and the Government's policy towards these interventions.

Section 3 categorises TECS into five types of service provision: teleconsultation, teletriage, telemonitoring, reminder technology and assistive technologies, and explains how each can be used.

Section 4 highlights the benefits of embracing TECS, including improved patient experiences, better health outcomes, improved staff/carer experiences and lower cost of care.

Section 5 explores TECS in the devolved nations.

Section 6 looks at TECS internationally.

Section 7 considers TECS in the era of Covid-19, and how the rapid adoption of some TECS as a result of the pandemic should be embedded into routine service offerings in the future.

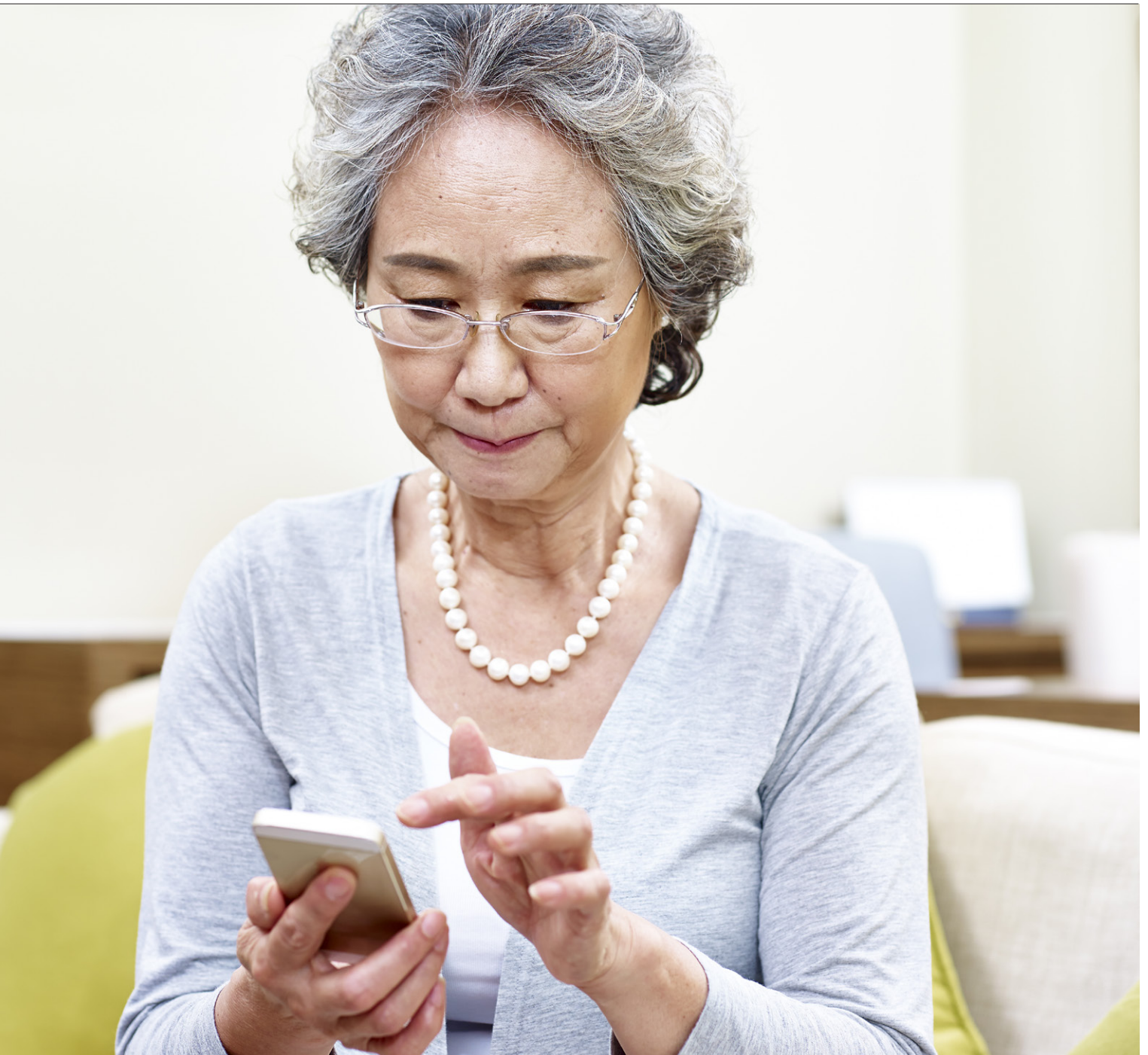
Section 8 highlights the barriers to uptake of TECS in the UK.

Section 9 sets out what needs to be done to achieve the potential of TECS and makes the following recommendations:

- i. The social care sector needs to be supported in becoming technologically enabled. Many care homes and assisted living units currently do not have any form of digital or IT system or Wi-Fi, making the use of TECS challenging. There should be Government support to enable all health and care providers to achieve a minimum technology standard in order that they can benefit from technologies such as remote GP appointments, digital sensors and assistive technologies.
- ii. The commissioning and financing structures for TECS need to be reviewed to support 'invest to save' technologies for which benefits are long term rather than immediate. This may require greater use of innovative funding models such as gain-share agreements.
- iii. The rapid increase in the use of TECS during the Covid-19 pandemic should not be reversed once the pandemic is over. Instead there should be a thorough assessment of where TECS have been beneficial and ensure that progress is maintained, and best practice is shared.
- iv. All employees in the health and care sector should be encouraged to understand the transformational potential of digital technology. Training in

TECS needs to be included in all health and care professionals' education and CPD. To do this, the Government should revisit and implement the recommendations of the Topol Review utilising the Skills for Care Digital Framework¹. The TECS industry also has a role to play in educating all stakeholders on how TECS can be most effectively and efficiently deployed.

- v. There should be further investment in enabling people to live in their own homes



for as long as possible. Local authorities, the NHS, the third sector and individuals need to work together to develop care and support packages which enable independent living. This will require truly integrated patient-centric services, with common objectives, cross-functional working and interoperable systems.

- vi. Alternative methods of assessing TECS and calculating any benefits (outcomes/satisfaction/financial) to service users, staff/carers,

and the wider sector must be developed as it can be challenging to assess TECS services to build the evidence for further usage. Standard methods of conducting evaluations – such as Randomised Controlled Trials – are not appropriate in this field. Only then can there be a wide evidence base on which future services can be designed.

- vii. The Government must provide support to the TECS sector to assist with this switchover and to establish minimum standards of

cyber security for the new digital platform. This digital switchover will have a sizeable impact on the TECS sector with most devices (and indeed non-TECS devices such as landline phones and alarms) needing to be upgraded or decommissioned.

- viii. Integrated Care Systems (ICS) should have a role in driving integration via digital investment to support a collaborative approach between all providers, be they NHS, social care, local authority or third sector.

Section 1:

What are Technology-Enabled Care Services (TECS)?

Telehealth, telecare, telemedicine, assistive technologies

The terms telehealth, telecare and telemedicine are often used interchangeably, yet there are important differences. For clarity and ease of communication, it is important that this terminology is used correctly.

The widely used catch-all term is Technology Enabled Care Services (TECS).

Telecare

Telecare has been defined by the Department of Health as a service that uses 'a combination of alarms, sensors and other equipment to help people live independently. This is done by monitoring activity changes over time and will raise a call for help in emergency situations, such as a fall, fire or a flood.'²

Telecare normally combines monitoring equipment (such as alarms, motion sensors and door locks) with a monitoring service, which responds when a sensor or alarm is triggered, or – in more sophisticated systems – when a pattern of behaviour changes. It is normally installed in an individual's home, sheltered accommodation, or a care home.

Telehealth

Telehealth has been defined by the Department of Health as a service that 'uses equipment to monitor people's health in their own home... [monitoring] vital signs such as blood pressure, blood oxygen levels or weight.'³

Telehealth services can consist of a smart hub which allows the patient to enter vital signs and data or have the data collected by various devices (blood pressure readers, pulse oximeters and blood glucose monitors) which automatically transmit the readings to the hub. In other cases, it can be as simple as the deployment of apps to the patient's own smart device. In both cases, this data is then sent to a clinical or non-clinical monitoring service where the patient's health is monitored, and any unusual readings addressed by the appropriate service.

Most commonly used by people with long-term conditions, telehealth systems can reduce the burden on primary care by allowing people to monitor their own vital signs rather than attend a clinic. Regularly monitoring vital signs can provide an early warning of any changes and reduce emergency admissions.

Telehealth systems can also provide automatic coaching and mentoring for the patient through a series of questions and answers which are processed by the system's software algorithms.





Telemedicine

Telemedicine is the use of video technology to enable specialists and consultants to support patients and other professionals remotely by making a diagnosis and recommending treatments. Often used in remote areas or for emergency specialist care such as thrombolysis for stroke, it can reduce cost and improve patient outcomes.⁴

Assistive technologies

Assistive technologies support, maintain or improve an individual's functioning and independence, by allowing them to carry out day-to-day activities.

Some assistive technologies that began as tools for the elderly and vulnerable, such as smart doorbells or voice-activated software, are now in routine use across people's homes. Conversely, some technology that was developed for commercial uses, such as smart home appliances (e.g. fridges), can be utilised as assistive technologies.

Telecare tiers

Telecare spans a range of TECS, from reactive emergency response through to proactive and personalised services designed to reduce or prevent adverse events arising.

Reactive: At the emergency response level (reactive telecare), installed sensors, worn pendants or other devices ensure that user- or system-triggered alarms can rapidly identify issues and alert the monitoring centre. Once triggered, the monitoring centre will establish contact, triage the issue and deliver the necessary support or external response as needed.

Proactive: Proactive telecare incorporates reactive capability but extends this on a preventive basis with the objective being to avoid or reduce critical situations arising in the first place. Delivered as an integrated programme of outbound calls, follow-ups, homecare visits, along with advice and guidance, proactive telecare provides a much broader and holistic support for service users and their carers.

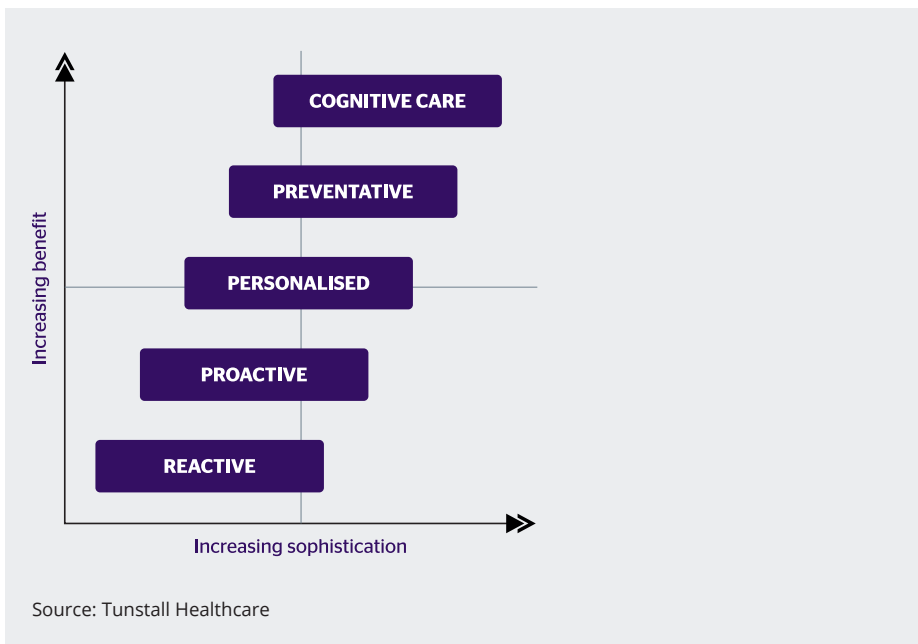
Personalised: The benefit of a proactive approach can be enhanced when the service is personalised to the specific needs of the service user/carer through an ongoing stratification methodology. As well as better meeting individuals' needs the approach enables far greater support to be directed to the cohort with the highest needs, risks and/or service usage. It is, of course, this group who are most likely to place higher demands on social care and healthcare systems, and by improving their support these impacts can be reduced.

Predictive: Use of data-driven predictive analytics can extend the proactive/ personalised capability to facilitate even earlier identification of potential issues so that interventions can be made more quickly, reducing the impacts on the service user and their support systems.

TUNSTALL COGNITIVE CARE

Tunstall Cognitive Care is a vision for an integrated health and care system that enables diverse and scalable models of health and social care. The underlying idea behind Tunstall Cognitive Care is integration. By connecting health and care services it is possible to look at data from multiple sources and over time learn to adapt the way care is delivered. An intelligent system like this would consider both predictive and preventative measures when assessing risks and mitigating circumstances for a community or population to improve and sustain desirable health outcomes.

The goal of Tunstall Cognitive Care is to deliver intelligent health and social care solutions that empower individuals, families and carers. It helps people work out the best personalised care programmes, making sure that those in need have the right level of support and reassurance.



CASE STUDY: ARMED TECHNOLOGY

Predicting healthcare events and stopping them before they happen is the holy grail of preventative medicine. Doing so is beneficial not only for the patient’s physical – and often mental – health, but it is also likely to prevent expenditure for the NHS and care services.

In the case of falls, evidence suggests that incidents can be prevented through monitoring a range of factors, including inactivity, sleepless nights, dehydration, abnormal weight changes and reduction in muscle mass. These can be monitored via a wearable device, worn 24/7 by an individual, with the addition of body-composition scales and grip-strength measurements. The consolidation of these readings with predictive analytics and machine learning allow problems to be identified that may not have been obvious to those in everyday contact.

