The 5th Wave of Technology Enabled Community Care (TECC) - the Need to Prepare for the Age of Video

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Introduction

The 1st wave of TECC applications and services introduced community and social alarms as popular and efficient methods of enabling many older sheltered housing residents who could not afford to have a telephone of their own, to access support in the case of an emergency on a 24/7 basis. These systems led to the development of monitoring centres that could coordinate responses from families, friends and neighbours thus avoiding many unnecessary hospital admissions.

This infrastructure provided an ideal platform on which to build the 2nd wave of TECCs, especially when dispersed alarm units could be used to support anyone with their own telephone line living in the community. Telecare alarm systems included a range of smart wireless sensors that could provide an automatic early warning of an emerging problem, whether it was an environmental issue such as fire, flood or gas escape, a security issue such as door left open, or a social care issue such as a fall, a failure to take medication appropriately, or leaving the property during the night. The use of these systems helped to manage many of the risks that might otherwise prevent patients from being discharged from hospital when they were medically fit, or which could lead to a premature use of long term care including admission to a residential care home.

Table 1 shows a summary of the features and applications that are included in the 7 waves of TECC.

Wave Number	Description	Examples	Possible Maturity Date
1	Basic connection service	Community alarms with pull cords and push buttons; hard-wired smoke detectors; welfare check calls;	From 1980
2	Home telecare alarm service	Dispersed telephone alarm unit; wireless environmental emergency sensors; personal fall and bed occupancy sensors; key-safes; linked lights	From 2001
3	Pseudo-continual monitoring	Basic movement and room monitoring for assessment; remote physiological monitoring (telehealth);	From 2003
4	Mobile-based monitoring	GPS trackers and locators; simple telephones; mobile worn fall detectors; smartphones and apps	From 2008
5	Video-based systems	Remote teleconsultation and conference; telecoaching; telerhabilitation; virtual visits; enhanced security & access	From 2012
6	Personalised connected solutions	Wearable sensors; health and well-being dashboards; Internet of Things; augmented reality; big data analytics	From 2015
7	The march of robotic and digital assistants	Chatbots; artificial intelligence; smart agents and companions; robotic appliances; exoskeletons	From 2017

The 3rd wave of TECCs allowed long term and continual monitoring of activities or physiological vital signs. Remote monitoring of vital signs using peripheral sensing devices such as pulse oximeters, weighing scales and thermometers has slowly become an important component in the management of long term conditions such as congestive heart failure and chronic obstructive pulmonary disease. Although the cost of the equipment and services initially compromised the value for money proposition, charges have since dropped significantly; the latest technologies are proving to be exceedingly cost effective in reducing the number of exacerbations that might previously have led to hospitalisation and/or high use of primary care resources. They are also enabling patients to become experts in their own conditions – they are becoming key to many self-care initiatives.

In the same way, the monitoring of domestic activities and mobility within the home, using miniature movement and vibration sensors attached to walls, appliances, furniture or items of equipment, can aid assessment, including the impact of reablement and rehabilitation programmes. However, as many of these TEC applications allow data collection, analysis and feedback using the web, many monitoring centres were left behind by this technology. In the same way, the 4th wave of TECC moved monitoring out of the home through an extended use of mobile technology, with GPS location devices enabling the person to be located if they became lost. But there has been little integration of mobile devices with telecare systems, thus compromising the viability of many monitoring centres to become coordination centres for care and support services.

The Rise of the 5th Wave of TECC

Video cameras have been available for decades, but their applications have been limited by cost and quality, and by the need to transmit high levels of data for images to be viewed remotely; hard-wired arrangements were the only practical means of delivering the necessary bandwidth. Both the above obstacles to increased deployment have effectively been removed in recent years. Miniature cameras with high resolution have become standard on all smartphones and tablet devices. When coupled with digital zoom and very low power consumption, even in low light conditions, they have resulted initially in a surge in the sharing of still photograph and then, more recently, in video clips, using dedicated apps such as Instagram, WhatsApp and Facebook.

