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Evaluation of the Regional Scale Plan Programme and National Innovation Collaborative

Evidence scan

The Strategy Unit

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Contents

Executive Summary

This rapid evidence scan has been commissioned as part of the evaluation of the Regional Scale Plans (RSP) programme and the National Innovation Collaborative (NIC). It has been produced by the Strategy Unit, with input from Ipsos MORI. It reviewed evidence concerning technology adoption in healthcare, including a summary of evidence on technologies supported by the programme. The evidence scan answers the following research questions:

- What evidence is available on technology adoption in healthcare and its barriers and facilitators?
- What does the evidence tell us about the main RSP solutions/technologies?
- What lessons are emerging from the implementation of technology projects during the COVID-19 pandemic?

Technology adoption in healthcare

The widespread adoption of technology in healthcare has the potential to transform the way we access and deliver healthcare, improving people's health and experience of care. However, realising the full potential of technology is not currently a reality in the NHS.

The evidence scan found numerous barriers to adoption including: an increased workload for staff (administration, training, lack of IT system integration); upfront costs of procuring remote monitoring technologies; and top-down decisions being made at the organisational level with a lack of input from patients, service users and clinicians. These were also consistent with the wider evidence.

Key facilitators were also identified. They related to the usability of the technology within the current setting and systems, and leadership by senior management and clinical champions in driving organisational adoption.

Evidence on the effectiveness, cost-effectiveness as well as experience of staff and patients is summarised below for three key areas of remote health technology: remote monitoring and remote care in care homes; remote monitoring and remote care in health care settings; advice and guidance between primary and secondary care.

Remote monitoring and remote care in care homes

Secondary research highlights an emerging evidence base for technologies focussing on remote monitoring and remote care in care homes. The first available source focussed on care homes was published in 2019. The lack of high-quality research in this area prevents firm conclusions about the effectiveness and cost-effectiveness of remote monitoring innovations in care homes.(1) Some scenario-based cost-efficiency calculations are provided by SEHTA (2), suggesting efficiency gains of +£19,500 per nursing home per year where remote patient monitoring is adopted to measure physiological signs. Positive impacts identified from case study evidence include: the potential for

savings in care staff time concerning direct care activities, medicines management, communication and reduced administrative burden.(2,3)

While case studies highlight some positive findings concerning continuity of care, available secondary research notes that “residents’ and relatives’ voices are also largely missing. This is, in part, because they were absent in the papers reviewed”.(4) Recent reviews state that involving residents and families in future research is a crucial priority.(1,2) No evidence was identified concerning the impact of remote monitoring technologies on staff experience of delivering care within care home settings.(1,5)

Remote monitoring and remote care in health care settings

Evidence identified regarding remote monitoring and remote care in health care settings was more established. The effectiveness of remote patient monitoring (RPM) varied according to the type of intervention and the condition investigated. Some examples of positive impacts of RPM were identified for specific conditions:

- RPM resulted in a moderate to large improvement in diabetes management, including for older adults, which was superior or comparable to usual care. Telemedicine interventions such as video consultations, remote self-monitoring, and wearable devices were among the RPM systems investigated.(6-8)

- Automatic patient data transmission, including automatic alarms, and virtual consultations for patients with congestive heart failure was reported to reduce healthcare utilisation compared with usual care, including lowering the number of hospital admissions, and improving mortality.(7-10)

- There was evidence to suggest that RPM can indirectly positively impact a patient’s reported pain level, fatigue, depression, and overall quality of life when compared with usual care models.(6,7,11-14)

The evidence as to the cost-effectiveness of RPM is limited and varied according to the condition being managed. The evidence mostly supported that RPM – including wearable devices, blood pressure monitoring, and video consultations – was more cost-effective compared with in-person clinician visits to the patient’s home or usual care; however, there was limited evidence to suggest that any increased adherence to treatment led to a reduction in costs.(7-9)

There is mixed evidence concerning the cost-effectiveness of telemedicine. Furthermore, the majority of studies concerning cost-effectiveness are rated low or critically low quality according to the AMSTAR review quality checklist (8).

Patients, including children and young people, and older adults, who frequently consult with clinicians as part of managing long-term conditions, were more likely to prefer a face-to-face appointment compared with a video consultation (13-16), with the exception of patients in rural or remote communities.(12,13,15,17,17a)

The clinician experience of using video consultation was generally positive; however, satisfaction was reported to be reduced when commencing a new treatment or needing to order laboratory tests.(16)

Advice and guidance between primary and secondary care

Previous systematic reviews noted substantial gaps in the literature concerning the effectiveness of advice and guidance services sometimes referred to as e-consults (defined as communications or consultations between healthcare providers). Since such earlier reviews, the lack of published literature on population health and patient clinical outcomes persists, such that it is unclear whether advice and guidance services have a positive impact on population health and clinical outcome (17,18)

- Systematic reviews highlight mixed findings concerning referral avoidance. While the proportion of avoided referrals ranges from 12 to 84 per cent, referral avoidance has been measured in different ways (in some cases, based on provider self-report) such that rates of avoidance are not directly comparable.(19)

- More recent systematic reviews provide mixed evidence that advice and guidance services may reduce waiting times to access specialist advice, with the median time for accessing advice ranging from one to six days.(17,20)

- Such more recent reviews also highlight that existing studies use such different methods to assess costs and benefits that evidence of cost-effectiveness for advice and guidance solutions cannot be established.(17,18)

- Secondary research indicated that advice and guidance services are associated with high levels of primary care provider (PCP) satisfaction, with 70 to 95 per cent of PCPs reporting a high level of satisfaction. This centred around the perceived value of improving the timeliness of specialist responses, and in providing enhanced communication with specialists.(17-19,21)

Reviews also highlighted that the advice and guidance received through such services was perceived as having the potential to improve the clinical management and care of similar patients in the future.(17,19)

Despite high acceptability and satisfaction rates from previous studies, recent reviews identify gaps in the literature concerning patient experience. Specifically, few studies measure patient satisfaction or experience of care directly, with systematic reviews pointing to the importance of conducting future research which directly measures the impact on patient experience of care.(17,18)

Implementing remote health solutions during the pandemic

Despite growing evidence of the benefits of telehealth, there was limited use of it internationally prior to the pandemic (22), with regulatory uncertainty, patchy financing and reimbursement

structures as well as unclear governance arrangements thought to be the key barriers to wider use.(23)

Internationally, the COVID-19 pandemic has accelerated the need to use digital healthcare. Countries with more established use of telemedicine prior to the pandemic were able to scale up services quickly.(22)

The pandemic has also seen some barriers to digital care removed. For example, regulatory barriers have been relaxed in countries such as France, England, Japan, and the United States.(22)

The single biggest factor enabling the rapid spread of video consulting was the cancellation of face-to-face appointments at the start of the pandemic.(24) National coordination and procurement have also aided the spread of video consultations.(24) App-based technology has been reported to have advantages over device-based or wearable-based approaches during the COVID-19 pandemic as no hardware is required to assist quick deployment.(25)

Structural barriers such as interoperability, lack of technology infrastructure, limited digital health literacy among patients and providers, and connectivity issues have been harder to tackle in a short period of time. However, countries that were progressing with challenges prior to the pandemic were well-positioned to quickly scale-up use during the crisis.(26)

The predominant reliance on telephone-only contact, and more limited uptake of video-based technology, has been reported as a barrier to remote COPD care (27), and video consultations (24) in the NHS. A survey of NHS Staff covering primary care, clinicians and specialists, managers and support staff found that respondents reported that increasing support for patients to use video consulting was the single most important thing that would enable the further spread of video consulting.(24)

Studies exploring the impact of the rapid transition to online services are currently limited.(28,29)

Introduction

This evidence scan has been commissioned as part of the evaluation of the Regional Scale Plans (RSP) programme and the National Innovation Collaborative (NIC).

The RSP is an NHSX programme that aims to accelerate the deployment of innovative technologies to enable care to be delivered to people at home or their place of residence.

To help contextualise findings and recommendations emerging from the evidence collected as part of the evaluation of the RSP and the NIC, this review explores evidence concerning technology adoption in healthcare. It also provides a summary of what is known about the main technologies supported by the programme. In doing so, the review answers the following research questions:

1. What evidence is available on technology adoption in healthcare and its barriers and facilitators?

2. What does the evidence tell us about the main RSP solutions/technologies?

a. Defining what is covered by the intervention, theory of change and any variations in practice

b. Exploring the reported outcomes (such as effectiveness, cost-effectiveness, patient experience, staff experience)

c. Looking at the facilitators and barriers to adoption

3. What lessons can be learned from previous international programmes focusing on remote monitoring in the UK/overseas, or interventions implemented by devolved administrations?

Methodology

Question 1 - What evidence is available on technology adoption in healthcare and its barriers facilitators?

This question focuses on evidence assembled through the non-adoption, abandonment, scale-up, spread, and sustainability (NASSS) framework (30) and any key additional evidence published since.

Question 2 - What does the evidence tell us about the main RSP solutions/technologies?

Based on an assessment of project information and programme documentation on Future NHS Innovation Collaborative workspace, the following technologies were prioritised for further exploration:

1. Remote monitoring and remote care in care homes

2. Remote monitoring and remote care in healthcare settings (inc. virtual wards)

3. Advice and guidance between primary and secondary care

The following inclusion criteria were used for searching and screening:

	1. Remote monitoring and remote care in care homes	**2. Remote monitoring and remote care in healthcare settings**	**3. Advice and guidance between primary and secondary care**
Population of interest	Care home residents	Patients with long term conditions	Primary care patients
Intervention	Remote monitoring	Remote monitoring	Advice and guidance
Settings	Care home setting	Healthcare setting	Primary care - secondary care interface
Outcomes	Reported outcomes (such as effectiveness , cost-effectiveness, patient experience, staff experience)	Reported outcomes (such as effectiveness , cost-effectiveness, patient experience, staff experience)	Reported outcomes (such as effectiveness , cost-effectiveness, patient experience, staff experience)

The following criteria were also used across all three research questions:

Geographical scope	International.
Language restrictions	English language only.
Date restrictions	Evidence published in the last five years so that there is a focus on contemporary literature.
Type of evidence	Secondary evidence (e.g., reviews) was prioritised. Where evidence from secondary evidence was limited, criteria was expanded to include primary evidence (with a UK focus) and/or

	grey literature (excluding individual case studies). See appendix 1 for evidence types included for each intervention.

Keywords included in our search strategies, and sources searched can be found in Appendix 1.

Question 3 - What lessons can be learned from previous international programmes focussing on remote monitoring in the UK/overseas or interventions implemented by devolved administrations?