ARMED technology – from HAS Technology Group – empowers users with easy access to data allowing for better self-management, whilst healthcare professionals (HCPs) can be quickly alerted to potential issues. Through identifying risks at an earlier stage there is the ability to drive change and potentially prevent the occurrence of an avoidable issue such as a fall. Clearly, this presents a far better outcome for the individual, however it also provides significant cost avoidance to the health and social care system. Bangor University (2019) cites an associated cost of £32,000 for dealing with a fractured hip, therefore there is a significant direct and expediential cost beyond this to supporting a significant outcome for that person.

East Dunbartonshire Health & Social Care Partnership initially started collecting data from its service users in 2016, although without using that data to proactively raise risks. Six weeks into the process, an individual fell, resulting in a fractured hip. When the data was reviewed it became clear that this person was extremely inactive and was sedentary for up to 16 hours per day and slept restfully for fewer than three hours per night. When the individual's data was re-run through the ARMED prediction modelling in January 2020 it raised risk-escalation flags that would have been initially raised up to 32 days in advance of the fall, therefore offering the ability of intervening at a much earlier stage and potentially averting the fall.

ARMED was rolled out to 28 individuals within a sheltered scheme run by Loreburn Housing Association. Across the six-month period of May to November 2018, zero falls were recorded within this group. As a comparison, across the control groups where ARMED had not been deployed, 22 individuals fell a total of 59 times. The cost implications associated with providing social care to the individuals who fell were approximated at £200,000 per annum whereas the cost associated with the installation of ARMED was £8,000, therefore representing a 25:1 save-to-spend ratio.

Falls are a public health concern in Wales and represent the largest cause of serious injury for anyone over the age of 65. Around 30 per cent of adults who are over 65 years of age and living at home will experience at least one fall a year. This accounts for more than 4 million hospital bed days. In Wales, it is estimated that between 230,000 and 460,000 people over the age of 65 fall every year, and between 115,000 and 230,000 older people fall more than once per year. Research by Cardiff Council found that someone who had fallen five or six times was 56 per cent more likely to go into residential care within two years. Last year, out of the 3,796 people supported by Telecare Cardiff's response service, 1,088 of them fell, many several times. The number of people who fell more than 10 times in a year increased dramatically, from 17 to 49.

Telecare Cardiff has implemented the ARMED solution in order to identify the benefits of becoming more aware of the changing risk dynamics of individuals prior to an adverse event such as a fall. The project has aspirations of working towards reducing the number of falls, GP calls, ambulance call-outs, increasing activity amongst service users, promoting better sleep and increasing the number of people being referred to the virtual Stay Steady Clinic.

Telecare Cardiff has acknowledged that technology is not the answer, it is the enabler. It is the information that is supporting the ability for facilitating and enabling decisions to be made around supporting people more effectively in a proactive manner. The overall objectives of the ARMED solution are to identify proactive risk escalation of a person prior to an adverse event such as a fall occurring. The ability, therefore, to identify prevailing risk allows for interventions which may include basic things around self-management/telephone call support to be put in place as opposed to dealing with the outputs of an adverse situation after the event.

TECS: how is the UK placed?

It is challenging to quantify where the UK sits on the reactive to predictive framework, as the TECS offering varies between localities. The vast majority of the 1.7m TECS users are likely to be reactive, using alarms to alert carers or family after an event has occurred.

The rise of privately purchased devices, connected to the 'internet of things', also makes quantifying the growth of predictive telehealth and telecare more challenging; how many people are using their own devices to identify changes in their condition, in order to consult a healthcare professional prior to an incident occurring?

There are pockets of mature deployment in the UK such as Luton or Cardiff (see case studies later in the report) but these remain rare and disjointed, with limited replication. Even in these cases, predictive TECS are still only in the early stages of development.

Spain currently has the most mature deployment of proactive TECS (see Section 6), and there is early indication of a growing evidence base for the benefits of proactive service offerings when compared to a reactive service in the UK:⁵

- In a 10-month comparative study of 6,000 telecare users in the UK the total difference between the service users with and without telecare - less the cost of the telecare service - equated to a cost saving of £4,500 per service user per annum.
- A study of approximately 250,000 service users over a seven-year period in Spain concluded that where proactive telecare was in place service users were able to live independently for longer, particularly those who ultimately required residential care. On the most prudent basis of assessment the relative increase for people transferring to residential care compared with the overall was 8.6 months. Using an assumption of £84 per day for residential care, and with 27 per cent of telecare users ultimately requiring residential care, this has the potential to avoid £5,900 per person of costs.
- A five-year study in Spain also concluded that proactive telecare also enabled wider operational efficiencies, particularly in reducing emergencies; inbound emergency calls per person reduced by 54 per cent and ambulance mobilisation by 36 per cent over the study period.

Section 2: How are TECS used, and what is their potential?

Current usage

It is challenging to obtain a complete picture of TECS in the UK. There are clear pockets of best practice, where usage is universal in care homes in a locality, but there are other areas where there has been limited penetration.

As the adage goes, TECS has had more pilots than a commercial airline, and yet despite the success of many of these schemes and the widely recognised opportunities, there is nowhere in the UK where TECS are systematically utilised.

Assessing market size is also hindered by the lack of centralised commissioning. Traditionally, telehealth has been funded by the NHS, and telecare by local authorities. However, as areas move towards integrated care systems commissioning responsibilities are increasingly shared between a Clinical Commissioning Group (CCG), a local authority and often a mental health trust or housing association, making funding channels unclear. There is also likely to be some out-of-pocket or private provision, funded by private care home providers, or installed directly by relatives or carers in an individual's residence.

For telehealth specifically the picture is patchy. Some products or services seem to have achieved good penetration into the NHS and are now being used by several trusts. However, these seem to be the minority, and there are many more innovative products and services that are struggling to gain traction in the UK, often because of unclear funding streams and complex commissioning structures. Again, out-of-pocket purchase is significant and growing, although much of that is likely to be by the 'interested well' rather than those with long-term conditions.

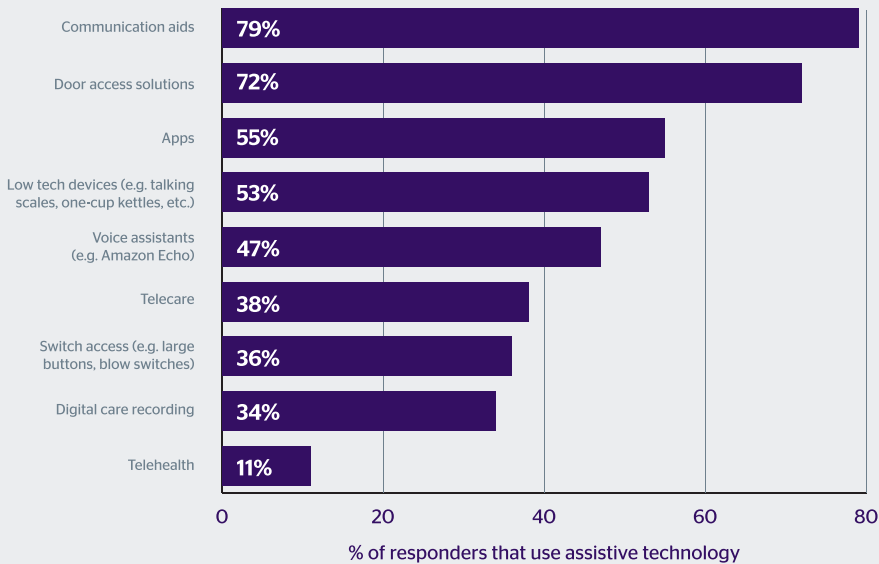
A 2019 report by Socitm concluded, 'uptake of telecare has been static over the last 10 years at 1.7m users nationally.' It goes on to state that the majority of this is an analogue, reactive service, rather than more flexible or portable tools. It concludes that 'only a fraction of the potential of care technology has been exploited, and a key reason has been limited sound evidence of the benefits of investing in care technology, especially cashable cost savings.'⁶

There has been some attempt to quantify TECS usage in Scotland. As at May 2018 there were 130,000 local authority-provided telecare systems in operation and a further 50,000 are in receipt of telecare from housing associations and social care providers. Among those aged 75 and older, 20 per cent are using a telecare device or service.'⁷

HFT SECTOR PULSE CHECK⁸

The 2019 Sector Pulse Check by Hft investigated social care providers' appetite for, and understanding of, assistive technologies. It found that 76 per cent of social care providers use assistive technologies, although only 19 per cent use them as a core part of their service provision. One in five social care providers do not use any assistive technologies. Of those that do utilise assistive technologies the majority used it for communication or door access. Only 11 per cent used them for telehealth and 38 per cent for telecare.

Use of assistive technologies (for social care providers which use assistive technologies)



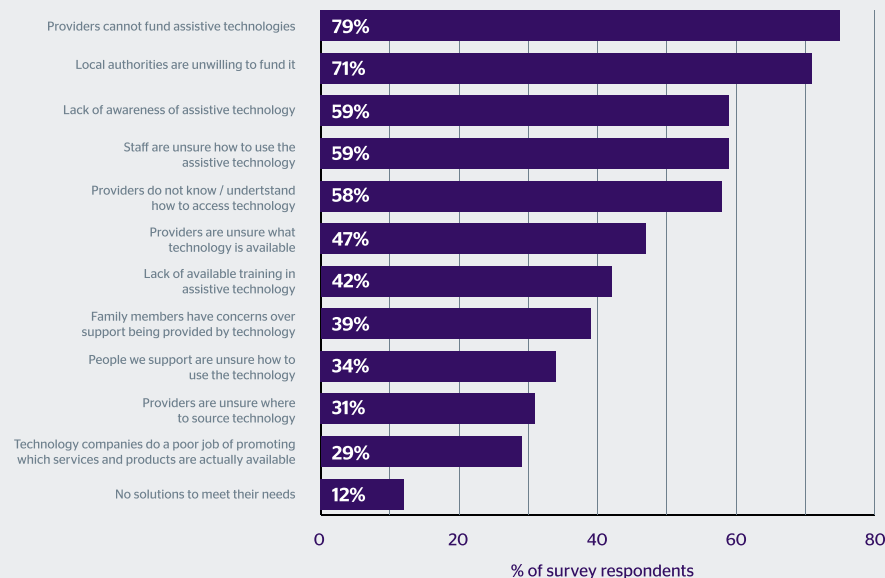
Source: Hft Sector Pulse Check 2019

Organisations using assistive technologies were also asked if they believe they are using it to its full potential, to which the significant majority (81 per cent) answered no.

Despite this limited utilisation, organisations understand the benefits that assistive technologies can offer, with 76 per cent agreeing that these technologies can improve outcomes for recipients, and 68 per cent agreeing they can give users more independence.

When asked about barriers to greater use, funding was the most mentioned obstacle, with limited understanding of the technology also raised.

Barriers to using assistive technology

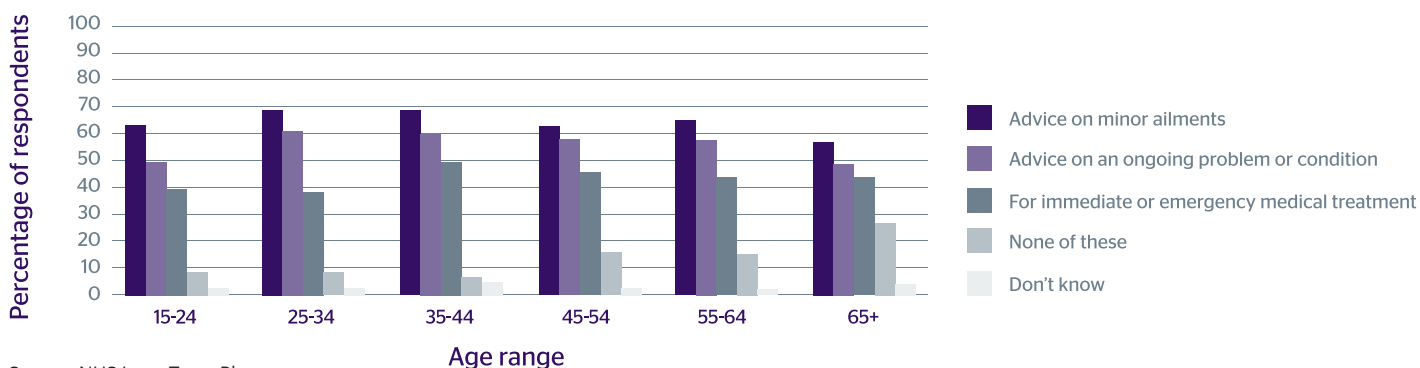


Source: Hft Sector Pulse Check 2019

Patient appetite

Prior to Covid-19 there were some attempts made to quantify patient appetite for the use of TECS. According to the 2019 NHS Long Term Plan, patients – particularly those aged between 15 and 44 – were willing to see their GP via video consultation, although 25 per cent of those over 65 were not willing to under any circumstances.

Public willingness to use video consultations with their own GP



Source: NHS Long Term Plan

“In which, if any, of the following circumstances would you be willing to use a video consultation with your GP?” n=2,083 UK adults aged 15 and over.

A 2018 survey by Healthwatch Enfield found that 60 per cent of the population would use video-calling services such as FaceTime, Skype or WhatsApp to consult with their primary care physician, however, this does depend on characteristics such as age, ethnicity and the medical condition to be discussed.⁹

There is also substantial evidence that people want to stay in their own homes for as long as possible, and thus are likely to embrace any technology which enables them to do so safely. Currently, the over-55s account for 33 per cent of all owners of smart speakers, compared with just 10 per cent of those aged 18 to 24. Embracing that technology – which is already being used in the home – can have health and other benefits for individuals.