This phenomenon has become possible primarily because of the increasingly ubiquitous availability of wi-fi networks, both at home and in many public places and on transport networks. Add to this the success of 4G mobile data networks to replace 3G and GPRS in most towns and cities, and it is apparent that video messaging has become as practical as texting for most people. In the same way, video-calling or video-chat technologies such as Skype which enabled people to speak to and see family, friends and business colleagues on their laptop and home computers, has been extended to mobile devices including tablets and smartphones using video versions of the apps used on laptops. These include FaceTime on i-phones and i-Pads, and a wide range of free apps for Android phones including Hangouts, BBM, ICQ, JusTalk, KakaoTalk, Line, Viber, WeChat and Tango.
This leaves four main factors that limit universal adoption of video communication:

1. Security concerns;
2. The failure for technology providers to integrate their equipment and propositions into existing services and coordination centres that use the first 4 waves of TECC;
3. Reluctance of some, mainly older, people to use the technology; and
4. A lack of specific applications that make adoption beneficial to all stakeholders.

The maturity of video technologies is increasing rapidly. Applications have been demonstrated with some user groups for several years, including some main-streaming since 2012. High definition video conferencing over the open Internet is happening in many industries. The issues described above are being addressed for health and social care applications in some innovative ways that are described below. They will therefore be available to most potential end-users within the next 2 years, and may provide a basis for the subsequent launch and realisation of 6th and 7th wave technologies. Some forward-looking TECC service providers will therefore be embracing this future, and will ensure that their platforms can integrate such applications so that service users do not experience limited access to new applications. The challenges facing existing telecare monitoring centres will include having access to their own independent technical experts who can ensure that advertised applications will be interoperable with other applications and databases. In other words, the monitoring centres and services must accept a greater focus on informatics and on the use of the data that they hold.

The concept of future-proofing will therefore need to be defined in terms that embrace both health, social care and housing standards, as well as e-healthcare requirements and tool-kits that are increasingly requiring open APIs and access to service user and patient data.

Security and Video Interactions

For most video conference or interaction applications, video over the open Internet with AES (acronym of Advanced Encryption Standard) using 128 bit, Secure Socket Layer (SSL) is very secure. The world's largest financial institutions and e-commerce retailers rely on this level of security for billions of transactions, also with appropriate firewalls in place to block unauthorised access while permitting communication with intended service recipients. This is the standard adopted by many of the dedicated platforms for secure video interactions in many industries.

However, the emphasise is often on the prevention of board-room espionage, data security and the protection of company secrets in most commercial applications. Such matters, though important, are not the greatest concern in health and social care where personal data and the confidential nature of consultations between people and their medical, well-being, social care advisers or family members may be considered even more relevant. There are few examples of good practice guidelines that adequately address the new and additional issues that are relevant to patients or service users who may not be adequately educated or trained in the use of new technologies and who may struggle to be comfortable discussing perhaps intimate problems with a virtual professional adviser.

In the UK, there are many excellent examples from NHS Digital that cover electronic health records and how remotely recorded vital signs data may be added appropriately and in a secure manner. But these do not yet specifically address newly available video consultation concerns for services that have developed quickly in the USA. These services, often described as telehealth or telemedicine, tackle inequitable access to medical services, and a dearth of support for social care needs, especially for populations in rural areas. They must have appropriate protocols in place to protect the security of patient information and prevent unauthorized access to such information both throughout the video encounter and during any subsequent provision of care. The providers of service need to be compliant with HIPPA (Health Insurance Portability and Accountability Act of 1996) which governs health insurance for employees and specifies minimum standards for electronic health record retention. HIPAA compliance offers a useful template for best practice for any organisation whether in the USA or elsewhere that deals with confidential patient or service user data, and informs storage, backup and Disaster Recovery policy.