This question originally aimed to review evidence concerning national remote monitoring programmes identified through Question 2. The evidence reviewed for Question 2 however failed to identify information on relevant programmes to be further explored. Grey literature sources also found limited recent programme evaluations. Furthermore, no programme evaluations for programmes highlighted to us such as FLORENCE, the Scottish home blood pressure monitoring programme using a SMS-based solution, were found.

A recent overview of the use of telemedicine in OECD countries (23) highlights that the majority of OECD countries have not conducted comprehensive evaluations of telemedicine programmes or services. The review highlights that while not all countries have conducted national evaluations, many have assessed the impact of specific programmes, published either as institutional case studies or in the peer-reviewed literature. The review however highlights an umbrella review of systematic reviews and meta-analyses of telemedicine in OECD countries (8) which identified primary studies from 28 OECD countries. We have included this review in response to Question 2.

In response to identifying limited evidence concerning national remote monitoring programmes, we changed the focus of Question 3 to emerging lessons learned from the implementation of technology projects during the COVID-19 pandemic.

Technology adoption in healthcare

"Many promising technological innovations in health and social care are characterised by non-adoption or abandonment by individuals or by failed attempts to scale up locally, spread distantly, or sustain the innovation long term at the organisation or system level."(30)

The widespread adoption of technology has the potential to transform the way we access and deliver healthcare, improving people's health and experience of care. However, the full potential of technology is not currently realised in the NHS. Telehealth is a useful illustration of technology with promise, but that has previously failed to deliver the anticipated benefits. Despite small-scale proof-of-concept examples and policy support, telehealth services are rarely mainstreamed or sustained, with non-adoption and abandonment of telehealth technologies by their intended users common.(30)

The COVID-19 pandemic has, however, altered the pace of adoption of technology in healthcare. Many health services were forced to rapidly respond to the pandemic by moving to digital solutions. Evaluation of this rapid shift is vital so that we understand the extent of the advantages and drawbacks. Evaluations of services implemented during the pandemic are still emerging. Therefore, this section of the review focuses on lessons concerning technology adoption in healthcare drawing on sources published prior to the pandemic. The final section of this report explores some of the emerging findings from responding to the pandemic.

Introduction to NASSS framework

Various complex barriers to technology adoption exist. A recently published King's Fund report on technology and innovation for long-term health conditions highlights *the "received wisdom that the NHS struggles to adopt digital innovation, with many government reports and research papers highlighting barriers to the spread of technology"*.(29)

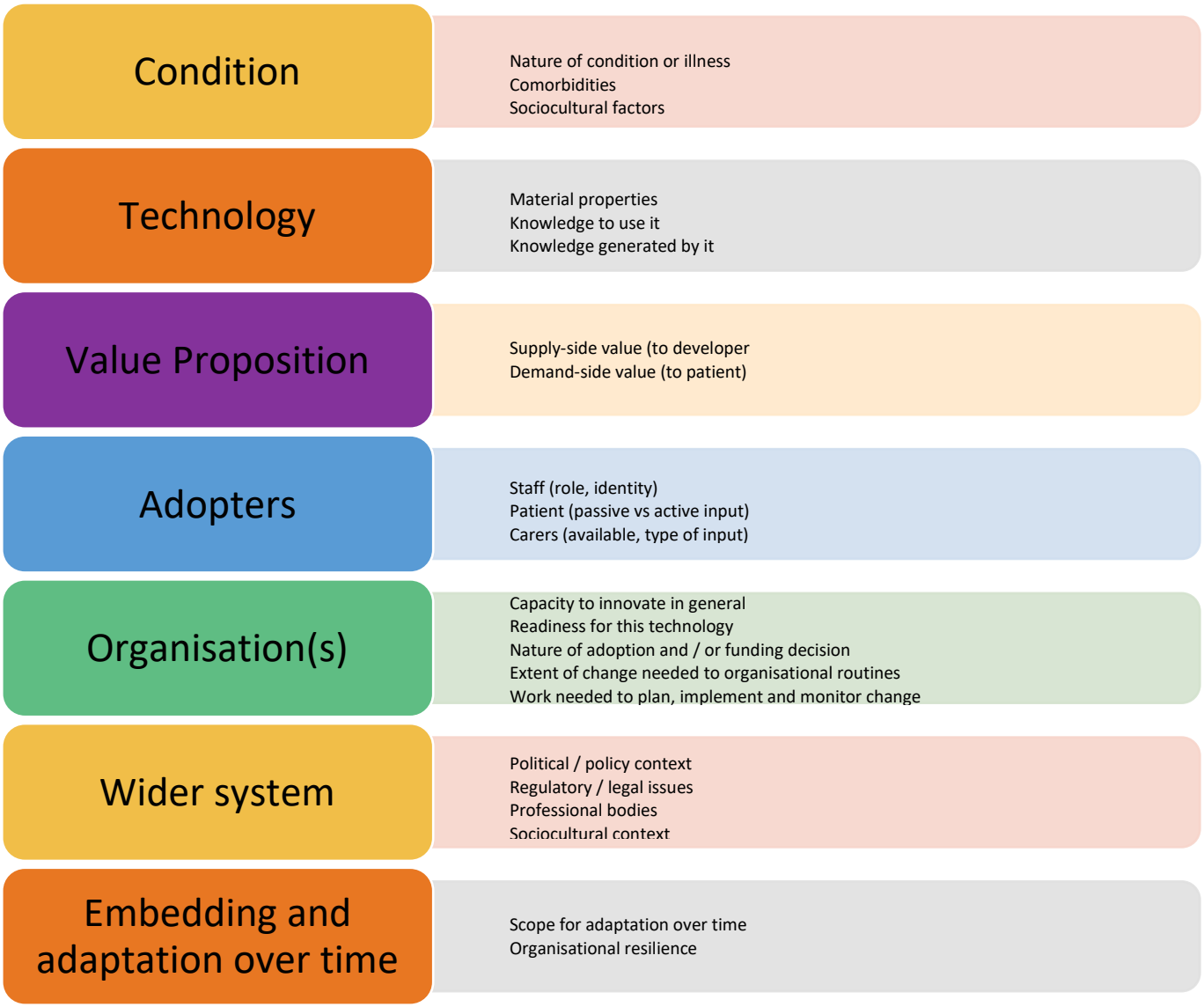
Whilst barriers and facilitators are a useful start in considering technology adoption, Greenhalgh and colleagues argue that they fall short of theorising the failure to adopt, scale-up, spread, or sustain a technology-supported program.(30) In recognition that theorisations of adoption of technology-supported programmes in health care are academic and inaccessible to key non-academic audiences (clinicians, managers, technology developers, executive decision-makers in health and care organisations, and patients and caregivers), they have developed a framework for theorising and evaluating non-adoption, abandonment, and challenges to the scale-up, spread, and sustainability of projects implementing health and social care innovations through technology (NASSS).

The non-adoption, abandonment, scale-up, spread, and sustainability (NASSS) framework is based on a narrative systematic review of theory-informed frameworks for analysing and evaluating technology-supported change programmes in health and social care. The framework has also undergone empirical testing and refining.

The framework is used to denote five key problems in explaining the lack of technology adoption in health and social care: *"digital technologies are either **not adopted** or soon **abandoned** by professionals and/or their patients and clients, or the technology-supported service succeeds as a small-scale demonstration project but fails to **scale up** locally, **spread** to other comparable settings or be **sustained** over time."*(31)

Technology projects usually encounter problems because they are too complex and because the complexity is sub-optimally handled (32). The NASSS framework is designed to identify and explore where complexity lies in a technology project. It does this by considering the following seven domains (Figure 1.1).

Figure 1.1: The NASSS framework (31)



Each domain may be characterised as one of the following:

- Simple: few components, predictable;

- Complicated: many components but still largely predictable; or
- Complex: many components interacting in a dynamic and unpredictable way.(32)

Complexities can cover logistical elements relating to things such as scope, scale, deadlines and resource constraints, or socio-political things such as attitudes, feelings, conflicts of interest or historical path dependencies.(31)

Remote monitoring and remote care in care homes

Definition

Remote patient monitoring, or telemonitoring, uses telecommunications technologies to collect and send data on patient biometrics, vital signs and health indicators to healthcare providers, to better inform and intervene in care.(10) This innovation is used outside of conventional healthcare settings, such as in the community, residential settings, or at home.(1) Patients use a range of technologies (such as biosensors, computers, mobile phones, or wearable devices, including pendant alarms) that passively or actively collect and send data to relevant healthcare professionals.(33) Clinicians and other health professionals may monitor, track, and act upon this information within a dedicated system, such as within an electronic health record or a dedicated clinical dashboard.(1)

This is intended to provide a convenient way for clinicians and other health professionals to observe and understand changes in patient vital signs or biological and physiological parameters relevant to their care (such as blood glucose level or monitoring medication efficacy).(1) This also enables patients to track and understand changes in their condition, and for healthcare professionals to intervene or make changes to care more proactively based on the data collected.

Monitoring and tracking changes in patient vital signs remotely in care home settings may enable earlier detection and prevention of clinical deterioration, thereby avoiding unnecessary emergency hospital admissions for residents.(34) Where data collection is automated and linked to an electronic health record, this may also free-up staff time otherwise spent on aspects of patient observation and subsequent administrative tasks.(1,34)

This innovation is often used with wider digital technologies (e.g.biometric sensors to track physical activity) and infrastructural solutions (e.g. electronic health records) to collect or record, store, view, share and analyse healthcare information collected.(1) While recent and robust data are lacking, a review by the South East Health Technologies Alliance (SEHTA) (2) suggests that home sensors that detect falls (‘fall detectors’) appear to be the most common type of monitoring technology used in care home settings.

There are several core components and key variations in the way that remote monitoring in care homes has been implemented, including:

- **How and when patient data are collected** – this can be periodic (on a fixed-schedule) or continuous. It may be asynchronous (involving the patient collecting or inputting data and sending it via email or text).(33) In some cases, patients themselves may collect and send data to healthcare professionals, and, in some cases, the collection and transfer of data are automated.

- **Type of device or monitoring technology** – most remote monitoring interventions use sensors as a means of collecting and transmitting data.(33). A range of sensor-based technologies has been reportedly used, including physiological sensors, fall detectors and environmental sensors. Most commonly, sensor-based technologies are integrated or embedded within wearable devices (e.g. pendants or wrist straps) or mobile devices (mobile phone or tablet-based), however, they may also be embedded within the built environment.(33)

- **Indicators used** – there are a set of indicators or clinical metrics that are commonly used or collected across remote monitoring innovations, including weight, blood pressure and heart rate. In some cases, a set of indicators is used and monitored to understand and respond to the likelihood of specific clinical outcomes in individuals.(5) Some remote monitoring innovations connect with electronic health records, using the indicators collected to predict and intervene earlier in clinical deterioration- this is achieved through risk stratification algorithms.(1,5)

What does the evidence tell us about reported outcomes?