TECS is also popular with carers, with over 60 per cent agreeing that telecare/telehealth solutions had given them peace of mind, and one in eight saying these solutions had enabled them to stay in work or return to work.¹⁰

Market potential

In 2015 the entire UK telehealth and telecare equipment and services market was estimated as £200m of turnover for independent providers¹¹, although that is likely to have increased significantly in the last five years.

The most often quoted statistic around TECS’s market potential estimated that the sector could generate £1bn of savings for the NHS, and improve hundreds of thousands of patients’ lives¹². A 2018 European Commission study estimated that the market potential of telemedicine is expected to grow at a compound annual growth rate of 14 per cent in the coming years¹³. The ageing UK population – combined with the digital premium – results in the almost unlimited potential of the TECS market.

What is the digital premium?

The digital premium refers to the potential that digital technology has to deliver more cost-effective, efficient and reliable services. It can do this by preventing issues in the first place, by offering greater flexibility in the delivery of services, and by giving the recipients of these services more independence for longer.¹⁴

TECS and Government Policy

The 2019 NHS Long Term Plan said:

'Under this Long Term Plan, digital-first primary care will become a new option for every patient, improving fast access to convenient primary care. There are about 307 million patient consultations at GP surgeries each year. Some GPs are now offering their patients the choice of quick telephone or online consultations, saving time waiting and travelling. Over the next five years every patient in England will have a new right to choose this option – usually from their own practice or, if they prefer, from one of the new digital GP providers.'

It is hoped this will remove 30 million face-to-face consultations¹⁵. To assist with this transition, NHS England has introduced a new digital tariff into the payment system, which provides for reimbursement at 75 per cent of the rate of face-to-face consultations.¹⁶

Covid-19 is likely to have accelerated achievement of this target, although whether widespread online and telephone consultations will remain after the peak of the pandemic remains to be seen.

Alongside the NHS Long Term Plan, Dr Eric Topol's review, *Preparing the Healthcare Workforce to Deliver the Digital Future*, described telemedicine as an example of 'a technology already in place, but with partial and uneven adoption across the NHS. It is nevertheless likely to be routinely used within a decade.'¹⁷

The report highlights examples of where video streams can detect adverse events such as falls, as well as where artificial intelligence (AI) can be used to read automatically transmitted data and generate patient summaries for HCPs.

There is clearly Government will and ambition behind greater use of TECS, but it must be able to demonstrate benefits, not only in terms of cost savings, but more importantly in terms of patient outcomes and staff and patient satisfaction.

Section 3:

What are the types of TECS?

TECS encompass a range of services, models and provisions across community, primary, secondary and the care home sector. Whilst there is a wide range of models of care, they can be broadly categorised into five types of service provision:

- a) Teleconsultation
- b) Telerriage
- c) Telemonitoring
- d) Reminder technology
- e) Assistive technologies

a) Teleconsultation

In the Covid-19 era teleconsultation is what people imagine when they picture TECS: a patient connecting with their GP via an online video platform. Many individuals would be familiar with this type of platform, routinely using Zoom, FaceTime or Skype for business or personal interactions. However, for a range of reasons, prior to the pandemic teleconsultation made up just a small part of the overall telehealth provision. Data suggests that in 2019 just 1 per cent of GP appointments were conducted via videolink.¹⁸

As of August 2019, just 59,924 people had registered with GP at Hand, opting for a fully online NHS GP service. This is out of a total population of 60,458,907 registered with a GP in the UK¹⁹. Of those who have registered, 85 per cent are aged between 20 and 39, an age group consistently less likely to have health concerns and visit their GP compared to the population as a whole. At the other end of the scale, only 1 per cent of GP at Hand's patients are aged 60 or over, compared with 23 per cent of all patients registered at practices in England.²⁰

In the Covid-19 era the use of teleconsultation has increased exponentially, and this will be further discussed in Section 7.

Prior to the pandemic, there was also limited use of teleconsultation in secondary care, although there have been some promising pilots in Berkshire and Brighton.

CASE STUDY: OUTPATIENT CLINICS, BERKSHIRE²¹

In autumn 2019 Royal Berkshire Hospital began video-conference outpatient appointments for patients in rheumatology, physiotherapy and oncology. The virtual system, called 'Attend Anywhere' allows patients to discuss their progress with medics without visiting the hospital, and the associated complications of time away from work or care responsibilities, plus travel time and costs. The plan is to introduce virtual clinics in other areas including urology, paediatrics, trauma and orthopaedics and occupational health.

CASE STUDY: VIRTUAL FRACTURE CLINIC, BRIGHTON²²

In 2017 Brighton and Sussex University Hospitals Trust introduced a virtual fracture clinic for acute fracture and soft-tissue injuries. This includes a telephone consultation (combining an orthopaedic review and specialist therapist input) and self-management through use of online resources, with subsequent appointments only where clinically indicated. This model of care can meet fracture clinic guidance, whilst realising a saving for the CCG of over £700,000.

Brighton and Sussex University Hospital Trust Virtual Fracture Clinics



Annually, there are approximately

7.6 million

trauma and orthopaedic outpatient appointments



At least

50%

of fracture clinic appointments could be virtual



Virtual fracture clinic appointments reduce the total number of appointments needed by

15%

If scaled up, this would equate to a time saving approximating

570,000

15-minute outpatient appointments

Equivalent annually to approximately



142,000

Hours of outpatient clinic time



80

Healthcare professionals' time back for clinical care

Source: Topol, Preparing the Healthcare Workforce to Deliver the Digital Future

b) Teletriage

Teletriage is another system with which most individuals are familiar. The NHS 111 service has been in operation since 2012 and operates as a telephone triage system, signposting people to the most appropriate service, which might be self-care, a pharmacist, a GP, minor injuries unit or A&E. It handles around 40,000 calls a day, although this has increased to 95,000 a day in March 2020 due to Covid-19.²³

More tailored teletriage services can also be used as part of telehealth. It is a method of rapid clinical assessment of patients whilst they are in their home or a care home. This ensures patients are directed to the best care and support provision and prevents unnecessary journeys or inappropriate use of expensive services such as A&E. The most well-known national provision of video-enabled teletriage is the Immedicare service delivered by the Airedale Digital Care Hub. The offer now goes beyond simply triaging patients to the correct service, and the Hub is able to meet patients' needs remotely, including provision of mental health and therapy services such as speech and language therapy.

CASE STUDY: AIREDALE DIGITAL CARE HUB²⁴

The Digital Care Hub was established in 2011 and has become the country's leading provider of telemedicine, delivering a single point of access to expert clinical and social assessment, diagnosis, advice and support that operates 24/7, 365 days per year. It is staffed by a highly experienced multidisciplinary team comprising nurses, therapists and medical staff from a variety of backgrounds. The workforce is a multi-skilled mix, able to flex across services and respond to peak demands, ensuring 24/7 resilience across the range of digital services.

All calls received by the Hub are answered first time, every time, by a highly trained clinician, ensuring patients receive clinical assessment and advice straight away. This means a smoother pathway and a better experience for patients, with the right care in the right place at the right time.

There is also a teletriage system in operation across all the care homes in Wirral.

CASE STUDY: WIRRAL CARE HOMES

Care homes in the Wirral use a teletriage system to provide advice and support to care home staff to help manage any health concerns they have about their residents. They also facilitate virtual and rapid clinical assessments, without utilising the NHS 111 service. Using Skype on iPads the HCPs can conduct a virtual clinical assessment of the patient and co-ordinate the appropriate care or referral to the most appropriate local service. This benefits patients by enabling care home residents to stay in a familiar environment, rather than make disruptive and difficult journeys to hospital or the GP.





CASE STUDY: ECONSULT TOTAL TRIAGE

Total Triage has been championed by NHS England as the model for general practice to follow during the current Covid-19 crisis. Guidance has been rapidly produced and webinars created to help practices move to this model. Total Triage predominantly relies on practices having as much information as possible about patients' needs so that they can be helped by clinical urgency and need, instead of on a first come, first served basis. Whilst many practices have moved to this model only after encouragement from NHS England, the very first practices to develop and test iterations of this Total Triage model required much support and developed processes over a period of months. Supported by the Devon Digital Accelerator, in collaboration with eConsult, in November 2019 Beacon Medical Group in Plymouth developed and implemented one of the first Digital Total Triage models.

The Total Triage model allows clinicians to decide which patients need an appointment in the surgery and which could be dealt with remotely. It works better than a traditional, purely phone-based triage because online consultation allows the practice to manage a portion of work asynchronously and efficiently. The information is provided by the patient in their own time and following a consistent structure. Key red-flag questions embedded into every symptom or condition questionnaire identify and immediately navigate patients reporting serious symptoms to the appropriate care, to ensure each eConsult submitted is suitable for a primary care response by the end of the next working day.

Online consultations are generally quicker to resolve and open more options for clinicians in terms of how to respond (text, one-way email, phone call, video consultation or inviting the patient in for a face-to-face consultation). Having a full patient history up-front has reduced the need for face-to-face appointments and improved the quality and efficiency of those that are required. Clinicians feel supported in making safe and impactful decisions that are in the best interests of their patients.

At the start of the Covid-19 crisis, Beacon Medical Practice – which by then had six months of experience with Total Triage – increased from just over 1,000 eConsults a week to over 1,400 a week.

eConsult Health has also pioneered digital triage for urgent and emergency care, with an urgent care centre that has been using its patient check-in and automated triage service, eTriage, since January 2018. In early 2020, two additional departments in West Sussex began using eTriage, which is currently being rolled out in hospital departments across England.

c) Telemonitoring

A rapidly growing section of the TECS sector is telemonitoring. Whilst much telemonitoring is privately purchased and used to monitor the 'interested well', it also has a crucial role in the management of long-term conditions. It is particularly beneficial when linked together as part of the 'internet of things' and – where required – remotely monitored by carers or support staff.

There are several NHS Trusts and healthcare providers which already offer a telemonitoring service for patients with long-term health conditions, normally diabetes, COPD and hypertension.

CASE STUDY: MANAGED HEALTHCARE SERVICES IN NOTTINGHAMSHIRE

Tunstall works in partnership with Nottinghamshire County Council (NCC) to deliver a managed healthcare service. This includes home units and telecare sensors such as fall, smoke and heat detectors, as well as items sourced from other suppliers, such as dementia clocks, smart speakers and smart plugs, all tailored to the needs of the individual service users. Tunstall Response monitors all connections, and refers to the NCC Responder team, nominated contacts or the emergency services, as appropriate. Once deinstalled, equipment is returned to Tunstall, where it is cleaned, tested and stored before redeployment. Service users pay a nominal fee each week for monitoring, but telecare sensors are provided free of charge if they are required to meet an identified social care need, subject to the fairer contribution policy for social care. NCC also has Reablement Assessment flats, with telecare in place to support people leaving hospital, helping them to increase wellbeing and regain skills to enable them to return home.

Monitored connections have risen from 1,010 in December 2018 to 1,375 in March 2020. In addition, as of April 2020, there are 1,531 people using stand-alone equipment (not monitored by Tunstall Response) to support them at home as part of the service.

Between October 2018 and December 2019:

- 289 cases where a high and immediate risk of admission to residential care were delayed/avoided
- 739 cases where a delayed transfer of care were avoided
- 250 cases where a high risk of carer breakdown were delayed/avoided
- 655 cases where additional community care costs were avoided

Between April 2019 and December 2019 this has resulted in savings of £2,243,665, after additional service costs, costs of homecare for people diverted from residential care, and loss of client contributions are deducted.

CASE STUDY: HAMPTON – REMOTE BLOOD-PRESSURE MONITORING IN PREGNANCY

High blood pressure affects 10 per cent of the 600,000 annual pregnancies in the UK every year. Standard care pathways require frequent hospital visits. This has significant cost implications, both to the NHS and to patients, and can cause anxiety to pregnant women as it creates a burden in terms of travel and time commitments, including time off from work and childcare. These women may also undergo unnecessary medical interventions, such as induction of labour. Whilst high blood pressure has no impact in 80 per cent of cases, in around 20 per cent it may lead to further complications such as pre-eclampsia. Pre-eclampsia can lead to maternal death and to maternal, foetal and neonatal morbidity.

Home monitoring of hypertension in pregnancy (HaMpton), is an innovative platform which enables pregnant women to safely monitor their blood pressure at home. It allows women to input the results of their blood pressure and protein in the urine, and respond to a set of trigger questions. If the results are within defined parameters, the advice given is to continue monitoring. If the results of tests or trigger questions are outside these defined parameters, then the woman is advised to make an immediate hospital appointment. It alerts women if they need to attend the hospital, and links with the hospital computer system where the data is transmitted in real time. HaMpton empowers women to be involved in their own care, reduces the number of visits (>50 per cent), saves £300 per patient per week (50 million annually across the UK).

d) Reminder technology

Often used alongside telemonitoring is reminder or nudge technology, which notifies patients of an appointment, reminds them to take their medicine or prompts them to check their vital signs, normally via text messaging. Sometimes described as 'nudge' technology, it both reminds and encourages people to take action to help with their self-care, with the aim of reducing or preventing a deterioration in their condition which could require more costly treatments in the future.

This can be delivered by a text message or, more recently, from a smart device in the home or a smartphone.