The template covers five key areas that the service provider, which in the TECC world could be any monitoring or coordination centre involved in service provision including those of the 5th wave:

1. Physical safeguards – including access and control, and policies on transferring and removing electronic media and relevant health and well-being information;
2. Authorisation to electronic data on patients and clients – this includes access procedures, logging off and encryption and decryption;
3. Record keeping – a full auditable log of activity;
4. Technical policies – measures that ensure that records are not altered or destroyed, and how off-site storage may be used to ensure that problems can be quickly remedied and information recovered; and
5. Transmission security – protection measures to protect against unauthorised access to transmitted data whether by email, Internet or private cloud methods.

These principles are included in the latest guidance for service providers, such as the 2017 International Code of Practice for Telehealth, but are not mandatory in any state. Furthermore, these principles need now to be extended to the peripheral equipment that may be needed to accompany the video system in order to provide additional objective data for discussion and/or diagnosis.

Integration of Video Technology into Legacy Monitoring Centres

There are an estimated 1.5 million TECC service users in the UK, although 75% of them may only have a button and a box solution, perhaps enhanced by a linked smoke detector. These alarm solutions are all monitored through one of the UK's 250+ alarm receiving centres that can, through their databases, identify the location of a home alarm and the service user, enabling appropriate and timely responses to be activated. As described above, the majority have been slow to move into long term monitoring and other 3rd and higher TECC wave applications. Yet, the platforms that are already used i.e. Tunstall's PNC7, Legrand's (Jontek) Answerlink and Verklizan's UMO, all have the specified capability for enabling their users to deploy applications from 4th., 5th. and 6th. wave technologies. Figure 1 shows a generic overview of the requirements of a 24/7 monitoring and coordination centre which includes many functions that may be expected from a centre that has diversified to include other care and housing support functions that benefit from a 24 hour call handler presence.

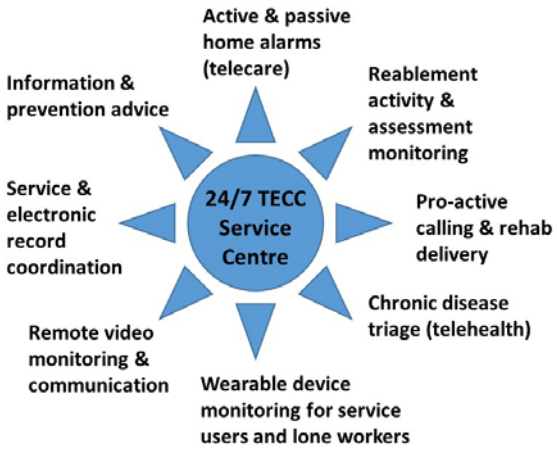

Figure 1: Eight Extended Functions for a Forward Looking TECC Monitoring, Coordination & Service Centre

Yet, only a handful of centres claim to offer the full range of functions described in Figure 1. The number that can offer evidence of experience and success in delivering services that utilise all of these features is only one or two. The reasons for this are likely to be complex but will certainly involve one or more of the following factors:

- A lack of expertise at the centres in dealing with the technical requirements for, and practical limitations to, more advanced applications;
- A lack of support from platform providers who cannot offer their own specialist software or hardware solutions to support new applications, leaving users with a lack of control over customer data;
- A failure of TECC applications providers to appreciate the need to integrate solutions onto existing system platforms rather than employing multiple platforms for many end users;
- A lack of investment in hardware for the home that may be needed to support new TECC solutions; and
- A shortage of TECC applications that have the return-on-investment needed to ensure that new solutions are cost-effective and popular.

It may be relevant that the reasons described above may be relevant for the slow deployment and use of 3rd and 4th wave TECC applications, and will therefore be a fundamental barrier to the adoption of 5th wave technologies unless the role of technology is given far more priority. Fortunately, continued austerity, and a failure of government to provide new investment in existing NHS and social care, may become the driver for new service propositions that build on TECC solutions. It follows that if the business case is developed on the basis of providing an extended range of benefits to all stakeholders, it will enable new TECC services to be offered using enhanced monitoring centre functionality. These concepts are developed in the remainder of this article, together with ideas for overcoming the obstacles to adoption.