Overall, there are only a handful of peer-reviewed secondary sources found that examine remote monitoring technologies within residential care settings. It was therefore necessary to explore the grey literature and relevant sources of primary research to gain a sense of the evidence base concerning remote monitoring in care homes or similar settings.

(a) Effectiveness and efficiency

The findings of two reviews (1,5) highlight the emerging nature of this evidence base, where much of the literature outside of care homes has focussed on proof-of-concept or prototype development, with limited research or testing in real-life settings. Peer reviewed studies concerning remote monitoring in care homes seldom examine the impact of remote monitoring upon outcomes such as access and utilisation of health services, clinical and patient-reported outcomes. Hanratty et al have argued that this lack of high-quality research, with most sources being pilot or feasibility trials, precludes firm conclusions about the benefits of remote monitoring in care home settings.(1) Notably, further experimental and empirical research is needed to ascertain the benefits of remote monitoring technologies in such settings.

The Southeast Health Technologies Alliance (SEHTA) outline the potential benefits of remote monitoring in care homes in terms of efficiencies in staff time spent. Specifically, this source notes the potential for savings in staff time across direct care activities (e.g. measuring respiratory rate or temperature), medicines management and communication.(2).

Two sources identified by Masconi-Yule highlighted mixed findings concerning staff efficiencies.(35) A feasibility study across 11 nursing home residents in Dublin examining remote monitoring data for a fall prevention programme found an extensive burden to care staff. However, results from a case study concerning the implementation of a digital health platform (CliniTouch Vie) with peripheral sensor devices to remotely monitor and transfer biometric and wellbeing data

during the COVID-19 crisis at a care home in Lincolnshire showed reduced paper administrative burden for staff, and improved communication between GPs and carers.

Initial findings from a pilot being undertaken in Bath, Swindon and Wiltshire (BSW) ICS, supported by the West of England AHSN show positive results in terms of efficiencies in staff time spent concerning patient observations and communication.(3) Specifically, BSW ICS are supporting the implementation of TPP's SystmOne (an IT system used by many GP practices), to enable care home staff to remotely record and communicate patient observations (including remote recording of NEWS2 scores and alerts to flag where scores suggest high risk of sepsis). Initial findings suggest the potential for substantial efficiencies in staff time spent around recording patient observations, and time spent communicating with other NHS professionals.

Healthcare access and utilisation

Two grey literature reviews were identified with findings relevant to the impact of remote monitoring in care homes upon measures of access and utilisation.

As part of a review into technology and innovation in care homes, the Southeast Health Technologies Alliance (SEHTA) (2) highlights early findings from two evaluation-based sources (Docobo in West Sussex; myKiosk in Bolton). Suggesting that remote monitoring may have positive impacts on measures of access and utilisation, the study reported around 58% reduction in GP visits, 70% reduction in urgent and emergency care admissions and 30% shorter length of stay for hospital admissions.

A more recent rapid review by Masconi-Yule outlines findings from several UK case study sources (including Docobo and myKiosk described above).(35) These involve the implementation of remote monitoring technologies (often as part of multi-component interventions) with positive findings relevant to access and utilisation, including:

- 40% fewer GP referrals and 30% fewer ambulance calls involving n= 7,687 nursing and care home residents across Lancashire and Yorkshire.
- 66% reduction in 111 calls and 7% reduction in A&E conveyances in 76 care homes across Wirral.
- 75% fewer admissions, with just under half of residents (n=23) requiring no admissions over 12 months of implementation of a tablet-based telehealth intervention (using Docobo software) across eight West Sussex nursing and residential homes.
- 34% fewer hospital admissions across 250 care homes in Sunderland using telehealth software (Dignio portal) and monitoring blood pressure and oximetry, and spirometry.
- No impact on 999 calls or hospital admissions over nine months in three care homes based in Sutton using tablet-based telehealth technology.

- One case study based in 34 care homes in Bolton concerned with the implementation of myKiosk systems (using thermometers, oximeters and blood-pressure monitors) with staff training focused on how to collect data. This was implemented in response to COVID-19 and showed positive outcomes in terms of fewer clinical call-outs across Bolton care homes.

(b) Cost-effectiveness

Overall, secondary resources note that few sources consider or report the cost of implementation, with recent reviews identifying no formal economic evaluations relevant to the introduction and implementation of technological innovations, such as remote monitoring, into long-term care settings.(1) Specifically, Hanratty et al. caution that *"without formal, independent assessment of the positive and negative consequences of new technologies or new use of existing technology, it will be impossible to make rational choices about the allocation of future resources."*

Two grey literature reviews relevant to the cost-effectiveness of remote monitoring innovations in care home settings were identified through grey literature searching.

As part of the SEHTA review, Maczka et al. performed cost-benefit calculations (reportedly calibrated for the average UK nursing home) to estimate the potential efficiencies of using remote patient monitoring to measure physiological signs in nursing homes.(2) This is based upon scenarios created by the authors to illustrate the potential benefits of technology enabled care in care home settings. The efficiency gains described above were derived from SEHTA's costs-benefits calculator, which defines an efficiency gain as any saving on staff time spent. The estimated overall efficiencies created by using physiological monitoring for all nursing home residents were +£33,400; it was also calculated that efficiency gains for the NHS overall from this technology were around +£19,500 per nursing home per year.

A recent rapid review (35) identified five evaluations with cost-effectiveness evidence; one showed no financial or cost-savings due to a lack of impact on access or utilisation metrics. Findings for the remaining evaluations include:

- Potential cost savings of around £3 million (£1m via reduced ambulance callouts; £1.5m via fewer non-elective admissions; £200,000 via fewer A&E attendances) over 12 months implementing monitoring equipment as part of a wider package of interventions. This involved n= 7, 687 Lancashire and Yorkshire care and nursing home residents.

- Projected cost savings of £198,709 and £212,229 in the first and second years of implementation of a tablet-based telehealth intervention (using Docobo software) across eight West Sussex nursing and residential homes.

- Cost savings of over £750,144 over 12 months across 14 care homes in Sunderland implementing tablet-based technology and sensor-based monitoring technologies (pulse oximetry and blood pressure).

- Cost savings of £164,556 over 7-months of implementing a portal-based software and technology remotely gather data from n= 250 care home residents in Stockport (involving blood pressure monitors, thermometers, pulse oximeters, spirometers).

(c) Patient experience

A limited volume of secondary evidence was identified concerning the impact of remote monitoring technologies on measures of patient experience in care home settings, such that Hanratty et al. state that the involvement of care home residents and their families in future research is essential.(1).

Several sources identified pointed to gaps in the literature relating to a lack of active involvement of patients or care home residents. Several sources note ethical concerns around the use of monitoring technology. Specifically, Hall et al. highlight the potential influence of remote monitoring technologies on residents' privacy, dignity, and freedoms, noting that these influences are seldom explored in the published literature.(1,33) A systematic mapping review identified similar gaps in the inclusion of patients and relatives in the implementation of remote monitoring technologies within care homes. Bunn et al. state that *"residents' and relatives' voices are also largely missing from this study. This is, in part, because they were absent in the papers reviewed. It is a significant limitation that so little can be said about how residents and their representatives influence the planning and uptake of healthcare interventions."* (4)

Masconi-Yule identified a feasibility study across 11 nursing home residents in Dublin.(34) They examined the feasibility and acceptability of collecting and transferring remote monitoring data for a fall prevention programme. Reported results state that the programme was an extensive burden to patients. Conversely, a case study-based source at Manor Care Centre care home in Lincolnshire implemented a digital health platform (CliniTouch Vie) with peripheral sensor devices to remotely monitor and transfer biometric and wellbeing data during the COVID-19 crisis. Results suggested that remote monitoring improved continuity of care for patients with long-term conditions.

(d) Staff experience

No evidence was identified concerning the impact of remote monitoring technologies on staff experience of delivering care within care home settings.

Facilitators and barriers to adoption (NASSS summary)

(a) Domain 1: The illness or condition

Limited evidence was identified with relevance to this domain. Specifically, few secondary studies examined the appropriateness or alignment between different remote monitoring technologies and specific conditions or illnesses in the context of care home settings. However there is evidence from wider care settings that suggest that remote monitoring may be most appropriate or useful for conditions or contexts which require frequent observations and monitoring to manage effectively, such as long-term conditions.(10)

(b) Domain 2: The technology

Two sources noted that where remote monitoring solutions or similar innovations are not integrated into care home record-keeping systems (requiring staff to document or enter this information manually), staff workload can be increased and reduce the likelihood of adoption.(1,4)

(c) Domain 3: The value proposition

Several sources identified the importance of how the potential benefits of remote monitoring technologies (and innovation adoption in care homes more broadly) are communicated to and perceived by adopters, and how this influences the likelihood of adoption. Successful technology adoption may be challenging where benefits are communicated poorly to stakeholders. Specifically, Hall et al. note that a lack of involvement of residents, care home staff, and families in the decision-making and implementation of remote monitoring technologies may restrict or limit their understanding of the potential benefits (and drawbacks) of such technologies.(33)

Hanratty et al. also noted that staff workload impinges heavily upon how the value proposition is perceived.(1) Specifically, the authors note that “Any technology that places demands on staff would need to offset this with significant benefits to residents, staff or the organisation”. Thus, adoption is more likely to be successful if the benefits, or perception of benefits, generated from adopting the innovation are greater than the associated burden.

(d) Domain 4: The intended adopters

The SEHTA review (2) notes that among other barriers to the adoption of technology-enabled care services for care homes, a lack of awareness of what products are available among intended adopters, and lack of awareness of what these can achieve, may limit the adoption of remote monitoring and other innovations in care home settings.

Stakeholder involvement (including residents and staff as adopters) has been identified as crucial to influencing innovation uptake in care homes across multiple sources.(1) Adoption may also be particularly challenged where staff turnover levels are high and capacity levels low (meaning fewer staff with the skills and authority). This is mirrored in more recent reviews concerning digital innovation in care homes. Hanratty et al. and a previous review by NIHR note that staffing levels and levels of demand on the service have the potential to support adoption, where staff had extra or protected time to become familiar with the innovation and embed it into existing workflows.(1,5) Or to restrict adoption, as in cases where high levels of demand and low staffing levels preclude staff protected time or training to become familiar with the innovation.