CASE STUDY: DIGITAL ASSISTANTS IN STOKE-ON-TRENT²⁵

The Staffordshire and Stoke on Trent STP undertook a pilot programme in which they distributed 50 digital assistant kits (Alexa Echo Show plus Wi-Fi if needed) to 50 patients with health or dependence needs. Initial findings are that with the aid of Alexa, patients report being better able to manage their health conditions and lead more independent lives. With the continuing national trends towards increased use of smart speakers in the home, it seems a good time to focus on how to use their existing functions for patients', and potentially for primary healthcare clinicians', mutual advantages.





e) Assistive technologies

Assistive technologies are another rapidly growing market sector, and not just amongst the elderly or infirm. In 2019 it was estimated that 11 per cent of households had a voice-activated assistant, and three per cent had a smart security system such as a video doorbell.²⁶

For those with care needs there is a wide range of assistive technologies on the market, from motion sensors to fall detectors.

As discussed earlier, assistive technology can be reactive, proactive, personalised or predictive, and a range of systems (and a blend of them) are currently operational in the UK.

CASE STUDY: TELECARE IN LONDON BOROUGH OF HAVERING

The London Borough of Havering Adult Services team worked in partnership with Havering CCG to deliver better integrated care for the older population, including increasing the use of telecare. A group of 1,500 eligible telecare patients were given a homecare and telecare package of assistive technologies, and a control group received only the standard homecare offering. The results were then independently analysed.

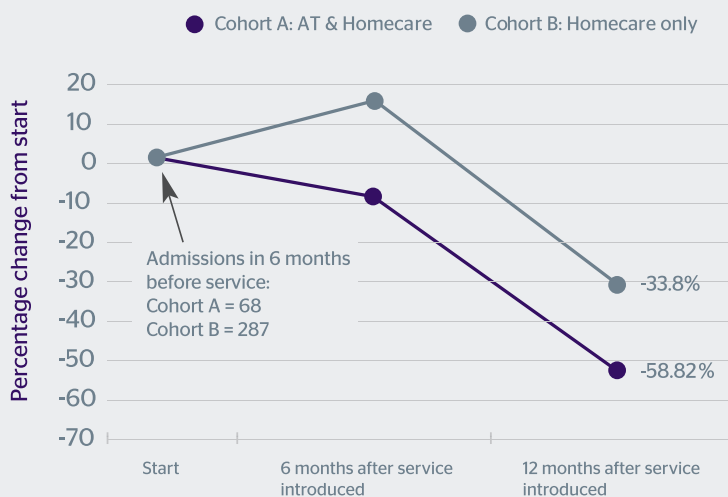
Results

The council commissioned an independent evaluation of the telecare service, resulting in a robust, longitudinal analysis of three key measures to evaluate the benefits provided by the telecare service, comparing two cohorts:

- Cohort A - Adult Social Care (ASC) clients who receive Assistive Technology (AT) and homecare (70 at outset)
- Cohort B - ASC clients who only receive homecare (407 at outset)

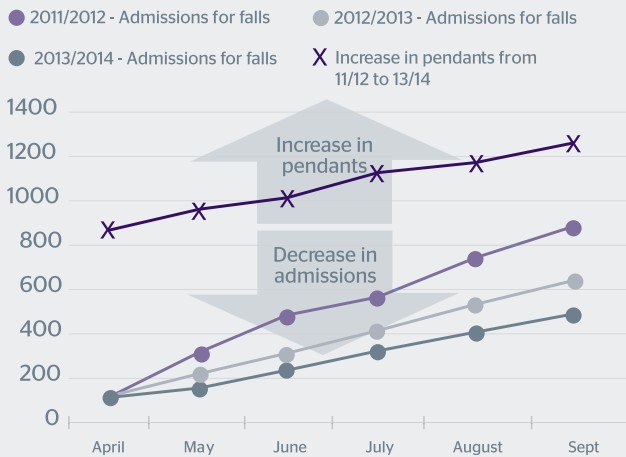
1: General impact on hospital admissions

Cohort A, (AT and homecare) is less likely to be admitted to hospital than cohort B (homecare only) after a period of 18 months by a margin of 25.02%. This contributed to the overall 50% reduction of hospital admissions in the borough.



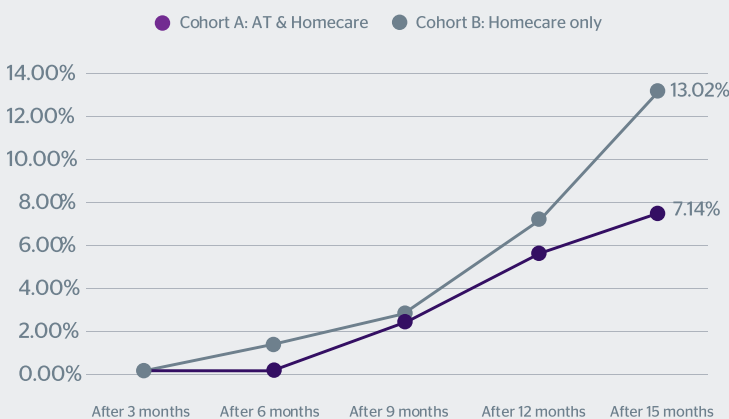
2: Reductions in admissions due to falls

Analysis of ASC data indicates that there is a correlation between the increased number of pendants in the community and a reduction in hospital admissions due to falls of 44% in 2013 compared to 2011. This would convert to an estimated annual saving of £2.24m, or £1.12m if attributing half of this to the telecare service.



3: Impact on admission to residential/nursing care

Cohort A (AT and homecare) is less likely to be admitted into residential or nursing care by a margin of 5.9% than cohort B (homecare only). Cohort A also demonstrates that of those who are admitted there is significant delay in the elapsed time from when they start to receive services until admitted of at least three months but this is likely to be significantly longer. A delay of three months in the start of a typical residential care package costing £25,000 indicates a gross benefit of £6,250. After accounting for the average cost of domiciliary care prior to admittance at £3,125 per quarter the net saving equates to £3,125 per person. If these numbers are factored up, with approximate numbers entering residential care of 300 per year, the projected minimum annual net saving would be £937,500.



Source: Tunstall Case Study

44%

Reduction in hospital admissions as a result of falls for telecare users compared with home care alone.

A next step from purely reactive systems is a predictive system, which either uses early intervention or – in its most advanced form – AI algorithms to predict health and wellbeing needs and provide services to meet those needs. These systems are normally tailored precisely to an individual’s care needs, rather than a one-size-fits-all approach.

CASE STUDY: QUEST FOR QUALITY IN CARE HOMES IN CALDERDALE CCG

Tunstall has been working with NHS Calderdale CCG and other local stakeholders since 2013, when the Quest for Quality in Care Homes programme was first introduced. The aim of the programme was to establish a more consistent and sustainable model of care for older and vulnerable individuals in Calderdale. The programme took a person-centred approach to meeting the needs of people with long-term health and care needs and help to make efficient use of NHS resources. A key focus was to reduce avoidable hospital admissions from care homes, increasing quality of life for residents and reducing demand on primary and secondary care.

The Quest for Quality in Care Homes programme combines a multidisciplinary team, telecare and telemonitoring systems to improve the quality of care and help to reduce avoidable hospital activity and GP visits. It aimed to:

- Reduce avoidable ambulance call-outs, A&E attendances, hospital admissions and GP visits
- Improve resident/patient care and safety
- Respond more effectively to urinary tract infections, respiratory infections, falls and fractures
- Support staff to feel confident in providing high-quality care
- Improve quality of life for residents

The telehealth element of the programme involved utilisation of Tunstall's portable myclinic multi-user telehealth system. At specified times care staff will take residents' readings such as blood pressure, temperature and oxygen saturation. These results are then transmitted to the Tunstall Response Centre and results outside the set parameters will raise an alert on the system, resulting in the Quest Matron being informed. The Quest Matron can then review the results and take any action required. The Quest Matron has secure access to residents' readings at any time, giving them the opportunity to identify trends.

Telecare consists of a range of sensors which can automatically detect incidents such as someone falling, having an epileptic seizure, or leaving their bed, chair or room, and alert staff to these events via a pager. Residents are assessed and sensors chosen according to their individual needs.

More than 1,300 residents have been supported in 38 homes as part of the Quest for Quality in Care Homes programme over the last six years, and the project has achieved significant financial efficiencies and associated cost savings since it was introduced.

Results for the second year of the Quest for Quality in care homes pilot (2015/16) showed:

- The cost of hospital stays has reduced saving £799,561 year-on-year
- Emergency admissions are down 26 percent year-on year





- Hospital stays are down 72 percent year-on-year
- Hospital bed days used has decreased by 68 percent year-on-year
- GP care home visits have reduced, with Quest for Quality care homes requiring 45 percent fewer visits than non-Quest homes

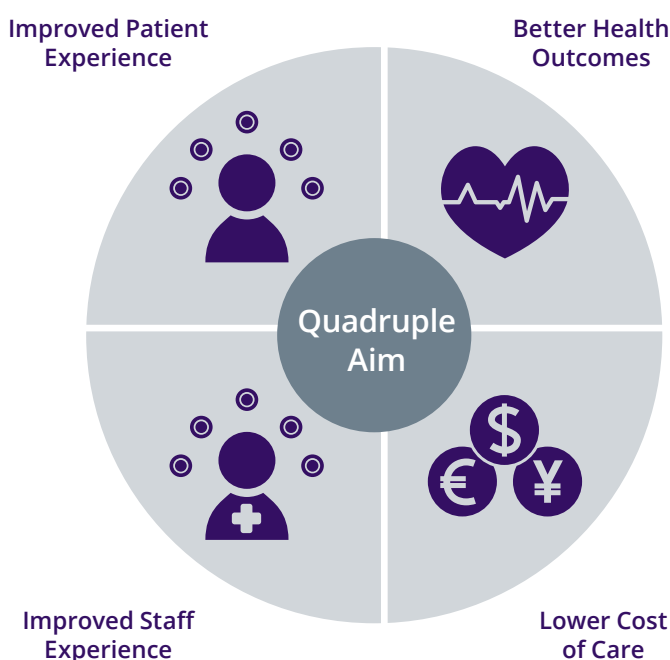
The period 2017/18 to 2018/19 showed:

- Admissions to hospital related to falls due to fractures have reduced by 18.6 per cent year-on-year, which has resulted in savings through the Quest programme of more than £300,000.
- 78.1 per cent of care homes (25 out of 32) have seen a reduction in falls year on year, with 59.1 per cent of homes (19 out of 32) seeing a reduction in falls of at least 25 per cent.
- The percentage of falls to total incidents has decreased year on year from 23.9 per cent to 19.5 percent.

The Quest for Quality in Care Homes programme demonstrates the benefits of integrated working between health and social care, and how this can be underpinned by technology.

Section 4: What are the benefits of TECS?

When assessing the benefits of TECS it is important to reflect on who benefits and to ensure that all parties realise improvements. For that reason, the Quadruple Aim model is helpful:



Source: Philip's Future of Healthcare Index 2019²⁷

However, analysis of the literature and randomised controlled studies offers sometimes conflicting data on the benefits of TECS.

The UK Whole System Demonstrator, established in 2008, concluded in its Headline Findings that, 'early indications showed that if used correctly telehealth can deliver a 15 per cent reduction in A&E visits, a 20 per cent reduction in emergency admissions, a 14 per cent reduction in elective admissions, a 14 per cent reduction in bed days and an 8 per cent reduction in tariff costs.'²⁸ However, in 2013 the programme concluded, 'Telehealth does not seem to be a cost-effective addition to standard support and treatment.'²⁹ This acted as a significant brake on investment in, and commissioning of, telehealth, resulting in patchy and localised provision over the following few years.

However, nearly a decade on from the start of that study the world has changed, almost beyond recognition. Not only is technology to monitor our health widespread, portable and inexpensive, but it is also widely used by all segments of society, not just those with long-term conditions. Attitudes towards technology have also changed, with individuals more familiar with smartphones or smart watches monitoring our sleep, steps or heart rate, as well as more comfortable with the use of voice-activated assistants.

Even more recently, Covid-19 has also had a significant impact on individuals' behaviour, with people increasingly turning online for a range of services including, for the first time, healthcare services.

A review of more recent studies – including looking internationally to more established TECS markets – has found more positive assessments of the benefits of TECS. On a general level, an analysis of a range of studies done in the US concluded that there were obvious benefits in terms of convenience, time saved and reduced travel costs, but studies also showed no reductions in the quality of communication or quality of care.³⁰

Breaking that down into the segments of the Quadruple Aim:

Improved patient experience

TECS have a significant role to play in improving the experience of individuals who need health and care services, their families and carers. Services such as telecare enable people to stay in their own homes for longer and provide reassurance to their carers and families through devices such as pressure sensors, fall, smoke and flood monitors.

By allowing patients to take vital signs readings remotely, telehealth services reduce the number of visits patients have to make to clinics, reducing travel time and costs, whilst encouraging service users to engage with their medical condition.