Reluctance to Utilise New Technologies

The success of Skype and similar video telephony apps to link families and friends across the generations and the continents augers well for the introduction of 5th wave TECC applications. The most basic of applications are no more than telephone calls where the two parties can also see each other. However, this originally required both parties to be computer literate, to have computers with webcams, and to have broadband in their homes. Laptops with integrated cameras made the technology more accessible, but it was the arrival of low-cost tablet devices and smartphones that made the biggest difference in introducing the masses to the Internet and the benefits of on-line access; this included opportunities to share images and film clips, and to engage in video chats. It is not surprising that this technology has become the cornerstone for current remote vital signs monitoring systems (sometimes still known as telehealth), resulting in much reduced costs and simpler interfaces that avoid the possibility of the home appearing like a medical facility.

The rapid emergence of portable devices with Internet access has helped to prove that age alone is not a barrier to the use of technology, and there are thousands of examples of people aged over 90, and who have had little formal education, being able to embrace and benefit from computers of all descriptions. They share an ambition of wanting to take advantage of the opportunities, having access to the hardware, and having someone to help them both with setting up and learning to use the applications, and in providing on-going support if, and when, something goes wrong. Charities are becoming experienced in offering support, while many local authorities recognise the need and offer classes and other facilities that are needed to enable older technology users to become digitally proficient.

Table 2: Popular Assistive Technologies for Older People

Assistive Technology	Purpose	Obstacles to Deployment	Opportunities to Improve Utility
Stair lift	To help people with limited mobility to safely climb or descend the stairs	Stigma; Changes the fabric of the home; fear of breakdown; can make people housebound	Slimmer designs; integrated alarms; self-testing facilities
Bath-hoist	To enable people to get into and out of the bath more safely	Fear of mixing electricity with water; lack of confidence	Integration with bath; designs using air pressure
Walking aids	To improve confidence and stability	Stigma; lack of training in correct use; lack of portability	Improved design/choices; online assessment and training videos
Hearing aids	To overcome loss of hearing sensitivity by amplifying sounds	Stigma; failure to accept that hearing is poor; expense	Wireless ear-bud designs; use of smartphone apps
Alarm pendants	To enable help to be summoned in the event of accident or illness	Stigma; remembering to carry device; limited range	Mobile jewellery devices; voice interfaces
Automatic lighting	To switch on lights automatically when movement detected	Fear about the waste of electricity; cost of installation	Movement activated bulbs; voice activation

However, a lack of training and motivation aren't the only reasons why some older people are reluctant to try out new technologies. Some will have spent their working lives in factories or in industries that depended on the continuous operation of production lines and machines. A mistake using these mechanical devices and systems could lead to fatal accidents or to expensive failures that could cost operators their jobs, or could mean a complete workforce being laid off for weeks or months until a repair could be made. This could leave them with a real fear of touching or using a machine (a computer) that they might associate with expensive and dangerous or costly mistakes. It is very easy for them to believe that digital equipment is generally for younger people who have both quick minds and nimble fingers. The lack of dexterity of many older people, and the fact that most were not taught to type on a keyboard, can put them off entering information and data in this way. Similarly, age-related decline in visual acuity can make viewing a small screen very difficult. These factors can contribute to reducing the utility

of equipment, assistive technologies and digital technologies by the older people that they were designed to help. Table 2 describes how some of the most useful assistive devices for this group of people does not achieve the potential benefits, and how society might respond to improve the benefits realisation.

In the case of using video (i.e. 5th wave TECC applications), it may be apparent that the 2 biggest issues for older people, that make smartphones and tablet devices unsuitable, are:

1. The need for a large viewing screen, and
2. The need for simplified controls

Smartphone devices and tablets are effectively mobile devices; they need to be small enough to be carried about, if not in a pocket then in a handbag or shopping bag. This limits the screen size significantly. The result is that more than 50% of tablet devices will have a screen size of less than 8 inches (192mm.) costing, on average, rather less than £100 each. More than a third will be in the range 8 to 11 inches (192 to 264mm.) at a cost of a few hundred pounds each. Only 5 or 6% are likely to have screens that are bigger than 11 inches (264mm.) and these are likely to cost £1000 or more, depending on the resolution. Tablet devices are unlikely to cost-effectively satisfy the needs of many older people.