The level and nature of engagement and education provided to adopters (including both staff and residents) also has the potential to constrain or enhance the likelihood of successful adoption. This is particularly relevant to remote monitoring technologies, where Hall et al. notes a lack of involvement of care staff and residents in discussions and decisions around implementation.(33) Where implementation entails significant changes to the existing roles and practices of staff and patients or caregivers, successful adoption was contingent on these changes being communicated gradually. Hall et al. note the importance of “staff training that moves beyond functional instruction to include deeper discussion about anticipated benefits and challenges, and by the involvement of

staff, residents and relatives in discussions and decision-making within the implementation process." (33)

(e) Domain 5: The organisation(s)

Goodman et al. identified 27 studies which referred to the role of leadership (i.e., the way leaders shape change and best practice) of care homes influencing processes of innovation adoption.(36) Seven studies reported that leadership could be a barrier to innovation adoption where there was: poor role clarity; manager resistance to technology; an excessive delegation of responsibilities (e.g., to staff who lacked the seniority or experience to fulfil responsibilities); high manager turnover; and lack of buy-in or involvement in innovation adoption from managers.

This relates to the organisational capacity or readiness for innovation. Where senior buy-in and involvement in change is low, the innovation is likely to be seen as not a priority for the care home and may be abandoned. The importance of this was also highlighted by other sources, noting major challenges to adoption where the innovation does not appear to align with care home priorities (4,33). Conversely, thirteen studies depicted care home managers and leaders as skilled professionals with a key role in driving innovation adoption. Where managers were engaged with the project from the outset, this fostered positive working relationships ensuring that the innovation was presented to care homes in a way that supports its importance and feasibility. (36)

Goodman et al. identified 28 studies which highlighted elements of care home organisational culture and its influence upon innovation adoption and uptake.(36) Cultural attributes that involved supporting staff education, reinforcement of learning and improvement through quality improvement, and ownership of change, were reported to have a positive impact on adoption and uptake. Similarly, instances in where organisational culture was identified as facilitating adoption or uptake were those in which the innovation was viewed as acceptable to healthcare professionals, care home staff and residents (with staff having the chance to engage in ongoing consultation).

Several elements of organisational culture were identified as having the potential to negatively impact innovation adoption or uptake, such as where staffing and capacity levels in the care home were not congruent with levels required to support adoption. Furthermore, Goodman et al. identified one study which highlighted that the financial model of a care home (i.e. whether the home is commercially run or not-for-profit) may impact readiness and how receptive care home leadership are to innovation.

Concerning the work involved in driving implementation, Goodman et al. identified the potential role of champions in leading change and acting as role models for the adoption of the innovation. It was noted that this could be a useful lever for driving adoption in care home settings, particularly where champions had protected time and were involved with both the care home and the linked NHS organisation supporting change.(36)

(f) Domain 6: The wider system

Wider system changes or reorganisations were noted as a major challenge to adoption, particularly if the wider system change does not align with the innovation, as this impacts the level of time and headspace that staff have to support adoption and embedding of the innovation into existing

workflows. Bunn et al. note that where care homes experienced changes in the wider system or reorganisations, their capacity to take on and adopt new interventions or innovations was limited; suggesting that wider system changes or reorganisations may restrict organisational capacity to adopt technological innovation.(4)

(g) Domain 7: Evolution over time

For remote monitoring in dementia care homes (for example, sensors to monitor falls or location-based monitoring technologies), the concept of “alarm fatigue” and overcoming or developing ways to mitigate this were identified as central to adoption and embedding remote monitoring innovations over time. Hall et al. note that in some instances of adoption of remote monitoring systems, staff reported concerns around a high rate of false alarms (e.g. when a resident leaves the building with relatives on an agreed visit, while still wearing the device, giving the impression that the resident has left the building unattended); because of this, care home staff had developed their own heuristics or strategies for managing or preventing these alarms(33). A care home deputy manager interviewed by Hall et al., outlined that as a consequence of this “[there were] more logistical issues to using it than to just not have it at all.” Other examples include where care home residents “removed fobs and moved to a different location, which confused staff as the resident was not located where the system indicated.” (33)

Remote monitoring and remote care in health care settings

Definition

Remote patient monitoring, or telemonitoring, refers to the use of telecommunications technologies to collect and send data on patient biometrics, vital signs and health indicators to healthcare providers, to better inform and intervene in care.(10) This can be done in real-time, either through the active logging of information or passively using wearable technology.(37,38) The patient data is automatically transmitted to a clinician to interpret – most often a nurse but it can also be a doctor or senior consultant – who can proactively review care if required.(12,38) Remote patient monitoring takes place outside of traditional care settings, typically in a patient's home or whilst on the move. This offers the potential to reduce pressure on hospital and emergency services.(6)

The interventions under the scope of remote monitoring in healthcare are varied and can include: automated reminder systems via text message or app notification to take medication; telemonitoring of long-term conditions such as diabetes or asthma; telecare detectors; video; consultation software; telephone or email communication systems; and virtual wards.(8,12) For this report, virtual wards are defined as a service for patients who are managed at home using telemonitoring methods, in order to avoid an emergency or acute hospital admission.(6)

The type of intervention used may vary according to the condition or individual patient need. Patient groups that have used telemonitoring and were explored in the literature included those with long-term conditions, chronic illnesses, mental health conditions, palliative care, and vulnerable people such as frail elderly living in their own homes or those in remote areas.(8,13,22,37,39) The patient information transmitted to the clinician can also be condition-specific, for example, blood glucose levels for patients living with diabetes or lung function for patients with asthma. For this review, we limited the scope of the search to the use of remote patient monitoring for the management of long-term conditions.

What does the evidence tell us about reported outcomes?

(a) Effectiveness

The effectiveness of remote patient monitoring varied according to the type of intervention investigated. Across the reviews found, the interventions included the automatic transmission of patient data via monitoring devices (8,37), applications integrating clinical data with reminder systems or patient feedback (37), smartphones (8,10), and communication via telephone or video consultation.(9) For interventions delivered to patients in rural areas, there was some evidence to suggest that these were as effective as face-to-face interventions.(8) One review, which investigated the impact of remote patient monitoring on acute care use, reported that these interventions reduced admissions, length of stay and emergency department presentations in just under half of the included studies, with the majority of remaining studies reporting no change in use.(10)

In the case of using remote patient monitoring to manage glycaemia, a moderate to large improvement in diabetes management that was superior or comparable to usual care, was reported by several studies.(6-8) The interventions aimed to promote patients' compliance to their care plan and improve outcomes, including healing time for diabetic foot ulcers and weight loss management for prevention of type two diabetes. However, self-managed interventions, as opposed to clinician-led, only had limited improvements.(7,8)

Remote patient monitoring in the form of automatic patient data transmission and virtual consultations for patients with congestive heart failure was reported to reduce healthcare utilisation compared with usual care, including lowering the number of hospital admissions and improving mortality.(7-10) There was some evidence to suggest that remote patient monitoring was superior to usual face-to-face care in improving these outcomes. However, there was more evidence that there was little difference between usual care and remote patient monitoring in improving readmission rates, particularly when utilising less invasive monitoring methods.(8,10) For example, patients with acute ischemic stroke, telemedicine was determined to be safe and had little impact on clinically relevant outcomes including morbidity, mortality and discharge rates compared with usual care.(8,15)

For managing patients with chronic obstructive pulmonary disease (COPD), some evidence reported that remote patient monitoring was as effective as face-to-face care in controlling symptoms and reducing emergency department presentations, and was also found to improve physical capacity and quality of life.(10) However, there was no significant effect on pain and disability, or hospital admissions, compared with usual care.(7,8,10,17) The evidence was inconclusive as to the benefits of remote patient monitoring for asthma management, with only low-quality evidence reporting a beneficial effect.(40) Similar conclusions were found for managing patients with chronic pain.(8)

The Queirós et al. review highlighted that a common factor between diabetes, COPD and heart failure are episodes of acute exacerbations, particularly if the condition is poorly managed.(7) This, therefore, suggests that remote patient monitoring may improve adherence to care plans and proactively identify changes in the patient's health status, in turn improving the management of their condition.

(b) Cost-effectiveness

The evidence for the cost-effectiveness of remote patient monitoring is limited and inconclusive. One umbrella review reported that seven of eighteen reviews determined telemedicine to be cost-saving or cost-effective. However, sixteen of these were rated low or critically low quality according to the AMSTAR review quality checklist.(8) Another review reported that almost all studies included found telemonitoring to result in higher costs for healthcare providers; however, cost was closely aligned with the technology implemented, with the use of modern smartphones resulting in lower costs.(15) One limitation discussed across all reviews were the heterogeneous way that costs were reported, with not all studies reporting costs such as set-up, staffing, or overheads; only 20% of all published telemedicine studies contain quantitative data related to service costs.(8,9) This can then impact how cost-effective a service may appear.

The literature reviewed for this report compared a variety of other services to telemedicine, including in-person clinician visits at the patient's home. The evidence mostly supported that remote patient monitoring was more cost-effective compared with in-person clinician visits to the patient's home or usual care; however, there was limited evidence to suggest that any increased adherence to treatment led to a reduction in costs.(7-9) For patients living with heart failure, the evidence indicates that the use of remote patient monitoring would reduce long-term costs by reducing travel costs to the patient and lowering the risk of hospital readmission.(9,41) However, there was limited evidence as to the cost-effectiveness of remote patient monitoring for the management of patients with high blood pressure, citing the greater number of interventions required compared with usual care.(7)

Overall, the cost-effectiveness of remote patient monitoring varied according to the condition being managed. One review commented that nurses were typically the clinicians involved in administering remote patient monitoring, including reviewing results and modifying the patient's care plan. While this increases the cost-effectiveness of providing these services, as the scope of remote patient monitoring expands, greater involvement from doctors may be required, which could reduce the cost-effectiveness.(9)

(c) Patient experience

While the literature reviewed supported that video consultations offered convenience and increased access to healthcare, much of this evidence referred to patients using video consultation as a one-off and not part of a care plan in conjunction with remote patient monitoring. For patients in the latter group, they were more likely to prefer a face-to-face appointment; one reason cited was difficulty in finding a private space to have the consultation.(13-16) However, for patients in rural or remote communities, remote patient monitoring was generally preferred due to reducing the need to travel long distances to access healthcare (particularly specialist care) and reducing reliance on others for transport or childcare.(12,13,15,17) Remote patient monitoring may also support the frail or elderly population to remain in their own home.(42) There was some evidence to suggest that patients were generally more accepting of remote care than the clinicians administering it.(8,11,15) Two reviews noted that despite improvements in internet access, some clinicians felt that patients who are disadvantaged or vulnerable may struggle to engage with video consultations, which could lead to an unintentional inequality in healthcare provision.(16,43)

There was evidence to suggest that remote patient monitoring can indirectly positively impact a patient's reported pain level, fatigue, depression and overall quality of life when compared with usual care models.(6,7,11-14) This may be attributed to increased adherence to their care plan, patient empowerment, or more rapid changes in their care plan by clinicians in response to changes in their health status. However, one meta-analysis reported that the use of telehealth for home care patients with long term conditions did not have a statistically significant effect on quality of life, anxiety, depression, or psychological wellbeing.(17)