Evidence from a small-scale study in the UK suggested similar findings to studies elsewhere in the world, with patients and clinicians generally positive about the use of video consultations. For those who work, are housebound, have significant caring responsibilities, live a long way from the surgery or who have mental health needs, teleconsultation was especially appealing as it resulted in saved time, transport costs and anxiety. Despite this, both clinicians and patients felt that for serious or sensitive problems face-to-face consultation was better³¹. This was confirmed in the Topol Review, which stated 'video consultations appear to be well received by patients, with the greatest benefits being seen with specific patient groups as part of their long-term care.'³²

A recent paper assessing the effectiveness of video conferencing for healthcare in the UK concluded that 'teleconsultations appear to be safe and effective in the right clinical situations'.³³

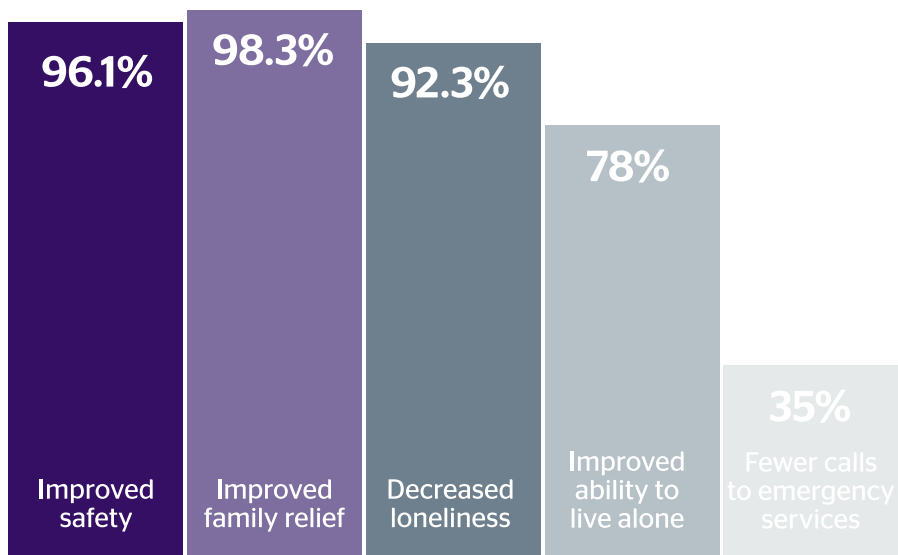
There is likely to be significantly more data on patient experiences of video consultation after the Covid-19 pandemic, during which time there has been a rapid increase in the use of such technology for physician-patient consultations.

Beyond teleconsultation, evidence of patient satisfaction with TECS is patchy and small-scale. In the Stoke-on-Trent trial of smart devices, nearly all the device recipients have reported increased independence since using the device.³⁴

There is currently no standard assessment procedure on the benefits of assistive devices³⁵, although small-scale studies and user-feedback surveys find positive patient experiences of the technologies.

In terms of service-user perceptions a study on the impact of telecare on 1,200 elderly people and their families, by the Fundació Salut i Envel·liment (FSiE) at the University of Barcelona in 2016, illustrates not only the significant improvement in user-reported perceptions of their safety and self-sufficiency, but also in terms of peace of mind for their families:

Impact of telecare services based on explicit evaluation



'Telecare has a particular impact on the increase of the perception of safety at home, the individual's self-sufficiency and the family's relief.'³⁶

CASE STUDY: LIBERATE HEALTH MEDIA PACKS

Liberate can be used during GP face-to-face consultations to help the doctor explain a condition to the patient. The details of every consultation, including an audio-visual recording, medical illustrations, annotations and highly visual infographics are captured in a consultation 'media-pack' which can then be shared electronically with the patient. The patient can then review the consultation as often as they wish and even share it with trusted caregivers to improve understanding and compliance, leading to greater efficacy, fewer hospital admissions and readmissions.

HCPs have, on average, just 11 minutes to spend with each patient, and just 49 seconds to properly instruct patients about taking a new medication or talk them through exercise or lifestyle changes. In many cases, this is not sufficient time for the GP to check an individual's understanding, or to allow for follow-up questions. Allowing patients and their caregivers to review the information repeatedly – and in their own time – can improve a patient's understanding of their condition.

CASE STUDY: BRAINOMIX E-STROKE SUITE

Brainomix is an Oxford-based company specialising in the creation of AI-powered software solutions for medical imaging.

Mechanical thrombectomy is the most effective evidence-based treatment for ischaemic strokes that are caused by large vessel occlusion. Currently only 10 per cent of eligible patients are receiving this life-saving treatment in the UK. The NHS England Long Term Plan aims to increase the number of patients undergoing mechanical thrombectomy.

Most of these patients arrive at smaller stroke centres, where the level of expertise in interpreting brain scans can sometimes be limited. Fast identification of large vessel occlusion and reliable quantification of the extent of ischaemic injury is crucial to the robust delivery of a mechanical thrombectomy service, so that the patients can be referred to a specialist centre within the critical time window to receive the treatment. Covid-19 posed additional challenges, with A&E departments busy with suspected virus patients, and physicians redeployed across the hospital, creating the need for more remote decision making.

The e-Stroke Suite is an AI clinical decision support tool which processes non-contrast CT and CT angiography stroke scans in real-time and highlights and quantifies early ischaemic changes. It can also identify large vessel occlusion and collateral vessel density in the anterior circulation.

Royal Berkshire Hospital (RBH), Reading was the first hospital in the Thames Valley region to introduce the e-Stroke Suite into the stroke pathway. The Covid-19 pandemic demanded a rapid service redesign to enable remote decision making. In response, RBH fast-tracked the adoption of the additional e-Stroke Cloud capability of the Brainomix software, enabling the use of a smartphone app. The app enables instant access to brain imaging for on-call stroke or neurology consultants, alongside the AI decision support. The app also has the functionality to share pseudonymised images outside the organisation to facilitate referral along the stroke pathway, or to seek expert opinion remotely.

The pathway redesign that was made possible by the e-Stroke Suite enabled RBH, during the peak of Covid-19, to refer three patients for mechanical thrombectomy who presented out of hours to the hospital. The clinical decision and referral were made remotely with the help of e-Stroke Suite app. In addition, it also helped the delivery of intravenous thrombolysis to patients presenting out of hours. This enabled RBH to maintain a high thrombolysis rate of 30 per cent despite the challenges of Covid-19. Following the success of the RBH model, the Brainomix e-Stroke Suite has been deployed in all three primary stroke centres and in the tertiary neuroscience centre (John Radcliffe Hospital) in the Thames Valley region, making it the first AI-enabled regional stroke network in the country.

Better health outcomes

There is significant evidence that telecare and assistive technologies can not only reduce hospital admissions and GP visits, but that personalised and predictive care can also prevent incidents in the first place. This can be in the form of monitoring vital signs to identify possible future healthcare needs, or early detection of adverse events such as falls.

For telehealth, one meta-analysis concluded: ‘the use of telemedicine in the management of heart failure appears to lead to similar health outcomes as face-to-face or telephone delivery of care; there is evidence that [telemedicine] can improve the control of blood glucose in those with diabetes.’¹³⁷

In the UK, a randomised, parallel, investigator-blind controlled trial in primary care concluded: ‘telemonitoring and supported self-management of blood glucose can result in clinically meaningful improvements in blood glucose among people with poorly controlled type 2 diabetes managed in routine family practice while requiring relatively small increases in clinician workload.’¹³⁸

There is also widespread acceptance that patients who are actively engaged in their health and care experience better outcomes. Thus technologies – such as assistive technologies or remote monitoring – which encourage people to monitor and engage with their health will result in better patient outcomes.

CASE STUDY: LONDON BOROUGH OF SOUTHWARK AND BRAIN IN HAND

People with autism, a learning disability or mental ill-health often experience challenges with decision-making and managing their emotional and behavioural responses to specific events or scenarios. A relatively small proportion have long-term needs that are deemed eligible for statutory services but even those with lower-level needs can require intensive support when in crisis.

Southwark approached a company called Brain in Hand to explore how it could support this type of need. Brain in Hand is a user-friendly app that turns the current way of supporting people on its head. It empowers people to take control of their care and adopt greater self-management of their condition, enabling them to develop and practise personal coping strategies that help them to avoid crises.

With the support of a trained professional, users set goals and pre-programme the app with their routines, prompts/alerts and practical solutions. This allows them to access support whenever and wherever they need it via their smartphone. This is backed up by a support team that can include family and paid carers, and who (with the user’s permission) can access the Brain in Hand dashboard to view their progress. An anxiety monitor built into the app allows the user to report their anxiety levels via a traffic-light system, prompting supporter contact when in the ‘red zone’ or after multiple amber alerts.

Brain in Hand is based on Cognitive Behavioural Therapy and has been independently proven to help reduce anxiety and improve independence. It does not focus on a condition or diagnosis but instead will focus on the goals the person wants to achieve by using the strengths they already have and those they can develop.

As Brain in Hand is a digital device the usage of the system can be captured. More specifically, it is possible to identify the number of times a routine daily task has been completed and how many times it has not. It also collates data on the number of web traces and mobile traces which indicate that the pre-programmed strategies were used when the person needed support. The final data that the system captures is the traffic-light activity. This is an indicator of mood in the form of green, amber and red lights. This helps to promote self-monitoring and self-regulation by encouraging the user to pause briefly and reflect on how they are feeling throughout the day. A record of their traffic-light presses is stored on their timeline.

Improved staff /carer experience

As well as for patients, it is vital that staff and carers find TECS beneficial, both in terms of reducing workload and benefiting users. In one study of telehealth, a greater sense of job satisfaction and a reduced burden of travel was reported amongst staff.³⁹

For telecare and assistive technologies, causality can also be drawn that a reduced number of incidences, swifter resolution of issues and reduction in inappropriate call-outs will result in increased job satisfaction and reduced workload for staff and carers.

Carers in particular have reported a sense of reassurance from knowing that they would be alerted in the event of an incident, allowing them some time to recuperate, and prevent carer burn-out. In carers for those with dementia utilising assistive technologies, a study found, 'carers generally appreciated using assistive technologies.'⁴⁰

CASE STUDY: MYPREOP® BY ULTRAMED

Prior to an operation or procedure, an individual's fitness needs to be assessed. This is normally done during a face-to-face appointment with a registered nurse and takes around 45 minutes, as the nurse asks a long list of questions and writes down the answers, before moving on to the clinical decision making. MyPreOp allows the patient to answer the questions online, without paperwork.

Patients can complete MyPreOp from their homes using any internet-enabled device such as a desktop computer, a tablet, or a smartphone. The information they share with their healthcare provider is then reviewed by a registered nurse. Only those patients that must be seen face to face are then asked to attend the hospital for a preoperative assessment appointment.

The Clinical Summary Report that is produced has sophisticated clinical decision support. This is reviewed and triangulated against other information held in the hospital system by the registered nurse. They start the process with the questions answered and it therefore saves approximately 30 minutes per patient, enabling staff to spend more time on patient care rather than completing paperwork. During the Covid-19 pandemic it has also reduced the requirement for face-to-face contact, minimising infection risk. MyPreOp is supported by NHS England to scale nationally through the NHS Innovation Accelerator programme.⁴¹

CASE STUDY: CLOUD GATEWAY AND SENSYNE HEALTH VITAL SIGNS MONITORING

Oxford University Hospitals (OUH) NHS Foundation Trust realised the limitations of a paper-based 'early warning' to monitor if patients' vital signs were deteriorating. To address this, OUH worked with Sensyne Health to develop a web-based software application, SEND™. This allowed health professionals to monitor patient health within medical facilities via tablets and bedside devices which display early warning scores for clinicians.

As well as in-hospital monitoring, the software allows patients to enter their own data into mobile applications for remote monitoring and improved patient safety outside the Trust's facilities. To enable this, SEND™ needed to connect to the Health and Social Care Network (HSCN) to be able to securely send the patient data for monitoring. Cloud Gateway's hybrid cloud connectivity PaaS solution, PRISM, was able to provide secure HSCN connectivity and reach their application in Azure via private connections in UK data centres – essential for the project's success and to enable a much faster time to market.

As a result, the application is now able to provide a real-time overview of patient data, and consumers of the application can connect to it via the HSCN. Data and results are displayed in a simple and clear format so that patients and their families can easily understand them. Patient records are immediately available to clinicians, remote consultants, the nursing station in the Trust's facilities and via remote monitoring, rather than being accessible only at the bedside. Clinicians can prioritise patients based on real-time results and complete health records, which allows them to manage their time more effectively. Patients are benefiting from immediate identification of their condition and vital signs are being shared and monitored as part of normal clinical care, rather than in an emergency.

To date, 33 million observations have been recorded using SEND™, with a 30 per cent reduction in time to undertake a set of vital signs observations. This has lowered nursing workload as well as improved documentation quality. The time saved has released the equivalent of 3.5 full-time nurses back to the hospital in every 24-hour period. Hospital nurses can spend more time providing care to patients instead of doing administrative tasks. As a result, the care of over 200,000 patients has been enhanced.