Fortunately, almost the entire population already has a device in the living room which is perfect for seeing pictures, graphs and information. Thanks to the digital changeover and improvements in Liquid Crystal Displays, TVs ar bigger, slimmer, brighter and less costly than ever – there many TVs available with full HD capabilities and 55 inch screens at little more than £300 each. These sets are not “smart” but do have digital inputs that facilitate an ever-increasing number of ways to get video and pictures onto them. These range from straightforward cables through to wireless options, all of which can connect a tablet device (or smartphone) to a digital TV.

The former uses the standard HDMI (High Definition Multimedia Interface) which is present on every TV bought in the last decade as well as almost every set-top box, games console and many video cameras. It allows HD video and audio to be shared simultaneously enabling the use of the TV’s speakers rather than the miniature ones on the tablet device; three different sizes of connectors and leads are possible, all of which are likely to cost rather less than £10. For those tablet devices that don’t have an HDMI port, two widely-supported standards, SlimPort and MHL, have emerged that allow Android owners to connect to external displays using their microUSB port. These options support both video and audio, with up to eight channels of surround sound available. Both normally require breakout boxes - a small dongle between the device and TV that converts the signal from the tablet or smartphone to one that’s compatible with HDMI. SlimPort and MHL signal converter cost about £15. Apple users have fewer decisions to make, but are obliged to use proprietary cables that are generally much more expensive.

Figure 2:

Wireless connections between tablets and digital TVs are available through the Miracas standard for example. This is supported by some TVs while others need an appropriate set-top box to create an ad-hoc network. An alternative is Google’s Chromecast. This inexpensive £30 ‘dongle’ plugs into a spare HDMI port on the TV and connects to a wireless network. The Chromecast dongle does most of the processing rather than the tablet, and

therefore allows the tablet's battery to last longer. The iPad and iPhone don't support any open streaming standards, so it's necessary to use an Apple TV (£79). There are a range of Android dongles or sticks that can effectively convert the TV into a smart device rather than use a tablet or smartphone. These are cost-effective for running apps and accessing the Internet through the TV but lack the video cameras that are found on tablets and on smartphones. This limits their applications in care, support and security.

The difficulties facing older people using digital televisions were greatly exaggerated; many industry experts were surprised to find how quickly most users mastered remote control units that offered dozens of buttons and controls for complex functions and channel selections. Yet, some users have chosen only to use the minimum number of buttons, and therefore fail to take advantage of their advanced functionality. It means that they are likely to struggle with additional controls needed to take advantage of more interactive video opportunities delivered through new digital channels. Fortunately, several simple remote controls are now available which can provide reduced functionality for one or more devices. Five popular examples are shown in Figure 2. The lowest cost example (£9.99), the Geemarc Easy TV 5 Remote Control (on left of Figure 2) allows the profiles of 2 different devices to be managed; one might be the TV while the other could be a set-top box, a dongle or a smart device that runs a video app. The SpeakSet TV communications system currently being trialled in Lancashire uses the Doro HandleEasy device (centre of Figure 2) to provide the simple controls needed to link patients with medical personnel using video. This approach offers a more cost-effective solution than alternatives that rely on bespoke handsets that are more expensive to supply and which may need to be used alongside other remote controls.

Figure 3: Universal Simplified Remote Controllers Designed for Children or Others with Technology Challenges

Older people are not the only ones who might struggle to operate remote control units. Similar issues may be relevant to children and to people with intellectual or cognitive issues. Figure 3 shows some universal remote controllers that have been developed for use by these groups. These have hidden controls that cannot be changed by the users but which allow more restricted access.