(d) Staff experience

The clinician experience of using video consultation was generally positive; however, satisfaction was reported to be reduced when commencing a new treatment or needing to order laboratory

tests. This may therefore suggest that, as part of a remote patient monitoring program, face-to-face patient consultations may be preferred, as the care plan is more likely to be changed frequently.(16)

Several reviews discussed that staff preferred using video consultations as part of a care plan that also included face-to-face consultations, as patients could see the same specialist and local clinician at each appointment, improving the continuity of care. (11,12,44)

There was a preference for video consultations over telephone consultations, as it allowed clinicians to pick up on visual cues and allowed other family members to also be present.(44) Particularly in the case of patients living in rural or remote areas, the use of video consultations allowed multidisciplinary meetings to take place with the patient present, increasing information sharing and improving care coordination.(12,44)

Facilitators and barriers to adoption

(a) Domain 1: The illness or condition

The evidence demonstrates that not all conditions are appropriate for being managed using remote patient monitoring and that not all patients with the same condition would benefit equally from remote patient monitoring.(11,43,45) For patients with complex conditions, who are most likely to be recommended for remote monitoring, a change in their health status could result in decreased engagement with the technology. This included being admitted to hospital.(37) Limited evidence was found that discussed how specific clinical characteristics of a condition may influence the adoption of remote patient monitoring. One review mentioned that for the monitoring of antenatal diabetes, video consultations were abandoned due to the short duration, but high-risk nature of the condition, the involvement of multiple staff members across different departments, and the difficulty in staff accessing patient-held records during the video consultation. For patients with cancer undergoing surgery, the pre-operative consultation was felt to be too complex to have over a video consultation; however, post-operative consultations were felt to be appropriate for video consultation.(45)

Whilst some patients were described as benefiting from the use of video consultations in order to access specialist advice faster, other patients with complex conditions felt concerned that video consultations were inferior to face-to-face consultations, even if used for regular monitoring of their condition. This was in part attributed to the difficulty of physically examining patients.(43,45) The evidence has largely described remote patient monitoring as potentially benefitting vulnerable patient groups, there was some evidence to suggest depending on the type of technology introduced, it could have the unintended effect of excluding certain patients more; this was in part attributed to some patients not having access to the required technology if not supplied by the health service.(45) The appropriate selection of patients to use the technology is therefore imperative.(11,43)

(b) Domain 2: The technology

A lack of input from users, either patients or clinicians, was identified as a barrier to the implementation of remote patient monitoring.(11,43,46) The usability of any proposed remote

patient monitoring system was highlighted in several reviews as being a key facilitator of the technology's adoption.(37,44) System interoperability can be a facilitator to implementing a new remote patient monitoring technology, as the interfacing of new and current systems can reduce workload and increase staff usability.(8,37,43-46)

Integration with a patient's existing smartphone or computer, where relevant, was cited as a facilitator.(37,43) In conjunction with adequate support, the provision of a larger and simpler interface was most useful for older patients and there was evidence that this increased patient engagement.(8,37,39) Furthermore, the flexibility of the technology to meet the specific need of the patient or condition was also a facilitator.(39,46) For example, personalising the dates and times to receive notifications or send biometrics, opting out of unnecessary health tracking, or accommodating for a patient's ability to use the interface. Where it is possible to accommodate individual patient preference, for example by allowing the monitoring technology to be accessed on computers, tablets and smartphones, this also increased uptake.(37) This was attributed to some people preferring more portable devices, whilst others preferring larger devices where more information could be viewed. The use of additional devices such as an e-stethoscope or e-ECG also facilitated the uptake of video consultations by clinicians, as the scope of what could be completed over video increased.(45)

IT concerns were cited in the reviewed literature as being a barrier to the adoption of remote patient monitoring.(15,37,43) This included what would happen should a monitoring device fail, or if a patient did not have appropriate internet to transmit information across.(43,43) Other technology concerns included not receiving the correct notifications to take their medication, freezing of the system, or difficulties connecting a wearable device to a computer. This decreased patient engagement, contributing to them using the technology less.(37) A lack of user-friendliness, for example, the device being difficult to read, was highlighted as a significant barrier in one review; of sixteen papers identified, six explored the issue of difficulty using the remote patient monitoring system. This decreased engagement and increased reliance on family members.(39,46) However, there was a bias towards older studies reporting usability difficulties.(11) It was also identified that older people may be more likely to have multiple comorbidities, for example, poor eyesight and COPD, which developers should consider when developing their remote patient monitoring technology.

(c) Domain 3: The value proposition

Cost was cited as a significant barrier to the implementation of remote patient monitoring, including set-up costs, training, and staff to oversee the program.(8,15,43) The evidence is limited in determining whether the benefits outweigh the costs of implementing such a technology.(8,15,46)

(d) Domain 4: The intended adopters

Appropriate education of the use of remote patient monitoring for staff, patients, and carers is integral in facilitating the adoption of a new telemedicine technology.(43,46) Additionally, the engagement of patients in the design and implementation stage was also attributed to increasing patient uptake of remote patient monitoring. Awareness of the technology was highlighted as a key facilitator, particularly when doctors shared the information with their patients, as opposed to a

passive information source such as a leaflet. This should also include when it is appropriate to use the technology, particularly in the case of electronic consultations with a specialist.(43)

Patient engagement with remote patient monitoring is a key facilitator to implementing such a technology, and central to this engagement is how useful the patient perceives the technology to be.(37,42) There was limited evidence found to suggest that additional feedback about a patient's health status may be beneficial in increasing engagement; for example, when they have achieved a goal or general information about their condition. However, it was also noted in the literature that some patients may prefer a system that is as unobtrusive as possible.(37) As such, regular feedback may deter them from accessing the remote monitoring system.

Conversely, a lack of understanding or awareness of remote patient monitoring is a significant barrier to its successful implementation.(42,43) With technologies requiring the patient to actively log information or use a system, insufficient education can severely inhibit the patient's ability to access the technology.(43) However, if the technology is passive and wearable, this is less of an issue. Motivation and wanting to use the technology were two areas highlighted in a smaller number of reviews.(37) A lack of either was shown to be a significant barrier in both patients and clinicians adopting the remote monitoring technology.(45) An increased administrative burden and training were also suggested as barriers.(43)

Baines et al. describe how the low uptake of a technology can further prevent its successful implementation.(43) This can be due to a variety of reasons, including lower staff familiarity, decreased patient awareness, or lack of promotion.(43) Negative attitudes of staff, such as a belief that the technology will not provide a benefit to patients or resistance to change, were highlighted as barriers to successful adoption of telemonitoring.(6,44-46)

(e) Domain 5: The organisation(s)

Top-down decision making by managers and leadership engagement was associated with the adoption of home telemonitoring.(11,46) The provision of a standard protocol or strategy was deemed essential in facilitating the implementation of remote patient monitoring.(8,43,46) However, top-down decision-making combined with a lack of input from patients and clinicians can result in resistance, impeding the scale-up of new technology.(11)

The evidence suggests that ongoing staff training is essential when implementing remote patient monitoring.(43,44,46) This should not be limited solely to how the technology works and safety considerations, but also how the technology fits with existing practices, individual responsibilities, and purported benefits.(45) Electing a staff member as a champion of the technology to promote its use among patients and staff also facilitated the implementation.(43,45)

IT support was another key facilitator. Several sources cited this, describing how clinicians may be more reluctant or resistant to engage with an unfamiliar technology, or one that does not integrate with other systems well.(44,45) One review reported that poor adaptability of existing information workflows could result in a perceived increase in workload.(11)

(f) Domain 6: The wider system

The evidence reviewed highlighted that concerns regarding data protection and security, as well as medico-legal issues, as a potential barrier to the adoption of remote patient monitoring.(8,43,46) This in part goes alongside staff knowing what their responsibilities are with regards to technology, for example, who a clinician is required to notify should patient data be sent that is abnormal, or how quickly they are required to contact a patient.

(g) Domain 7: Evolution over time

Evaluation of the implementation of a telemonitoring technology was highlighted as being an important facilitator, as this can ensure that the service is still providing a benefit and can be used to secure further funding.(46) The ability of the system to respond to change and stress, in conjunction with a flexible approach to implementing the technology, increased the likelihood of successful adoption of the technology.(45)

Advice and guidance between primary and secondary care

Definition

Advice and guidance services (also known as e-consults) use telecommunications technologies to allow clinicians in different care settings to communicate and share information with one another. This involves a secure remote connection between a requesting clinician and a responding clinician and is intended to facilitate more timely communication and information sharing.(47) This innovation provides an alternative to post-consultation letters or other paper-based communication methods between primary and secondary care, which can sometimes create delays in care and decision-making.

NHS Digital outline several key purposes for seeking advice and guidance, including:

- Asking for advice on a treatment plan or ongoing patient management;
- Clarifying or seeking advice on test results;
- Seeking advice on appropriateness of a referral;
- Identifying the most clinically appropriate service for onward referral.(47)

In bypassing the need for meeting face-to-face or paper-based communication, these innovations are intended to address long waiting times and improve access to specialist care, while reducing inappropriate referrals.(6) Shorter waiting times and enhanced access to specialist care may enhance patient and staff experience.

The published literature highlights two main variations in the way that advice and guidance is implemented within telemedicine services:

Asynchronous communication does not require both clinicians to be present at the same time. This typically follows a ‘store-and-forward’ method, where the requesting clinician gathers and sends relevant information to the responding clinician.

- Examples include electronic systems such as advice and guidance within the NHS e-Referral service, which enables GPs to actively request advice with the additional capability of attaching supplementary information to the written request (e.g., patient history, diagnostic imaging, and blood test results).
- Advice and guidance may be sought prior to or in lieu of a referral. The specialist may also attach supplementary information to the response, with the option to convert the request into a referral.

- It should be noted that some clinicians may choose to request advice and guidance from a specialist via email or short messaging service-based systems, as opposed to seeking advice and guidance within the NHS e-Referral service. For example, some NHS Trusts use dedicated email addresses to enable clinicians in other settings to access specialist advice and guidance.

Synchronous communication involves clinicians securely sharing information or advice and guidance in real-time, through 'live' mediums such as video or telephone calls.

- Examples include telephone 'chase' systems where the requesting GP calls a dedicated telephone number, which automatically calls specialist clinicians on an agreed rota until the call is picked up.

- Other examples utilise electronic systems with teleconferencing capabilities, which enable video calls between clinicians in real-time.

Secondary research examining the implementation of advice and guidance systems points to two common components, which relate to the platforms used to host such services:

- **Web-browser, mobile app or intranet-based** - this describes services that are hosted within standalone platforms, such as those hosted within secure web -based platforms accessed via the Internet. Others include services based within mobile applications and those that utilise email-communication hosted within intranet-based software.(17)

- **Integrated within electronic health records or e-referral systems** - this describes services that are hosted securely within electronic health records (EHRs). These utilise closed systems or private networks to link participating primary care providers in general practice to specialists within hospital settings. In these circumstances, advice and guidance services may be integrated as part of the process for requesting referrals electronically, such as through the NHS e-Referral Service.(17,19) Through linkage or integration with EHRs, providers may also have access to additional patient information.