Lower cost of care

Demonstrating 'cashable' savings from TECS programmes can be challenging, particularly in the short term. Much of the cost saving is likely to be costs avoided (i.e. reduced hospital admissions, delayed admission to residential care) rather than immediate bankable savings, and often the benefits accrue to a different legal entity or scorecard than the expenditure was initially drawn from. However, attempting to calculate 'cash' savings is likely to grossly undervalue the potential impact of a TECS programme.⁴¹

The TEC Services Association (TSA) conducted an evaluation across 39 councils which identified average annual savings of £1,163 gross/£890 net per user (typically 70 per cent cost avoidance; 30 per cent cashable).⁴²

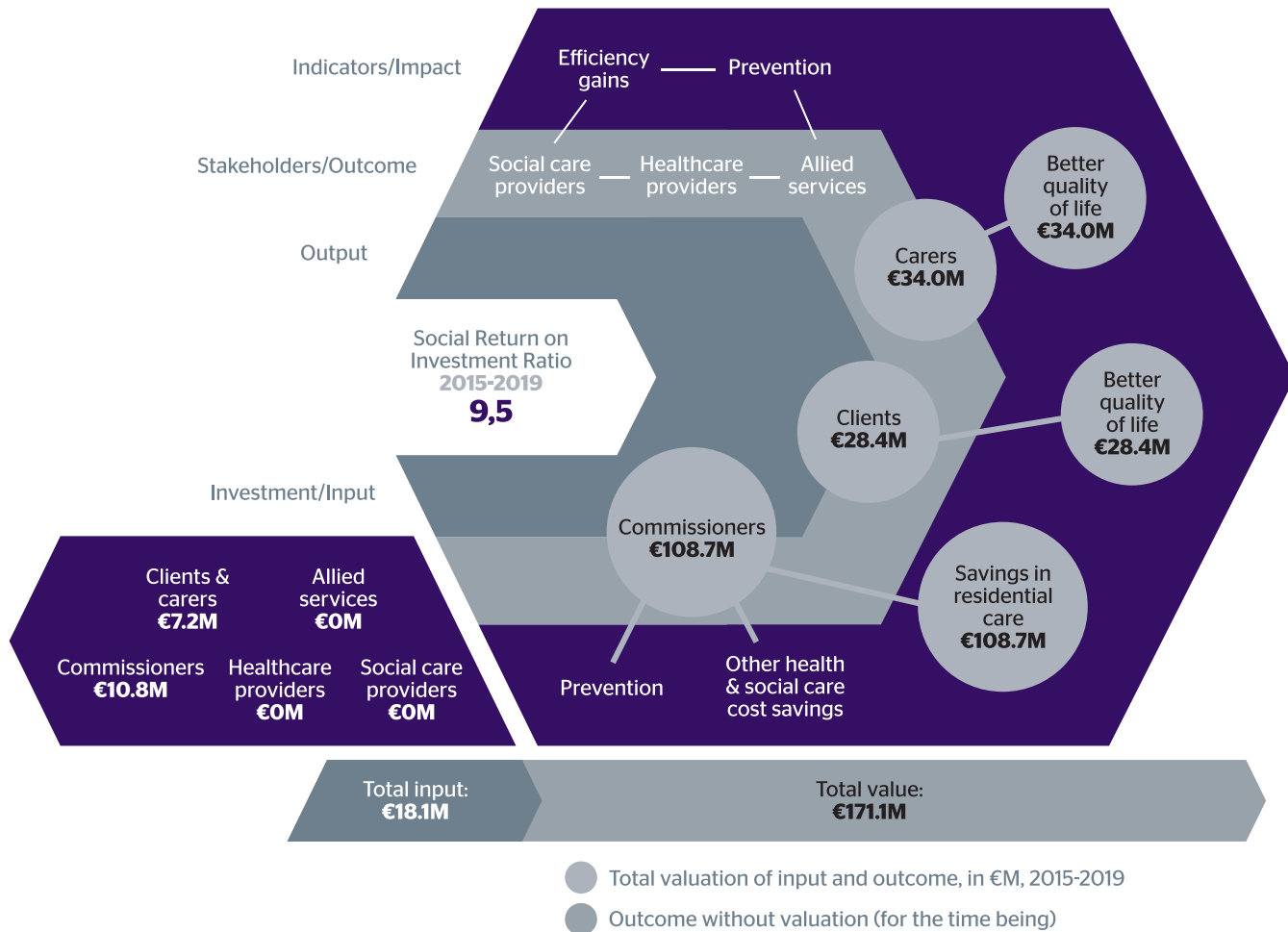
There are currently no long-term studies into the cost savings of TECS, but there is some excellent analysis of telecare which shows that individual programmes reduce emergency admissions and GP call-outs, and allow people to stay independent for longer, delaying time until more expensive care is required.

A 2018 EU study found that 'telemedicine is generally perceived and judged to be cost-effective in 73.3 per cent of the cases addressed by the literature.'⁴³

There are obviously some up-front costs associated with the installation of assistive technologies. 'Incorporating the latest digital technology aids into new sheltered housing builds, for example, adds considerable cost. But a lack of such technology means that residents are less able to fend for themselves at home and may have to visit hospital more often. With every elective hospital case costing around £4,000 and every extra day as an in-patient costing nearly £400 in 2018/19, failing to install such technology seems like a false economy.'⁴⁴

A study by VitaValley shows that the Social Return on Investment Ratio for proactive telecare services in Spain was 9,5:

SROI Quick Scan - Pro-active Services



CASE STUDY: HAMPSHIRE TELECARE

Hampshire County Council estimated that it currently spends around £1m a day supporting older people. With Hampshire's over-75s population expected to grow by 80 per cent by 2030, this figure is set to rise. With this in mind, and with Government funding being dramatically decreased, the Council reviewed new ways of delivering social care, which could also offer greater choice and independence to its older residents. The Council's management team recognised that increasing its use of telecare could offer a solution that would reduce costs without putting the users of its services at risk. In October 2014, the Argenti Telehealthcare Partnership (led by PA Consulting and including Tunstall Healthcare, CareCalls, Medvivo and Magna Careline) was appointed to help to transform Adult Services in Hampshire by increasing the number of people being supported using telecare.

The new telecare service has been introduced to help prevent unnecessary hospital admissions or readmissions and reduce the need for domiciliary care and delayed admission into residential or nursing care by providing unobtrusive support for people in their own homes. Services are offered free to users with critical and substantial needs, improving wellbeing for those with the greatest or most complex needs, including the increasing numbers of people with dementia. It was identified that one of the reasons that telecare had not become a mainstream service already was that the social care teams were not aware of the benefits of telecare and were unsure of the referral process.

Where it was used, there was no feedback system to demonstrate its effectiveness and promote future use. The Tunstall team, as part of the Argenti partnership, worked with the Council to develop a bespoke awareness and training programme, developed to meet local needs and focused on identifying risk and solutions to mitigate risk whilst promoting a new online referral process. Bespoke materials including slide decks and exercises were developed and delivered by a dedicated lead trainer, with the support of two other trainers, over a four-month period to ensure all relevant staff were trained.

The awareness and training programme undertaken by the Tunstall team has played a vital role in changing staff behaviour and supporting the cultural change needed to make the telecare service a success. Staff now understand the benefits of telecare for the people they support and have confidence in using it appropriately. More than 700 staff were trained over an eight-month period, from November 2013 to the end of July 2014. An initial target of 630 telecare users was exceeded, with almost 2,000 systems installed within the first full year of operation. ➤

A benefits-tracking system devised by PA Consulting recorded more than £800,000 in net savings to the Council, over a 12-month period because of the increase in telecare referrals. This effectively means the telecare service is self-funding yet achieving the Council's goal of helping people to retain their independence, dignity and wellbeing and ability to live in the place of their choice.

The positive results of the telecare service have been captured and communicated to professionals, resulting in continued ongoing referrals. As a result of the success of the programme, Hampshire County Council has committed to increasing its spending on telecare to £20.7m over the next five years. Telecare is now an established mainstream service, offering a safe and viable alternative to home visits and residential care.

CASE STUDY: LUTON ADULT SOCIAL CARE – FRAMEWORK FOR FRAILTY⁴⁵

The Luton health and care system developed a 'Framework for Frailty' through multi-stakeholder collaboration in response to requests from partners for a common approach to the early recognition and identification of frailty as a long-term condition. It was anticipated that by making this data available, there will be better targeted prevention and early intervention through a multidisciplinary approach.

This project aimed to incorporate data received from the Assistive Technology system, telecare, and have this information recorded in the Social Care System (Liquidlogic), to provide health and social care staff with a more holistic view of patients' likely health and social care needs.

It was calculated that this project reduced hospital admissions and resulted in £2.7m of potential hospital savings. There was also better cross-functional working between hospital and community staff, and increased knowledge to enable all staff to better support service users. Real-time data availability also allowed for improved prioritisation.

CASE STUDY: LANCASHIRE COUNTY COUNCIL TELECARE

The Lancashire Telecare Service has achieved the dual goal of increasing the cost-effectiveness of social care delivery and improving the service user experience.

The Service was established in 2015 to improve and expand the use of telecare as part of a package of solutions to address the increasing demand for social care. By expanding telecare, it was hoped to prevent, reduce or delay the need for other health and care services, improving people's outcomes, and giving carers peace of mind.

To assess the effectiveness of the intervention, a study was undertaken, with service users divided into two groups: one who received telecare on top of the normal service offering, and one who received only the standard care, without telecare. York Health Economics Consortium conducted an independent evaluation of the service and concluded:

- The total difference between the intervention and control is £4,949 per service user for the whole year.
- Cost of telecare is £384.80 for the whole year.
- Net difference between the intervention and control groups is £4,564.
- Total number of service users with telecare and other social care is 2,926. There would be an additional cost of £13,354,849 per year if they had not received telecare.
- The daily saving per user is approximately £12 – roughly equivalent to an hour's domiciliary care visit, for example.

Challenges for TECS

One of the challenges of TECS is that they normally require a minimum level of infrastructure, such as a Wi-Fi connection or smart device, or a minimum level of skill, such as using a touchscreen interface. Evidence from Scotland confirms that those who experience health inequalities are most likely to be digitally excluded, thus exacerbating the health inequality.⁴⁶

Additionally, many of the benefits of TECS for the health and social care system are only realised once a critical mass of users is achieved. Even when this number is reached, services are often required to be provided in multiple forms (paper, telephone and online) to ensure everyone can benefit, which has an impact on the potential cost savings.

Both challenges must be considered when assessing the potential benefits of TECS solutions.

Section 5: TECS in the devolved nations

a) Scotland

Scotland has long been at the forefront of the use of TECS. In 2008 the Scottish Government published its First National Telecare Strategy⁴⁷ followed by the Telecare Action Plan 2010-2012⁴⁸. In 2012 the Scottish Government published 'A National Telehealth and Telecare Delivery Plan for Scotland⁴⁹.' This was followed in 2018 by the Digital Health and Care Strategy⁵⁰ and in 2019 a Delivery Plan⁵¹. Scotland also has a clear vision for its TECS:

'I have access to the digital information, tools and services I need to help maintain and improve my health and wellbeing.

I expect my digital health and social care information to be captured electronically, integrated and shared securely to assist service staff and carers that need to see it ... and that digital technology and data will be used appropriately and innovatively:

- to help plan and improve health and care services
- to enable research and economic development
- and ultimately improve outcomes for everyone.⁵²

Since 2014 Scotland has spent around £9m per annum on a programme designed to increase citizen choice and control in health, wellbeing and care services⁵³. In 2018 Just Economics conducted an evaluation on behalf of the Scottish Government on the TEC programme. It concluded:

'There is emerging evidence for the value and impact of the TEC programme. Stakeholder engagement with implementers of technology-enabled care found that the TEC programme is highly valued and that it is unlikely the technology development, deployment and adoption could have happened independently. This conclusion is supported by the secondary literature on implementing technology-enabled care which highlights the need for dedicated funding, personnel and expertise to drive a programme of work such as this, especially in light of widespread barriers to adoption.'⁵⁴

Telecare is particularly advanced in Scotland. There are nearly 130,000 local authority-provided telecare systems currently in operation, with an estimated additional 50,000 people being supported via housing and care provider organisations. Among those aged 75 and older, 20 per cent are using a telecare service. In Scotland, there is evidence that use of telecare had the following outcomes:

- enhanced dignity, independence and quality of life in clients
- increased confidence of vulnerable clients to be more active
- increased health and wellbeing in carers
- reduced unplanned hospital admissions and prevention or delay of admission to care homes.⁵⁵

Home and Mobile Health Monitoring (HMHM) – also known as remote monitoring – is rapidly expanding in Scotland with 15,765 people using the service between May 2015 and June 2018⁵⁶. Positive outcomes were also reported for this programme; The main outcomes for patients were ‘a feeling of reassurance from the increased connectedness that HMHM offers. There was both quantitative and qualitative evidence for clinically focused outcomes around health and some evidence of reduced health visits and hospital admissions. Challenges centre mainly around the use of the technology and overcoming the initial trepidation of staff and patients around its use.’⁵⁷

Tunstall in Scotland

Tunstall has been delivering telecare and telehealth solutions across Scotland for decades. Alongside this service offering, Tunstall is a lead partner in the Digital Health and Care Institute’s Next Generation Solutions for Healthy Ageing Cluster. The cluster brings together corporate, SME, academic, health and care providers to enable them to co-design digital solutions to some of Scotland’s biggest health and care challenges. The project aims to develop personalised and preventative solutions and services fit for the 21st century, helping the Scottish population to live longer and healthier lives, while creating new jobs for the economy.

b) Wales

Like Scotland, Wales has had several reviews, strategies and plans focused on TECS. In January 2016 the Mid Wales Joint Committee published ‘A Review of Telehealth, Telecare and Telemedicine in Wales.’⁵⁸ It concluded that despite TECS activities across Wales, there were ‘common barriers to the success of technology-enabled care activities; lack of project management resources, clinician and patient engagement and infrastructural issues.’⁵⁹

In June 2018, a National Programme for Technology Enabled Care was initiated to provide oversight, cohesion and structure to Technology Enabled Care activity in Wales. TEC Cymru has a ‘Project Register’ for TEC activity planned or under way in Wales and an ‘Evidence Library’ to centralise and organise evidence regarding the use of technology in the field of Video Consulting, Telehealth and Telecare.⁶⁰

CASE STUDY: LLESIAANT DELTA CARE⁶¹

The aim of the project, which is the first of its kind in Wales, is to support a prevention and early-intervention care system through telehealth. It combines TECS such as lifelines and pendants, fall detectors, GPS tracking devices, door sensors and medication dispensers to enable individuals to live independently for as long as possible, with proactive wellbeing calls which can help identify any potential health and wellbeing issues at the earliest opportunity to ensure needs are supported accordingly, providing a specialist response service and via community-based support whenever individuals need it. It also offers wraparound support services: a 24/7 deployment team for emergencies, face-to-face ‘stay well’ planning and specific actions to reduce loneliness and isolation.