Specific and Disruptive Applications of Video Technology

Video opportunities in health, social care and housing have existed for many years. Some of the more popular applications have linked a camera at the front door either with a miniature video intercom or with a cable running straight to the TV. Those old arrangements have become redundant as analogue TVs gave way to digital sets and as the cost of wiring in connections became prohibitive. The reality is that all video cameras in popular use today have an ip address that enables them to link directly to the Internet or to cloud-storage facilities, either using a fast mobile connection or, more appropriately for the home, through a router. This is the approach which offers greater security and which enables the integrated service provision that may be the only practical and cost-effective way of delivering end-to-end services at scale. Below, opportunities are described under the respective headings of health, social care and housing, but the benefits are all linked.

1. Health

It is estimated that more than one in three patients who make an appointment to see a GP could be dealt with as effectively through a visit to a nurse or by a telephone conversation with a healthcare professional. Seveeral private services already exist in the UK, and are being used to redefine relationships between clinicians and patients. Some NHS Trusts are also invested in the technology to enable patients to be treated as close to home as possible.

However, face-to-face primary care appointments provide opportunities for the GP to pick up on other cues that may not be visible in a head and shoulders view, and to quickly measure or estimate a vital sign by direct contact. The emergence of low cost sensing devices, such as pulse oximeters, blood pressure monitors and electronic thermometers (typically available for under £20 online or from pharmacies) gives clinicians opportunities to add objective data to their assessment. In the future, there will be tricorder devices that can be used by individuals to monitor their vital signs. For example, the Viatom Check Me Pro (shown to the left of Figure 4) measures blood pressure, pulse rate, ECG and blood oxygen saturation through a single medical device. More significantly, the MedWand device (shown to the right of Figure 4) also includes a camera that could be used by parents, for example, to give a remote physician a view of an ill child, potentially avoiding a house call or a visit to A&E.

Figure 4: The Viatom Check Me Pro and Med Wand Devices Used for Home Telemonitoring

The systems and products described above both have their origins in the USA where most healthcare is provided privately, though usually funded, at least in part, by insurers and Medicare and Medicaid. This is driving a convergence of health and telemedicine systems that will lead to systems that were previously imagined only for doctor to doctor communication to reach out to the patient in their own homes. This will primarily appeal to the convenience agenda or people who are money rich but time poor, and who will then be prepared to pay for both the equipment and for the service. Companies such as Teledoc, DoctoronDemand, HealthTap and American Well are already selling general GP services directly to consumers. Others are moving into narrower field such as dermatology and behavioural health where access to specialists has tended to be more difficult. They are also partnering with connected device companies such as EarlySense, Clinicloud and Tytocare. Other applications for video interaction are described in Table 3.

Table 3: Video Opportunities for Healthcare in the Home

Application	Description
Supported self-care for people with chronic disease	Nurse or health coaching support for life-style changes including exercise, diet and motivation; video library of film clips
Out of hours support	Teletriage by remote physicians and nurses to gauge if an illness warrants a home visit, an ambulance call out or an ambulatory visit to A&E
Telerhabilitation	Remote monitoring of physiotherapy or mobility exercising using gaming
Virtual fitness	Automated assessment of physical activity using video analysis
Medication compliance	Video monitoring of patient administering and swallowing their medication
Lone worker protection	Cameras worn by healthcare staff to record hom interactions with patients
Virtual A&E	Remote assessment and analysis of injuries before A&E presentation
Video key-safe	Video recording of paramedics and nurses collecting keys to enter properties
Care home support	Multiple cameras to enable night staff to avoid unnecessary A&E admissions
Virtual wards	Remote views of patients for physicians doing virtual ward rounds

2. Social Care

While video-based health applications have the potential to save the NHS large sums in a relatively small number of interactions, the opportunities for cameras in social care applications are likely to save rather less money per interaction, but the interactions are potentially higher volume. It may be argued that the total benefits may be similar, but may be much more difficult to estimate because the potential benefits may difficult to calculate because they often involve improvements in Quality of Life, or a speedier identification of factors that are impacting the individual's well-being.