What does evidence tell us about reported outcomes?

(a) Effectiveness

A recent environmental scan by Joschko et al. presents qualitative and anecdotal evidence concerning the effectiveness of advice and guidance services worldwide.(48) Key benefits highlighted by providers centred around the convenience of receiving rapid guidance with faster turnaround than paper-based advice, reducing unnecessary referrals, and improving quality of care. Though it was noted that efficiencies arising from using these services extend beyond receiving prompt replies and referral avoidance. Specifically, Joschko et al. note that:

"Respondents also discussed how e-consult services improve the quality of care patients receive; this improvement was multifaceted and extended beyond the speed of replies and capacity to avoid unnecessary specialist visits. As one respondent noted: 'You can improve the quality of care,

you can improve the speed of care, you can reduce the cost of care. There are so many aspects associated to tele-consultation.' [Respondent 3]".(48)

Population health and clinical outcomes

Regarding the impact of e-consult services upon population health and clinical outcomes, previous systematic reviews (19,21) looking at the effectiveness of advice and guidance services note substantial gaps in the literature. Many advice and guidance services studied were restricted to a single clinical specialty (most commonly dermatology or nephrology), and no studies examined the impact of these services on population health using clinical outcomes such as hospitalisation or mortality. The majority of studies that examined impacts upon clinical, diagnostic, or treatment outcomes showed comparable results between usual care and advice and guidance services.(19)

Examining the literature published since previous reviews, Liddy et al. found only three additional articles relevant to clinical and population health outcomes, with mixed findings.(17) While there was some evidence of a reduction in the rate of adverse cardiovascular events, the other two studies note the potential for harm in relation to a lack of patient follow-up. Thus, the lack of published literature on population health and patient clinical outcomes persists, such that it is unclear whether advice and guidance services have a positive impact on population health and clinical outcomes.

Referral avoidance and access to care

Regarding referral avoidance or efficiency, previous systematic reviews looking at the proportion of referrals avoided due to advice and guidance services show mixed findings - with referral avoidance ranging from 12 to 84 per cent in included studies.(19) However, the authors note that these estimates are often based on self-reports of provider referral intention, and the use of different methods to measure referral avoidance means that rates of avoidance are not directly comparable. A more recent systematic review by Liddy et al. also notes the potential for substantial avoidance of face-to-face referral visits. (17)

Regarding the impact on waiting times, Liddy et al. identified three studies that suggest that advice and guidance services may effectively reduce the amount of time required to access specialist clinical advice, with median time for receiving a response ranging from one to six days.(17) This dovetails with a recent Cochrane systematic review.(20) Gonçalves-Bradley et al. found that for people with skin conditions and people with symptoms who require ultrasonography, mobile technologies (including devices such as mobile phones or tablets which use store-and-forward technology to support digital image transfer) that support e-consult or advice and guidance services probably reduce the time between presentation and management.(20) It should be noted that this evidence was graded low to moderate by the authors.

(b) Cost-effectiveness

Across the five secondary sources identified, there was limited evidence concerning cost-effectiveness of advice and guidance services.

Previous systematic and scoping reviews of the literature up to 2016 highlight limited evidence relating to cost-effectiveness of advice and guidance services between Primary Care Providers (PCPs) and specialists. Specifically, a systematic review and narrative synthesis of the advice and guidance services literature published between 1990 and 2014 identified no studies relating to cost-effectiveness.(21)

While a similar systematic review by Liddy et al. identified seven studies that included cost-effectiveness analyses, most related to teledermatology (n=5) and used such different outcome measures and designs that cost-effectiveness of advice and guidance services could not be demonstrated.(19) Similarly, Winpenny et al. identified a lack of studies assessing cost-effectiveness evidence for email communication between GPs and specialists, with most studies relating to teledermatology.(49)

Reviewing the evidence base for out-of-hospital care, The Nuffield Trust identified two studies in which teledermatology advice and guidance services were found to be cost-effective compared to usual care.(6) It was found that advice and guidance for teledermatology had the potential to be cost-effective where triage was assisted by digital image transfer, or where advice and guidance services are used for patients who live far from dermatology services.

In contrast, recent findings from a Cochrane systematic review (20) found that for patients with some skin conditions or chronic kidney disease, usage of mobile technologies to support provider to provider communication likely makes little or no difference to the total or anticipated cost of care for individual patients. This evidence was drawn from six trials identified by the authors (n=5,423).

Finally, two recent systematic reviews highlight emerging evidence concerning cost-effectiveness, though both note that this topic remains underexamined.

Since previous reviews, Liddy et al. identified six studies with cost-effectiveness analyses.(17) While there was positive evidence of the cost-effectiveness of advice and guidance services among individual studies, the authors reported promising findings regarding the potential for cost-savings for healthcare systems, but variation in the methods used to understand cost and economic impact preclude any direct comparisons of the costs and benefits of advice and guidance services between studies.

Similarly, Vimalananda et al. identified three studies that addressed the costs of providing advice and guidance services, including one cluster-RCT and two observational studies (pre-post design).(18) Individual studies showed positive impacts of advice and guidance services in terms of relatively low-cost implementation and some savings associated with referral avoidance, though the strength of this evidence is low given indirect and subjective approaches to cost-estimation (e.g., comparing the number of face-to-face visits with advice and guidance requests), and reliance on provider self-report as a proxy measure for referral avoidance.

(c) Patient experience

Early systematic reviews have identified an emerging evidence base with respect to patient perceptions and satisfaction with advice and guidance services.

For example, Liddy et al. identified ten studies concerning patient satisfaction with advice and guidance services, examining satisfaction via survey and interview-based methods.(19) Patient satisfaction rates were consistently high, ranging from 78% to 93%. Studies using Likert scales to assess satisfaction also reported high levels of patient satisfaction; for those using ten-point Likert scales, a mean score of 8.5 was reported. This was similar for those using five-point Likert scales, with a mean score of 3.5. It should be noted that the way satisfaction was measured was variable between studies.

This is supported by the findings of a systematic review and narrative synthesis, indicating high levels of satisfaction across two studies using patient survey methods.(21) Though, it is also notable that the authors were unable to identify studies that evaluated patient preferences or patient satisfaction with advice and guidance services compared to other forms of care.

More recent evidence from a Cochrane systematic review across four trials (n=972) concludes that using mobile technologies to increase PCP access to specialist advice from dermatologists may make little or no difference to patient satisfaction, or service acceptability.(20)

Further, recent systematic reviews have highlighted gaps in the literature regarding the impact of advice and guidance services on patient experience of care. While previous survey-based methods have shown high acceptability and satisfaction with these services, few measure the patient experience of care or patient satisfaction directly.(17,20) A limited number of qualitative studies have explored the perceived benefits arising from advice and guidance services and their impact on patient experience: among the benefits of faster access to care and avoidance of travel, an important trade-off was identified.(17,18). While some aspects of advice and guidance services are convenient, in foregoing the opportunity for a face-to-face visit the patient may also miss an opportunity to ask the specialist their own questions (18). Thus, accessing specialist care in this way may preclude consideration of patient values and preferences.

Vimalananda et al. identified one study examining this trade-off which found that patients were willing to accept this trade-off but only in context to long waits for face-to-face appointments, where they have high levels of trust in their PCP, or for clinical situations where the potential risks arising from not seeing a specialist face-to-face are low.(18)

Overall, while there is an emerging evidence base that supports patient satisfaction and acceptability of advice and guidance services, this has largely been survey-based where patient experience was measured by proxy or indirectly (i.e., through the PCP). Based on this gap, the most recent systematic reviews highlight the importance of future research which directly measures the impact of advice and guidance services on patient experience of care, through patient-reported outcomes measures (PROMs).(17,18)

(d) Staff experience

Primary care provider (PCP) satisfaction

Secondary research indicates that advice and guidance services are associated with high levels of PCP satisfaction.

For example, Vimalananda et al. highlight that 70 to 95 per cent of PCPs reported a high level of satisfaction with advice and guidance services.(21) Specifically, this centred around their perceived value in improving the timeliness of specialist response and in providing enhanced communication with specialists.(19,21) This is supported by Liddy et al. which shows that of the thirteen studies identified which examined PCPs' views, the majority described positive perceptions of advice and guidance services, being able to provide improved medical care in a timely way, and specific utilities such as being able to confirm diagnoses and receive medication advice.(19)

High levels of PCP satisfaction with advice and guidance services are also reported in more recent systematic reviews by Liddy et al. and Vimalananda et al.(17,18) Specifically, Liddy et al. refer to several studies concerning the Canadian Champlain BASE advice and guidance service, where over 90% of providers indicated them as having a high or very high level of value.(17) Across other studies, Liddy et al. also report high proportions (75 to 90 per cent) of PCPs indicating their satisfaction with advice and guidance services.(17)

While Vimalananda et al. also report high levels of PCP satisfaction with advice and guidance services since earlier reviews, they go on to highlight that qualitative studies conducted within more mature services have identified drawbacks or trade-offs.(18) For example, PCPs are not provided additional time or reimbursement for patients managed via advice and guidance services. Such that some studies have reported increased workload for PCPs, with mixed findings about whether this additional workload or burden is justified by the benefits incurred by using advice and guidance services, such as timeliness of specialist response.(18) Though, more widely there are mixed findings with respect to whether they increase PCP workload.(17)

Specialist satisfaction

Early systematic reviews identified a lack of studies examining specialist perspectives and levels of satisfaction with advice and guidance services. This is supported by more recent secondary research, which shows that, while specialist perceptions were largely positive in studies examining this technology, only a very limited number of studies have assessed the specialist experience of using advice and guidance services.

Among the seven studies identified by Liddy et al., the majority show high levels of satisfaction with advice and guidance services, albeit with the caveat that satisfaction levels are generally lower than for PCPs.(19) One teledermatology study identified by Liddy et al suggested dissatisfaction with advice and guidance services, namely with the lack of reliability on the platform used. (19) Other studies highlight concerns about a lack of patient contact, which can cause specialists to express less confidence in their clinical management plans and diagnoses made remotely when compared to those carried out face-to-face.(19)

Since more recent reviews, Liddy et al. identified four studies examining the impact of advice and guidance services on specialists.(17) These largely mirror previous findings in that while they suggested some positive impact of advice and guidance services on the specialist experience of delivering care, this question remains underexamined. Further research is needed for clarification,

particularly as other studies highlight concerns around the potential for negative impacts of advice and guidance services on specialists' workload.