CASE STUDY: FALLS PREVENTION IN CARDIFF

Falls are a public health concern in Wales among older people. They are a major cause of disability and death, with falls the most common cause of injury in people aged 65 years and older. Following a fall, 28 per cent of older people (those aged over 65) die within a year and for those who suffered a hip fracture, half 'never returned to their previous level of independence,' and approximately 20 per cent entered a care home.

In 2018/19, Telecare Cardiff responded to 2,929 calls where a service user had fallen. By having a response service in place, we were able to reach those in need of assistance without placing any added pressure on the Welsh Ambulance Service Trust. Of the 2,929 calls we attended, only 6 per cent resulted in an ambulance subsequently being called. Telecare Cardiff responded within one hour to 99 per cent of all service users who had fallen. By responding within an hour, 'long lies' were prevented. A long-lie fall is defined as someone who remains on the floor for over one hour following a fall. There is a 50 per cent chance that someone will die within six months if they have a long-lie fall. This highlights the important role telecare services can play by being reactive to emergency situations. In 2019-20 £672,000 of costs were avoided, on top of over £500,000 of savings in each of the previous two years.

The research into falls within Wales and the rest of the UK alludes to technology as a potential enabler in reducing them. However, there is minimal evidence highlighting the important role telecare services can play. Telecare services with a response element prevent long lies and ultimately premature death or early entry into a residential care setting. There is now the potential for response services to use data analytics by feeding correct, relevant data into various Microsoft software packages such as Excel, Azure and Power BI to adopt a proactive approach to falls management. Currently, Telecare Cardiff will look at how the customer has fallen, when and how often, to identify patterns within a person's falls history. This is a new process, but one which is felt will transform the way telecare services treat falls within a community setting.

Section 6:

TECS internationally

There is no systematic, evidence-based comparison of TECS internationally. Best practices are often drawn from France, such as Advanced Telecare in Limousin, or Sweden, such as Action in the Borås Municipality⁶³. However these services are a part of the health and care system in which they are embedded, so direct replication can be challenging.

Spain is home to the largest teleassistance service in Europe, with over 200,000 users of the Andalusian Telecare Service. The service makes over 16,000 calls per day, with an average satisfaction score of nine out of 10.⁶⁴

CASE STUDY: TELEASSISTANCE IN SPAIN

Tunstall supports more than 475,000 people across Spain with telecare and associated services, and its eight monitoring centres manage more than 17.7 million calls each year.

The Tunstall teleassistance service combines telecare monitoring and response, co-ordinates social care and third-party services and delivers proactive outbound contact from monitoring centres. Teleassistance aims to provide continued contact and support to older and vulnerable people in the community, helping them to remain independent for as long as possible and delay or avoid the need for more complex interventions.

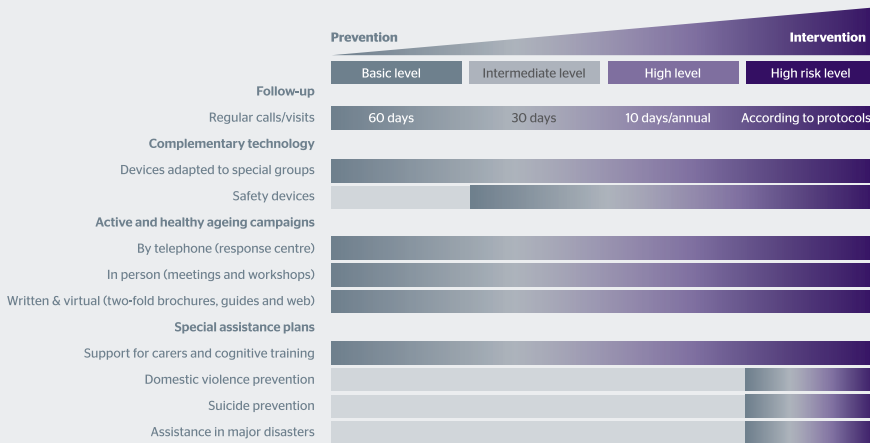
Tunstall supports over 165,000 people in Catalonia; 85,000 under Barcelona's municipal teleassistance service, and 80,000 under Barcelona's Local Teleassistance Service (SLT). The SLT has been delivered by Tunstall since 2005, in which time the service has increased from 3,800 service users. Commissioned by Barcelona Provincial Council in conjunction with the municipalities in the province, and currently 12 per cent of people aged 65 years and over and 31 per cent of people aged over 80 receive the service.

- 475,000 service users across Spain
- 17.7 million calls handled across eight centres
- Tiered service according to need
- Preventative approach with outbound calls and rapid response
- Co-ordinated across multiple stakeholders
- Reduced A&E visits and ambulance call-outs
- Delayed admissions to residential care



What is the the Tunstall teleassistance model?

The model is based on a tiered system of needs-based intervention:



Including prevention in the delivery model has been a key contributor to the success of the teleassistance service. It has significantly reduced the number of emergency service escalations, improved the wellbeing of users and made effective use of public services.

Operators at the monitoring centre answer incoming calls in an average time of less than 10 seconds, and approximately 60 per cent of calls are outbound. Operators proactively call service users on a regular basis to check on their wellbeing, remind them of appointments, prompt them to take medication, confirm medication has been delivered or wish them a happy birthday. The frequency of contact is adjusted depending upon the needs of the individual. Operators will also contact service users who experience a crisis, such as a bereavement, to offer reassurance and assess their mood and health. Special protocols and skilled staff are in place to support service users where there is risk of suicide or abuse, and in the event of major disasters.

Tunstall also provides a programme called Let's Talk (Hablemos de), where operators make calls to discuss public health issues relevant to users, such as tips for fire safety in the home, advice on how to prevent the spread of flu, ways of dealing with periods of warmer or colder weather, air pollution, or how to prevent allergies. Tunstall works with the council and other public services such as health, fire and rescue and the police to refine the advice they give as part of the programme, define protocols and agree prevention/training campaign delivery.

The Barcelona SLT service includes 29 mobile response units that cover the entire area of service, enabling a 24-hour response to possible emergencies or technical issues at users' homes. Mobile response units are classified into two types, depending on their activity: primary mobile response units and secondary mobile response units. There are 16 primary mobile response units in Barcelona province (which includes 310 towns) which attend emergencies at home (e.g. a fall) and provide a priority response in other cases (e.g. a disconnected home unit). The SLT also has 13 secondary mobile response units, which manage scheduled activity (e.g. checking sensors or collecting keys from users). This structure increases the effectiveness of the mobile response. The Service Level Agreement requires that, in case of emergency, responders must reach addresses in Barcelona province within 40 minutes. Each vehicle is equipped with medical equipment and staffed by specialist trained social care technicians offering swift support: for example, first aid, helping users after a fall and supporting people who feel depressed. The social workers also conduct annual follow-up visits to users, to assess their status and, if necessary, amend their service accordingly.

The teleassistance service can provide more advanced telecare such as falls, smoke, gas and carbon monoxide detectors and sensors which monitor activity/inactivity. Today there are more than 5,500 of these sensors in operation. Tunstall has also developed CareChat, enabling the service to be accessed by people with communication difficulties, using smartphones and a decision tree with predefined pictograms and text.

When Tunstall began to deliver the SLT in 2005, it worked with Barcelona Provincial Council and the 310 municipalities in the province to design a unique public service model to support older people and those with long-term health and care needs. By delivering a public teleassistance service under a single contract, public resources are used efficiently, there is greater consistency across the region and innovation is enabled and encouraged. Delivering the service in this way also enables increased co-operation with emergency services, successfully managing crises in the home such as falls, and local situations such as floods, fires, and extreme temperatures in a co-ordinated way.

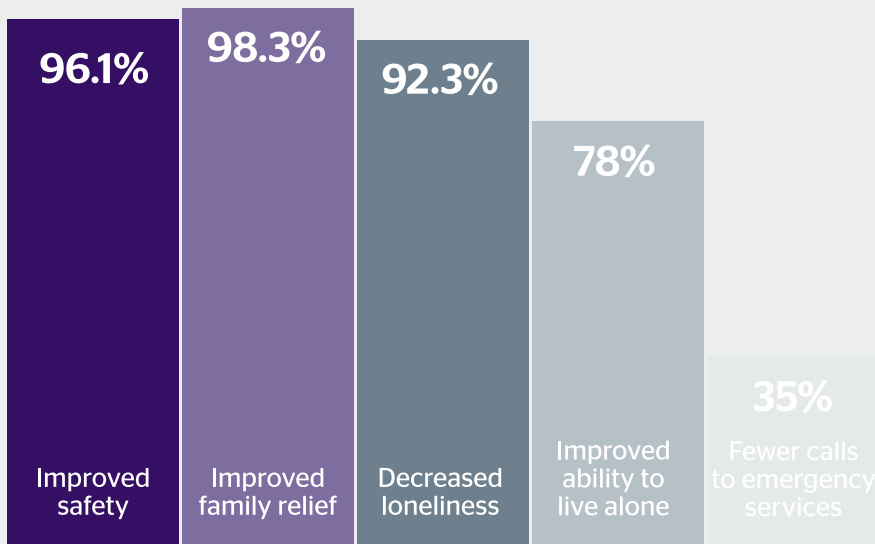
Tunstall strives for excellence, and the dedication, professionalism and experience of the 260 people working each day to deliver the SLT is an essential part of the success of the model. Approximately 35 per cent of staff work in the monitoring centre, and around half are homecare personnel, such as mobile response officers, social workers, and technicians/ installers. Over half of Tunstall's employees have a university qualification in a relevant field, such as social care.

Teleassistance provides preventative, proactive support to more independent service users. Vulnerable or at-risk service users receive increased levels of support according to their need. Care services are prioritised and co-ordinated to ensure resources are used effectively and focused on the areas where they will deliver the best outcomes. The service has significantly delayed unwanted moves into residential care, and reduced emergency calls from end users and their families which has correspondingly reduced ambulance call-outs and A&E attendances. The Fundació Salut y Envejecimiento UAB, FSIE-UAB (Health and Ageing Foundation of the Autonomous University of Barcelona) is a non-profit entity that works as a research and knowledge-transfer centre specialising in health sciences, ageing and health and social care. It studied the impact of the telecare service, based on the data generated by a phone survey that took place between November 2015 and February 2016, calling two distinct groups:

- Intervention group: 500 elderly people who have used the telecare service for six months.
- Control group: 700 elderly people who are on a waiting list to have the service installed.

Both groups shared similar characteristics with regards to their socio-demographic background, health, a need for personal support and help with daily basic tasks and a need for social support. Both the intervention group and the control group were asked about their situation at the time the survey took place and their situation six months prior to it. Sixty-seven per cent of the users selected to take part in the survey accepted and the impact assessment was carried out in accordance with the difference in differences method.

Impact of telecare services based on explicit evaluation



Strategy and transformation consultancy, Igetica evaluated of the operational and economic benefits of proactive and personalised telecare based on all teleassistance service users in Spain between 2011 and 2018. It found the service enabled people to stay independent at home for on average 8.6 months (262 days) longer, before moving to a care home. Emergency calls for help were reduced by 54% and ambulance mobilisations by 36%.

Section 7: TECS in the era of Covid-19

In response to Covid-19 there has been a significant shift in the use of TECS in all parts of the health and care system. For example, general practice has moved from carrying out around 70 per cent of consultations with patients as face-to-face appointments to managing more than 70 per cent of consultations remotely⁶⁵. Similarly, there has been investment in remote monitoring devices, voice-activated assistants and other similar technologies to allow carers and relatives to look after elderly or vulnerable individuals whilst reducing face-to-face contact.

Trish Greenhalgh, co-director of the Interdisciplinary Research in Health Sciences Unit at Oxford University (Oxford, UK) commented:

*'We have a research project that has been tracking the use of video conferencing in Scotland over the past six months, and in the space of the last two weeks we've seen [a] 1,000 per cent increase in use. It's incredible. [Covid-19] has done what we couldn't do until now, because, suddenly, it's not just the patient who might die – now it's the doctor who might die. So, the doctors are highly motivated. The risk-benefit ratio for virtual health care has massively shifted and all the red tape has suddenly been cut.'*⁶⁶

During the pandemic there have been some excellent examples of partnership working between NHS managers (particularly in the acute sector) and some council managers. There are examples of better use of combined data to help in day-to-day planning and decision making; of the sharing of voluntary and community effort; the speedy discharge of patients at the outset; and a cementing of good collaborative relationships.⁶⁷

It is vital that this progress is not lost, and the elements of TECS introduced during the pandemic which are beneficial to patients, carers, staff and the wider health and care system are maintained.

CASE STUDY: NOTTINGHAMSHIRE AND COVID-19

The Tunstall Telecare Service in Nottinghamshire has maintained service levels as close to normal as possible during the Covid-19 pandemic. To adapt to the new normal, engineers now programme any required equipment inside their vans, and then knock on the service user's door, leaving the equipment at the door, before moving a safe distance away. Once the service user opens their door, the engineer explains who they are and lets them know that they will call them from their van. The engineer then returns to their van and calls the service user to talk them through the installation of the equipment.

CASE STUDY: REMOTE MONITORING FOR EATING DISORDERS IN CORNWALL

Young people with eating disorders would normally receive clinic-based care, but this is not possible during the Covid-19 pandemic. To address this, Cornwall Partnership NHS Foundation Trust worked with Tunstall Healthcare to introduce remote health monitoring for patients, using the myMobile app and ICP triagemanager™ software to enable clinicians to support patients in their own homes. A special health interview was developed based on the Junior MaRSiPAN (Management of Really Sick Patients with Anorexia Nervosa) risk assessment framework. Once a week, patients use devices in their home to take their vital signs and answer symptom-related questions.