It follows that the business case for introducing video product is less robust, and the number of bespoke products is correspondingly much smaller. Indeed, many of the applications that are described below in Table 4 rely on standard cameras (neither HD, nor with focus or zoom facilities). This can sometimes result in security arrangements being less than perfect. Although the significance of individual data points may not be evident, their collective significance should not be underestimated as they can be used to identify people who are vulnerable either through sensory impairments or through social isolation. These factors could encourage conmen to target them and compromise their independence.

Table 4: Video Opportunities for Social Care in the Home

Application	Description
Emergency alarms	Dispersed alarm unit that includes camera for enhanced communication
Extended telecare	Use of cameras to confirm alerts by imaging issues such as falls, fire and flood
Video befriending	Enhancing communication opportunities with friends
Virtual (reality) visits	Enabling users to take virtual tours so that they feel that they are getting out
Digital assistants	Screens and cameras on devices such as Amazon Echo to extend interactions
Video group meetings	Opportunities to virtually attend meetings, funerals and other social events
Video reablement	Reviewing progress made on reskilling for domestic activities
Video assessment	Using cameras (such as Kinnect) to analyse gait and other movements
Elderly abuse	Capturing interactions between carers (including family members) and cared for
Wandering control	Monitoring exiting of property and warnings of danger
Personal video record	Providing a diary of activities and interactions
Kitchen support	Analysing cooking and food preparation actions and prompting next steps
Video telephone	Interactive video conversation between individuals and family members

3. Housing, Access and Security

Teleconcierge and Access Control

The need for improved security is an important factor in driving some older people to give up their homes and to move into sheltered or private retirement housing. Access to these schemes is usually through intercom arrangements, but can also be managed remotely by a monitoring centre that uses a camera on the main door to the scheme, which allows them to verify the identity of visitors and to admit them using remote door opening technology. Similar technologies can be used in dispersed housing to overcome problems with bogus callers or with confirming social inclusion or enabling people to have enough time to get to the door if they have a mobility problem.

The examples shown in Figure 5 show (left) how a cameras system linked to a monitoring centre a video form of access triage that could be used either to open the door remotely or, more simply, to offer callers with id access to a digital code for a key safe. The device in the centre of Figure 5 can replace an existing peep-hole arrangement with a viewer that can also as a camera that it activated by movement or by a knocker. Pictures are time-stamped and recorded, and can be forwarded, using wifi, to family members or to a monitoring centre. Finally, the example

on the right of Figure 5 shows a simple video intercom that allows the resident to see as well as speak to a visitor so that they can decide on an appropriate course of action based on their knowledge of the person. These images can, in some cases, also be transferred to the TV so that people with poor eyesight are better able to view the screen and make a judgement.

Figure 5: Video Systems to Support Home Access

Home Security Cameras

Not only are cameras smaller and inexpensive today, but they are also capable of automatically detecting movement and of streaming live video of a room and anything in it to a storage cloud where it can be viewed anywhere using either a smartphone or a computer system. Detection of intruders may be the primary purpose, but they can also be used to manage carer visits, the action of nannies, carers, pets or relatives, and to give the householder peace of mind. Figure 6 shows some leading examples of products that have some innovative features such as face recognition. Many have been designed to blend in furniture and decoration to enable them to be less visible and intrusive.

Figure 5: Natatmo Welcome, i-on the Home, Withings Home and Nest Cam Video Capture Devices

Conclusions

Whilst the idea of using video for monitoring poses many questions regarding intrusion and aspects of "Big Brother", when video cameras are introduced to support an individual's independence, they become powerful tools that open up many more options for addressing defined issues of efficiency and control, as well as enablers for new ways of delivering services to people that avoid unnecessary travel. Any, or all, the applications described above can have a positive effect on both individuals, their families, and their carers, as well as enabling a transformation of care and support services. Changes are necessary for modernisation, and a convergence of support with entertainment, education and commerce, all of which will ultimately improve the capability of the NHS and social care services to exploit technology to make prediction and prevention a reality.