These findings contrast those outlined in systematic reviews by Vimalananda et al., which report mixed findings for specialist satisfaction with advice and guidance services.(18,21) While some studies indicated positive reflections around the efficiency of advice and guidance services in managing and avoiding referrals, others indicated ambivalence or dissatisfaction with insufficient reimbursement or lack of protected time to address questions and concerns around liability.(18)

Staff education (PCPs)

Several sources point to the potential educational benefits of advice and guidance services for PCPs, with reference to improving the management of long-term conditions in primary care.(18) For example, Liddy et al. report that across advice and guidance systems for specific specialities (dermatology, pulmonology, and nephrology), PCPs reported educational benefits in over 80% of cases or consultations.(19) Specifically, advice and guidance received was perceived as having the potential to improve the clinical management and care of similar patients in the future.(19)

The potential educational benefits of advice and guidance services for PCPs are also highlighted by more recent secondary research, with positive results across several studies identified by Liddy et al. (2019). For example, in one study identified by Liddy et al. around 90 per cent of PCPs reported having learned from advice and guidance responses, with 89 per cent in another study highlighting that they felt advice and guidance responses had conclusively addressed their question.(17) Finally, it is important to note that educational benefits in terms of improved clinical management may be stronger for PCPs with less clinical experience, such as nurse practitioners, physician associates or physicians with fewer than ten years of clinical experience.(20)

Facilitators and barriers to adoption

(a) Domain 1: The illness or condition

Early systematic reviews indicate that up to 2016, advice and guidance services had largely been examined in relation to some conditions or illnesses, more than others. For example, of the 36 studies identified by Liddy et al., over 60 per cent examined advice and guidance services in relation to dermatology, with only seven per cent examining multi-speciality services.(19) This may be because certain specialities lend themselves better to clinical questions being answered via store-and-forward methods or image transfer (such as in teledermatology).

More recent systematic reviews have shown that this has changed to some extent with advice and guidance services being provided for a wider range of specialties, though the provision of these services remains focussed on certain specialities, namely endocrinology, dermatology, haematology and cardiology.(17) However, as noted in an earlier scoping review, advice and guidance services may only be appropriate for a low proportion of cases, with Caffery et al. noting they were appropriate in fewer than ten percent of outpatient referrals.(50)

Finally, a discussion paper and literature review of the quality of referral letters between primary and secondary care acknowledges that the adoption and implementation of advice and guidance

services and similar technological innovations should be driven by patient need, and not availability or interest of speciality groups.(51)

(b) Domain 2: The technology

Several studies describe challenges associated with the technology or platform itself, which may reduce the likelihood of successful adoption of advice and guidance services.

Specifically, Liddy et al., Joschko et al., Osman et al. note that adoption of advice and guidance services is less likely to succeed where providers experience internet connectivity issues when using the software, or where users experienced serious issues in using the software.(17,48,52) Conversely, while challenges with the technology itself were described as inconveniencing, they were not viewed as insurmountable but were anticipated as part of the process of accommodating change and tailoring the technology solution to staff needs. In research conducted by Joschko et al., one respondent explained that *"You're going to run into some things where the information isn't processing right or there's something screwy in the EHR or whatever. [...]It's just a matter of working through those issues*."(48)

Vimalananda et al. note several practicalities around how the advice and guidance service is integrated into existing electronic health record (EHR) software, which impact how easily usable the services are.(21) Specifically, where providers across different care settings use different electronic health records, logging into multiple systems can create delays. Conversely, where provider organisations share an EHR, this prevents the need to log in to multiple systems and may enhance ease of use. Where existing IT systems are cumbersome, or do not link into EHR software, this may detract from the potential benefits of advice and guidance services, as indicated in a study identified by Osman et al., in which one respondent states that: *"Until a more slim-line IT system is developed reducing the number of steps involved in completing an eC [electronic consultation]…it appears to be beneficial for all parties except secondary care."*(52)

(c) Domain 3: The value proposition

Several barriers and facilitators were identified with relevance to articulating and communicating a robust case for the benefits of advice and guidance services to key stakeholders.

As part of a worldwide environmental scan of advice and guidance services usage (including stakeholder interviews), Joschko et al. noted that many respondents identified a major barrier to adoption as failing to secure buy-in concerning their benefits or value.(48) The authors report that scepticism about the benefits of advice and guidance services was most frequently encountered as a barrier at the managerial level. However, this was also experienced at the provider or practitioner level, with the authors noting that: *"Convincing providers to engage was also sometimes a challenge, though in their case, it was more a question of fighting inertia and getting practitioners to adjust to new methods of delivering care: The greatest challenge was getting people to think about their work differently."*

(d) Domain 4: The intended adopters

Several sources point to the importance of addressing provider concerns around advice and guidance services to ensure successful buy-in and adoption early on. Concerns might include the

perceived impact of adoption on existing workload, or a perception of increased clinical risk and responsibility by specialists.

Systematic reviews by Liddy et al. and Osman et al. concerning the use of advice and guidance services highlight a major challenge to adoption in terms of provider perceptions of increased workload.(17,52) Joschko et al. note that when discussing their experience of implementing advice and guidance services, several respondents noted the importance of addressing PCP and specialist concerns related to increased workload.(48) Specific concerns centred around the potential difficulty of fitting an unfamiliar set of tasks (i.e., the use of advice and guidance services) into an already pressured workload, where some providers were resistant to this.

In supporting successful adoption, several sources pointed to the importance of overcoming or changing negative perceptions of advice and guidance services, in order to fully engage the intended adopters of the innovation. Specifically, addressing the perceived drawbacks and risks of not being able to see patients face-to-face, for both specialists and primary care providers.(52) For example, a stakeholder interviewed by Joschko et al. explored challenges around this, noting a major challenge in convincing specialists who held concerns around the potential increased clinical risk entailed by not seeing the patient face-to-face.(48) Specifically, the stakeholder interviewed outlines these concerns, alluding to ways these concerns might be mitigated:

"How can I possibly care for somebody that I haven't seen face-to-face personally and laid my own hands on them?" Getting them to think about delivering specialty care through this interaction with a primary care physician. Getting PCPs to think about this not as extra work, [but] as an actual patient-centric intervention, because you are setting up a communication with the specialist." (48)

In addressing these concerns and securing the engagement of intended adopters, several sources pointed to the importance of engaging clinical champions to role model and drive usage.(48,52) Respondents across several interviews conducted by Joschko et al. (2018) placed a high degree of importance on engaging clinical champions early on in implementation. Typically, these were primary care practitioners or specialists who advocated for the use of advice and guidance services or communicated their benefits to colleagues, such as communicating the potential educational benefits of advice and guidance services for providers.(52)

(e) Domain 5: The organisation(s)

Related to addressing the potential adopters' concerns and minimising the burden of accommodating advice and guidance services into working life, efforts to embed the service as seamlessly as possible into provider ways of working were identified as a crucial facilitator to successful adoption across several studies.(48,52) Specifically, several respondents interviewed by Joschko et al. noted the importance of *"understanding the limitations that your teams have on a day-to-day basis and the bottlenecks that they experience"*.(48) Having established mechanisms and providing the time to test and explore how to adjust the service to reduce potential burdens were seen as central to addressing these limitations and ensuring seamless integration with workflows.

(f) Domain 6: The wider system

A limited number of sources mentioned financial barriers to the successful adoption of advice and guidance services. Specifically, stakeholders interviewed by Joschko et al. mentioned several financial barriers, including: difficulties securing funding to implement and maintain advice and guidance services; and, navigating the complex logistics involved in reimbursing primary care providers. (48)

One study highlighted by Osman et al. noted privacy concerns as a barrier to the adoption of advice and guidance services, however the nature of these concerns was unclear. (52)

The presence of wider or existing IT infrastructure has been identified as a potential facilitator to adoption of advice and guidance services, where they are integrated seamlessly into existing structures.(48) Similarly, a respondent from one study identified by Osman et al. framed prior investment in these systems as a necessity*: "Health systems or practices initiating telehealth programs need to provide a base investment in the technology and then provide an ongoing and available infrastructure."*(52)

(g) Domain 7: Evolution over time

Respondents interviewed by Joschko et al. identified several challenges to the evolution and adaptation of advice and guidance services over time. (48) Several respondents identified challenges around increasing the scale or coverage of advice and guidance services, following initial implementation. Specifically, as the number of providers using the service increases over time, existing structures to address payment or reimbursement of primary care providers, or structures that govern service delivery, must be adapted to be more formalised.

Similarly, a scoping review by Osman et al. identified that establishing or developing payment mechanisms and different incentives for providers to use advice and guidance systems may facilitate wider adoption. (52)

What lessons have been learned from implementation during the pandemic?

Despite growing evidence of the benefits of telehealth, its use internationally prior to the pandemic remained limited.(22) For example, a 2019 Commonwealth Fund International Health Policy Survey of Primary Care Physicians (53) reported that regular use of remote monitoring or connected medical devices to monitor patients with chronic conditions ranged from one per cent in Norway to 11 per cent in the US. The UK reported a nine per cent use, which was the second highest.

Research published by the OECD at the start of the pandemic (23) reports that while telemonitoring has increased in recent years in OECD countries, few programmes are established at national or higher levels. Sweden, Spain and Japan were reported as exceptions. The report cites regulatory uncertainty, patchy financing and reimbursement, and vague governance as barriers to wider use. Inequalities in health and digital literacy are also reported to limit use.

Internationally, the COVID-19 pandemic has accelerated the need to use digital healthcare. Countries with more established use of telemedicine prior to the pandemic were able to scale up services quickly. For example, Denmark already had a long-established teleconsultation service for patients with flu symptoms which they were able to build on (22). The pandemic has also seen some barriers to digital care removed. In the UK, national bodies have provided guidance on information governance and fast-track procurement frameworks (28). Countries such as France, England, Japan and the United States relaxed regulatory barriers for teleconsultations in the wake of the COVID-19 outbreak (22). France also lifted restrictions on the reimbursement and the requirement of a prior face-to-face visit.

Structural barriers such as interoperability, lack of technology infrastructure, limited digital health literacy among patients and providers, and connectivity issues have been harder to tackle in a short period of time. However, countries that were progressing with challenges prior to the pandemic were well-positioned to quickly scale up use during the crisis. For example, South Korea went from a relatively limited use of telemedicine before the pandemic to a rapid expansion as Internet access and broadband use are nearly universal. (26)

Whilst the rapid period of digital transformation in healthcare internationally has been welcomed in providing care in exceptional times, it is important to understand what the impact of this rapid shift has been. There are possible risks and downsides when changes happen at such a pace.(28) In May 2021, the UK Local Medical Committees conference voted in favour of a ‘full impact assessment’ into video consultations amid reports that GP practices were ‘overwhelmed’ by patient demand.(54) During the pandemic, video consultations offered flexibility and safety, but there is now a fear that practices are becoming overwhelmed and concerns over lack of access for the most vulnerable exist.