The information is collected via the myMobile app on the patient's smart device, and is automatically uploaded to ICP triagemanager, where any breaches of parameters set for individual patients will raise an alert on the system. Clinicians can log in to a secure portal to view a colour-coded dashboard which prioritises patients according to the need for intervention. Individual patient's readings can also be viewed over time to monitor their progress, with the standard monitoring period expected to be 26 weeks.

The service is still in its early stages and outcomes are still being measured, but 32 existing caseload patients deemed to be at high risk have already been referred, and feedback from clinicians involved is very positive.

CASE STUDY: CARE HOMES IN BOLTON

Care home residents are at particularly high risk during the Covid-19 pandemic. Bolton NHS Foundation Trust and Bolton CCG worked with Tunstall to use technology to protect residents, care-home staff and clinicians.

Tunstall's myKiosk is a multi-user remote health monitoring solution, which enables multiple patients to be supported by telehealth in grouped living environments, such as care homes. In Bolton, 36 care homes have been provided with myKiosk systems, along with medical devices such as thermometers, pulse oximeters and blood pressure monitors. The Tunstall team worked with staff in the homes to train them on the system and, where required, staff were also educated on how to take vital signs observations. Where care staff have concerns about the health of a resident, a member of care/nursing staff will use the myKiosk tablet to record their vital signs and help them to answer questions about their health and symptoms using the touchscreen. The information is then securely transmitted to Tunstall's ICP triagemanager patient management software which is based at the Community Services Hub. Results that breach the parameters set for that patient will raise an alert on the system, prioritising them on the triage screen using colour coding relating to the level of risk. This data can then be accessed and reviewed Advanced Nurse Practitioners at the Hub, enabling them to make an informed decision regarding next steps in the patient's care.

The triagemanager and myKiosk system enables closer monitoring of vulnerable residents, whilst reducing the need for clinical staff attendance thus reducing the risk of cross-infection. It can also help clinicians to effectively prioritise residents' care, as the system clearly identifies those most in need of interventions. myKiosk provides objective insight into a patient's health status which enables more proactive and preventative care. For example, residents with dementia may find it more difficult to communicate if they feel unwell, meaning their condition may not be identified until it has advanced. Triagemanager alerts clinicians to symptoms such as rising temperature at an early stage, enabling faster interventions. This can help to avoid the need for more complex care, improving outcomes and, for Covid-19 patients, enabling them to be isolated and treated as soon as possible. The system is not solely being used where Covid-19 is suspected; any resident feeling unwell can be monitored using the system. This can be particularly useful for patients with long-term respiratory or heart conditions, whose signs and symptoms can be monitored over time to detect any deterioration at an early stage. The success of the programme will be measured over time, with metrics such as reduced ambulance call-outs being assessed, as well as resident outcomes and the impact on caseload management.

In just six weeks over 1,100 residents were registered on the system and in one month – June 2020 – 479 observations have been recorded on 104 residents. It has reduced the need for face-to-face visits, helped prioritise residents' care and supported early detection of symptoms to enable timely interventions and improved outcomes. It has also accelerated the transformation of the model of care, changing working practices for the long term.

CASE STUDY: FIBRICHECK HEART MONITOR

FibriCheck is a smartphone and smartwatch application that can be installed on any mobile device, transforming a consumer-owned device into a medical device capable of recording heart rate and heart rhythm. FibriCheck utilises the smartphone camera, and the heart-rate sensors in smartwatches, to produce clinical-grade analysis that supports evidence-informed decision making. This is a radically new and disruptive way of monitoring patients, unlocking potential for a cost-effective remote self-monitoring solution. As users/patients can use their own device, they only need to download the application to get started, alleviating the need for expensive devices or extra hardware, which complicates logistics and increases costs. FibriCheck is commercially available and is regulatory approved as the first application in Europe with a Class IIa medical device clearance, Food and Drug Administration approval in the United States and Therapeutic Goods Administration clearance in Australia.

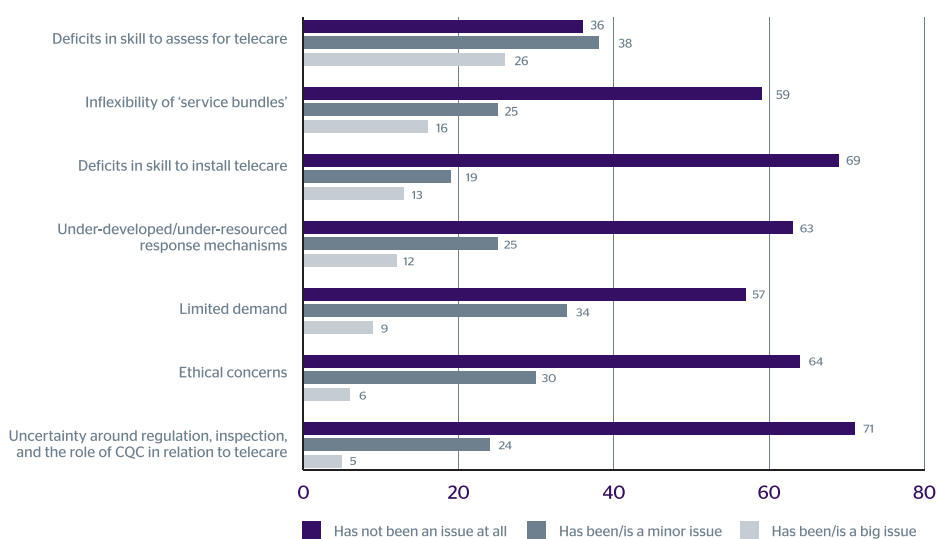
During the Covid-19 pandemic FibriCheck is enabling physicians across Europe and the UK to remotely monitor their patients without the need for pick-up/drop-off of an actual device in-centre. Participating centres simply send a FibriCheck code via email or SMS to their wait-listed patients. By empowering office administrators, the project is facilitating effective triage of non-urgent cases (unlocking availability for more complex patients), as well as offering a follow-up solution that impactfully bolsters teleconsultations. Each patient is asked to monitor for seven days prior to their teleconsultation, after which FibriCheck's clinical-grade summary report analytics is provided to the treating physician, enabling them to adjust medication dosages or plan interventions where necessary – completely remotely. Providers can also evaluate patient recordings in real time prior to teleconsultation via a secure physician dashboard, which concretely addresses the evidence gap needed for timely advice and effective treatment delivery. In as little as two months, 36 centres were digitally onboarded across Europe, including several top cardiac centres in the UK, such as Barts, Liverpool and Plymouth. With the second wave of Covid looming, major centres in the US and Australia are also exploring onboarding.

Structured patient feedback indicated that FibriCheck not only empowered them, as they could follow their own recording results, but also provided a sense of security from knowing their provider was in the loop of their self-management to discuss measurement concerns. FibriCheck's monitoring centre also assesses and validates the recordings of all patients prior to physician visibility to ensure quality outputs and reduced review burden – alerting only when necessary. Physicians also indicated time-efficiency gains (elimination of low-impact follow-up visits) and more effective decision making (as FibriCheck took the guesswork out of treatment options, typically based on self-reported symptoms). At system level, wait lists/appointment backlogs are being addressed and patients feel safer not having to attend clinic appointments, as well as creating much-needed capacity to support resource shortages.



Section 8: What are the barriers to uptake of TECS?

In 2018 King’s College, London conducted a national survey of local authority telecare provision for older people in England, known as UTOPIA. The survey explored the barriers to uptake of telecare, and respondents highlighted, ‘skill deficits amongst professional staff to assess for telecare, the inflexibility of “service bundles” or contracts with existing suppliers of technology, and lack of staff with the right skills to install telecare.’⁶⁸



Source: Taken from King’s College, London, UTOPIA, 2018

A quarter (24 per cent) of respondents estimated that the use of telecare saved money although many respondents found it difficult to provide hard evidence to support this claim.⁶⁹

There are several reasons for the slow adoption of TECS in the UK:

Sector fragmentation: In the UK the 2019 Topol Review concludes that the major underlying barrier to faster and more widespread adoption of telehealth in the UK is the 'challenge of getting the buy-in required from a multiplicity of NHS stakeholders in order to embed telehealth within complex local health economies in such a way as to exploit its cost-reducing potential.'⁷⁰ This is particularly relevant in relation to commissioning and funding, when pathways and funding streams are not always clear, and budgets are constrained.

Timelines: Organisations (LAs, CCGs, Trusts etc) have different funding settlements and timelines, so are unlikely to be procuring a solution at the same time, resulting in a lack of joined-up thinking when commissioning solutions.

Cultural challenges: The health and care sectors are traditionally risk averse, and slow to adopt new technologies or ways of working. As a result, adoption and spread of new technologies can take a long time, with each locality insisting on its own pilot or proof of concept.

Funding: Funding of health and care is already complex, with some care needs being funded by the state, and some out-of-pocket. There is often no clear commissioning or financing route for TECS innovations, and even when the technology is commissioned there can be further challenges in agreeing funding mechanisms for running monitoring centres or responding to emergency calls. Spend and benefits can accrue in different legal entities or scorecards, causing further complexity.

Regulatory: The regulatory framework for TECS – particularly assistive technologies – is also complex, and difficult for manufacturers to navigate. An assistive technology product can be classed either as a medical device, which needs a CE mark and is regulated by the applicable legislation, or it can be an 'aid for daily living'. Healthcare apps on smartphones also have a complex set of requirements and regulation.

Evidence base: Whilst many commissioners and purchasers recognise that TECS has the potential either to save costs – or at very least prevent expenditure – there is a limited evidence base to build a use in a business case for change.

As the 2018 European Commission Market Study on Telemedicine highlights, there are a number of barriers to the uptake of TECS.

Market study on telemedicine



Cultural conditions referring to a set of shared attitudes, values, goals and practices that characterises the environment within which medical technology, in particular telemedicine is deployed and taken up (risk-taking vs. risk-aversion of practitioners and patients);



Regulatory and policy conditions, i.e. regulations and means to enforce them, usually established at national level to regulate the healthcare sector and associated activities (including tax incentives);



Social security conditions, e.g. lack of incentives for doctors to provide care through telemedicine solutions; no clear support policy from social security providers of telemedicine; difficulties in implementing cross-border healthcare projects because of national barriers (different social security schemes);



Industrial and technical conditions referring to the availability, presence of medical technology in the global telemedicine market, the presence and the quality of the technological infrastructure, systems, networks, and information flows;



Knowledge conditions referring to a system of higher education and research organisations (universities, research centres, industry-specific training institutions etc.), their ability to deliver a skilled workforce relevant to the uptake and deployment of telemedicine solutions;



Financial conditions referring to a system of players and vehicles providing funds and incentives to support the deployment and uptake of telemedicine (availability of budgetary allocation, grants from foundations, loans/borrowing etc.);



Market conditions referring to factors influencing the exchange of medical technology goods and services, interaction of supply and demand, and the presence of competition.

Source: European Commission Market Study on Telemedicine, 2018⁷¹

Section 9:

What needs to be done to drive the adoption of TECS?

There is clear evidence that TECS – in all their forms – can result in better patient experiences, improved health outcomes, improved staff/carer experiences and reduced costs for individuals, the NHS and the care sector. Yet TECS are not being embraced to their full potential for several reasons, including unclear funding pathways, limited commissioning support, cultural barriers and challenging regulatory pathways.

To address these challenges the following actions must be taken:

- i. The social care sector needs to be supported in becoming technologically enabled. Many care homes and assisted living units currently do not have any form of digital or IT system or Wi-Fi, making the use of TECS challenging. There should be Government support to enable all health and care providers to achieve a minimum technology standard in order that they can benefit from technologies such as remote GP appointments, digital sensors and assistive technologies.
- ii. The commissioning and financing structures for TECS need to be reviewed to support ‘invest to save’ technologies for which benefits are long term rather than immediate. This may require greater use of innovative funding models such as gain-share agreements.
- iii. The rapid increase in the use of TECS during the Covid-19 pandemic should not be reversed once the pandemic is over. Instead there should be a thorough assessment of where TECS have been beneficial and ensure that progress is maintained, and best practice is shared.
- iv. All employees in the health and care sector should be encouraged to understand the transformational potential of digital technology. Training in TECS needs to be included in all health and care professionals’ education and CPD. To do this, the Government should revisit and implement the recommendations of the Topol Review utilising the Skills for Care Digital Framework⁷². The TECS industry also has a role to play in educating all stakeholders on how TECS can be most effectively and efficiently deployed.

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- v. There should be further investment in enabling people to live in their own homes for as long as possible. Local authorities, the NHS, the third sector and individuals need to work together to develop care and support packages which enable independent living. This will require truly integrated patient-centric services, with common objectives, cross-functional working, and interoperable systems.
 - vi. Alternative methods of assessing TECS and calculating any benefits (outcomes/satisfaction/financial) to service users, staff/carers, and the wider sector must be developed as it can be challenging to assess TECS services to build the evidence for further usage. Standard methods of conducting evaluations – such as Randomised Controlled Trials – are not appropriate in this field. Only then can there be a wide evidence base on which future services can be designed.
 - vii. The Government must provide support to the TECS sector to assist with this switchover and to establish minimum standards of cyber security for the new digital platform. This digital switchover will have a sizeable impact on the TECS sector with most devices (and indeed non-TECS devices such as landline phones and alarms) needing to be upgraded or decommissioned.
 - viii. ICS should have a role in driving integration via digital investment to support a collaborative approach between all providers, be they NHS, social care, local authority or third sector.

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