Studies exploring the impact of the rapid transition to online services are currently limited.(28,29) Evidence from surveys of clinicians' and patients' experiences of the transfer to remote-based care during the pandemic shows that services managed to transfer to remote care quickly. For example, the European TeleCheck-AF project was reported to have been set up quickly and easily across different European centres during COVID-19 despite different health care settings and mobile health experiences. (25)

Similarly, a survey and consensus-building process involving clinicians and patients with COPD suggest the adoption of remote care delivery in the UK appears high, with many care activities partially or completely delivered remotely.(27) Remote monitoring has also been directly used for the management of COVID-19 in the NHS. Case studies (55) and small cohort studies (56) have reported positive outcomes for patients and local acute services.

Evidence is starting to emerge concerning barriers and facilitators. Draft findings from research funded by the Health Foundation exploring how the pandemic has shaped, enabled and constrained the scaling-up of remote video consultations reports that the single biggest factor enabling the rapid spread of video consulting was the cancellation of face-to-face appointments at the start of the pandemic.(24) Other enablers included increased enthusiasm by staff, patients and clinicians and improved technology infrastructure (e.g., updated equipment, rapid procurement of platforms, support for home working). This was combined with executive/senior leadership support for video consulting, which further aided local spread.(24)

National coordination and procurement have also aided the spread of video consultations.(24) Across the four nations, the spread of video consultations was reported to be greater in Scotland owing to national coordination and rollout via the NHS Near Me service. In the other nations, national procurement of video platforms aided rapid set-up, with information about the use of different platforms for different purposes also helpful in shaping video-based services.

App-based technology has also been reported to have advantages over device-based or wearable-based approaches during the COVID-19 pandemic as no hardware is required. This had hygienic and logistical benefits to implementation.(25) In contrast, the limited provision of equipment, including pulse oximeters and spirometers, for in-home monitoring was reported as a potential barrier to realising fuller benefits of remote care delivery for COPD patients in the UK.(27) The predominant reliance on telephone-only contact and more limited uptake of video-based technology was also reported as a barrier to remote COPD care (27) and video consultations (24) in the NHS. Reported limitations of video consulting included poor video quality, the time needed by clinicians and patients to set up video calls, and the perceived value and ease of phone calls over video when visual cues are not needed. (24)

NHS staff reported that the single most important thing that would enable the further spread of video consulting was increased support for patients to use video consulting.(24) The Strategy Unit (56) have recently conducted a review on the impact of COVID-19 on inequalities in access to health services for vulnerable groups. The review found that digital exclusion was the most reported barrier, impacting access to services across all population groups, specifically:

- people experiencing homelessness, migrants, refugees and travellers (place of residence);
- black and ethnic minorities (race, ethnicity, language and culture);
- LGBTQ+ youth (gender, gender identity and sexual orientation);
- socioeconomically deprived groups (socioeconomic status);
- older adults (age);
- people with disabilities including mental health conditions (disability).

Poor health status, low technological literacy, digital poverty and fear of sharing confidential information from home have been cited as contributors to digital exclusion.

Further work to understand the implementation and scale-up of remote care during the pandemic is currently being conducted. For example, the NIHR has funded research exploring micro-, meso- and macro-level challenges of 'Remote-by-Default Care delivered in the COVID-19 Pandemic'.(57) The research is due to report in November 2021.

Research prior to the pandemic might also offer useful insight into lessons learned from previous technology projects. Lessons cover factors such as leadership and relationships, codesign and engagement with patients and staff, the importance of evaluation, addressing regulatory, policy and governance concerns. Figure 1.2 and Figure 1.3 provide examples of lessons learned from technology projects implemented in health and social care settings.

Figure 1.2: Ten rules for managing technology projects in complex systems (31)

1. Strengthen programme leadership (which may be distributed across the project and across contributing disciplines)
2. Codevelop an overall vision for the project, and maintain dialogue around that evolving vision
3. Nurture key relationships between individuals and organisations
4. Develop individuals, and encourage them to solve local problems creatively
5. Make resources available for creative individuals and teams to use for generating solutions to local challenges
6. Capture data on progress and feed it into ongoing deliberations
7. Acknowledge and address the concerns of front-line staff
8. Work with intended users to co-design technologies and the work routines they are intended to support, building in adaptability
9. Control scope creep
10. Address regulatory and policy barriers

Figure 1.3: Ten practical lessons for implementing digital innovations – learning from the Care City test bed (58)

1. Dedicate sufficient time and resources to engage with end-users
2. Co-design or co-production with end-users is an essential tool when implementing technology
3. Identify the need and its wider impact on the system, not a need for a technology
4. Explore the motivators and barriers that might influence user uptake of an innovation
5. Ignore information governance requirements at your peril
6. Don't be afraid to tailor the innovation along the journey
7. Ensure adequate training is built-in for services using the technology
8. Embedding the innovation is only half the journey – ongoing data collection and analysis is key
9. Ensure there is sufficient resource, capacity, and project management support to facilitate the roll-out
10. Recognise that variation across local areas exists and adapt the implementation accordingly

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Search terms and sources

Remote monitoring and remote care in care homes

Technology	Setting (to limit results)
MeSH headings	*MeSH headings*
Exp Telemedicine/	Exp "Residential Facilities"/
	"Long Term Care"/
Free text search terms	
"Remote care"	*Free text search terms*
"Remote monitor*"	"Care home*"
Telemedicine or tele-medicine	"Nursing home*"
Telecare or tele-care	
Telehealth or tele-health	
Tele-consult* or Tele-consult*	
"Telephone intervention*" or "phone intervention*"	
"Telephone consult*" or "phone consult*"	
"Video consult*" or "Skype consult"	
Telemonitor*	
"Mobile health" or mhealth	
Virtual wards*	
"Technology enabled care"	
"Digital health"	
eHealth or "electronic Health"	

Remote monitoring and remote care in healthcare settings (inc. virtual wards)

Technology	Setting (to limit results)
MeSH headings	*MeSH headings*
Exp Telemedicine/	Exp "General practice"/
	"Primary health care"/
Free text search terms	"Community health services"/
"Remote care"	"Ambulatory care"/
"Remote monitor*"	"Ambulatory care facilities"/
Telemedicine or tele-medicine	"Mental health services"/
Telecare or tele-care	"Comprehensive health care"/
Telehealth or tele-health	
Tele-consult* or Tele-consult*	*Free text search terms*
"Telephone intervention*" or "phone intervention*"	"Primary care"
"Telephone consult*" or "phone consult*"	"General practi*" or GP
"Video consult*" or "Skype consult"	"Community care"
Telemonitor*	Outpatient*
"Mobile health" or mhealth	"Mental health services" or "mental health trust" or "mental health provider"
Virtual wards*	Hospital*
"Technology enabled care"	
"Digital health"	

eHealth or “electronic Health”

Advice and guidance between primary and secondary care

Technology	Setting (to limit results)
Free text search terms	*Free text search terms*
“Advice and guidance”	“Primary care”
e-referral* or eReferral* or “electronic referral*”	“Secondary care”
e-consult* or e-consult* or “electronic consult*”	Outpatient*
“Telephone referral*” or “telephone consult*”	“Demand management”
“Email referral*” or “email consult*”	'Referral management tool'
“Digital referral*” or “digital image referral*”	
“Image-based triag*”	
“Electronic communication*” or e-communication* or “email communication*”	
“Electronic advice service*”	
“Electronic referral system*” or “e-referral system*”	
virtual adj2 clinic* or virtual adj2 service*	

Sources

Academic	Grey Literature
Medline	HMIC
Cochrane Library	NHS Evidence
NIHR Journals Library	NHS England and NHS Improvement
	NHS X
	AHSNs
	Kings Fund,
	Nuffield
	Health Foundation

Type of evidence included

1. Remote monitoring and remote care in care homes	Secondary evidence only.
2. Remote monitoring and remote care in healthcare settings	Secondary evidence identified only two reviews. Primary evidence (with a UK focus) and grey literature was therefore also included. It is important to note that an un-published rapid review was identified in the grey literature (Masconi-Yule, 2020) that included evidence concerning the programme being evaluated. Due to the paucity of published evidence concerning remote monitoring in care homes it was agreed that the evidence should be included in the review.
3. Advice and guidance between primary and secondary care	Secondary evidence plus one additional UK-based primary research article identified through previous evidence work (NewCareModels). This was included due to relevance to barriers and facilitators to adoption, within a UK context.

Our standards and accreditations

Ipsos MORI's standards and accreditations provide our clients with the peace of mind that they can always depend on us to deliver reliable, sustainable findings. Our focus on quality and continuous improvement means we have embedded a "right first time" approach throughout our organisation.

ISO 20252

This is the international market research specific standard that supersedes BS 7911/MRQSA and incorporates IQCS (Interviewer Quality Control Scheme). It covers the five stages of a Market Research project. Ipsos MORI was the first company in the world to gain this accreditation.

Market Research Society (MRS) Company Partnership

By being an MRS Company Partner, Ipsos MORI endorses and supports the core MRS brand values of professionalism, research excellence and business effectiveness, and commits to comply with the MRS Code of Conduct throughout the organisation. We were the first company to sign up to the requirements and self-regulation of the MRS Code. More than 350 companies have followed our lead.

ISO 9001

This is the international general company standard with a focus on continual improvement through quality management systems. In 1994, we became one of the early adopters of the ISO 9001 business standard.

ISO 27001

This is the international standard for information security, designed to ensure the selection of adequate and proportionate security controls. Ipsos MORI was the first research company in the UK to be awarded this in August 2008.

The UK General Data Protection Regulation (GDPR) and the UK Data Protection Act (DPA) 2018

Ipsos MORI is required to comply with the UK GDPR and the UK DPA. It covers the processing of personal data and the protection of privacy.

HMG Cyber Essentials

This is a government-backed scheme and a key deliverable of the UK's National Cyber Security Programme. Ipsos MORI was assessment-validated for Cyber Essentials certification in 2016. Cyber Essentials defines a set of controls which, when properly implemented, provide organisations with basic protection from the most prevalent forms of threat coming from the internet.

Fair Data

Ipsos MORI is signed up as a "Fair Data" company, agreeing to adhere to 10 core principles. The principles support and complement other standards such as ISOs, and the requirements of Data Protection legislation.

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About Ipsos MORI Public Affairs

Ipsos MORI Public Affairs works closely with national governments, local public services and the not-for-profit sector. Its c.200 research staff focus on public service and policy issues. Each has expertise in a particular part of the public sector, ensuring we have a detailed understanding of specific sectors and policy challenges. Combined with our methods and communications expertise, this helps ensure that our research makes a difference for decision makers and communities.

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