

Converting digital ambition into a reality: Delivering a modern health experience to de-stress the patient, improve the experience and enhance outcomes

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Abstract Using the UK National Health Service (NHS) as a model, this paper will examine how the implementation of a digital health service will benefit both patients and clinicians in providing a superior care package as well as protection, transparency and improved outcomes. Using the experience of healthcare institutions across the UK the case is made for a modern and digital health system that can make better use of available resources and greatly improve patient care and ultimate outcomes. There are evolving issues to providing care, including greater patient expectation, an ageing population and the need to provide better value for money. This paper will demonstrate how, by embracing digital technology and improving communication, the patient can be more empowered, provided with the best possible care and given a first-rate vision of how a modern health service functions.

KEYWORDS: digital model of care, patient care, digital age, electronic care, records on-line, patients, clinicians, transparency, patient closeness, patient experience, improved outcomes, digital, telehealth, social media, remote monitoring

WHY WE MUST HARNESS A DIGITAL HEALTH SERVICE

The pressures facing health services are well known. There are requirements to meet the needs of an ageing population, who have more long-term, comorbid conditions and much higher expectations.

Budget and workforce pressures in the majority of hospital groups mean providing

‘more of the same’ is not feasible.¹ A better and more efficient way of working must be found and this means investment in digital technology and communication.

A recent study by the Nuffield Trust,² an independent UK-based health charity, highlighted the problem: ‘Clinically led improvement, enabled by new technology, is transforming the delivery of healthcare and our

management of population health. Yet strategic decisions about clinical transformation and the associated investment in information and digital technology can all too often be a footnote to NHS board discussions. This needs to change’.

Health organisations will have to rethink their service provision, while encouraging patients to take on more responsibility for their health. Patient experience is a factor that is likely to become much more influential.

One example of this realisation is the Five Year Forward View of the UK healthcare provider NHS England. This document³ acknowledges that pressures are building and it is clear that new models of care are required to manage demand and improve efficiency.⁴

The Five Year Forward View recognises the role technology has in alleviating pressures, improving care and productivity while reducing costs and paperwork, supporting self-care⁵ and providing alternatives to physical face-to-face meetings.

According to the UK communications ‘watchdog’ Ofcom,⁶ the UK in parallel with other western countries has a large technology-literate population, accustomed to banking, shopping and looking up their symptoms online.

Technology use, however, remains low in the UK health services; professional behaviour generally evolves much more slowly than consumer behaviour. The Nuffield Trust reported in its 2016 reports Delivering the Benefits of Digital Health Care is at least a decade behind other industries in the use of information technology. This gap is certainly visible in the

NHS. While 88% of adults in the UK use the internet, only 2% report a digitally enabled transaction with the NHS’.

As Deloitte reports,⁷ the number of health apps on iOS and Android has more than doubled in two and a half years to more than 100,000. The report outlines that mobile health (mHealth or m-health) was valued at US\$2.4 billion 2013 and is expected to reach US\$21.5 billion by 2018 (growth of 54.9 per cent per year). Europe is expected to overtake the United States by 2018 as the largest mHealth market, worth US\$7.1 billion.

A recent report from Azoth Analytics ‘Global Digital Healthcare Market: Trends, Opportunities and Forecasts (2016–2021)’⁸ (August 2016) believes the rising trend in the use of smartphones, home healthcare, mobile health apps and government projects toward healthcare digitalisation represents one of the greatest revolutions ever seen in healthcare. ‘The global digital healthcare market grew at a CAGR of 13.21 per cent in the period 2011–2015 and for 2016–2021, the growth rate is expected to be 15.05 per cent’.

Despite the slow acceptance of technology, the UK health service has been promised an injection of £4.2 billion⁹ to improve its use of technology, including electronic health records (EHRs), online consultations, telehealth and free wi-fi to create a ‘paperless’ health service. UK Health Secretary Jeremy Hunt has stated he intends the NHS to become a ‘world leader’ in using new technology, and he acknowledges how modern information technology (IT) can save time for personnel and promote more patient facing care.



Figure 1: In the UK, healthcare is at least a decade behind other industries

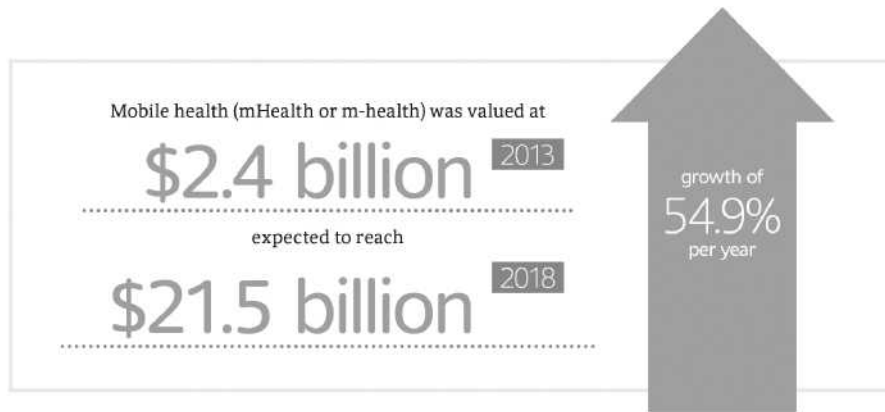


Figure 2: Mobile health expected to reach \$21.5B by 2018

Germany passed its politically controversial Secure Digital Communications and Applications Act, or E-Health Act in March 2016, which will implement an E-health card and also establish the infrastructure for interconnecting insured patients, doctors, hospitals and health insurance companies.

According to Dr Wolfgang Rehmann, partner at health law firm Taylor Wessing, 'the E-Health Card, which allows digital storage and retrieval of patient data, has been plagued in Germany by controversy'.¹⁰ This is believed to be due to data protection issues. The German 'Electronic Health Card' system is expected to be fully operational by 1st July, 2018.

There is a need for more evidence on the return on investment on technology in healthcare. Currently, little is available because health services are not fully realising its benefits.¹¹ With new IT infrastructure, healthcare providers will have to innovate in several areas including managing demand, streamlining processes, smoothing and shorting care pathways and generating appropriate data to identify areas for improvement along the whole patient journey.

A UK Department of Health policy paper 'Personalised Health and Care 2020: A framework for action',¹² published in 2014, provides support for this vision of additional technology in healthcare. 'Better use of data and technology has the power to improve

health, transforming the quality and reducing the cost of health and care services. It can give patients and citizens more control over their health and wellbeing, empower carers, reduce the administrative burden for care professionals, and support the development of new medicines and treatments'.

A European Commission survey in 1,800 hospitals across 28 European Union (EU) countries as well as Iceland and Norway measured the level of deployment and take-up of Information communication technology (ICT) and eHealth applications in acute care hospitals.

The survey showed that in general hospitals do not electronically share medical information they produce and store. Also the majority of hospitals deny patients access to their complete health records online effectively preventing personal involvement in their own healthcare. The overall top performing countries for hospital-based eHealth deployment are Denmark (66 per cent), Estonia (63 per cent), Sweden and Finland (both 62 per cent).

ONE PATIENT RECORD: CONNECTED PATIENT, CONNECTED CARE

A clear way to cut duplication and paperwork is by having an EHR for each patient. This is a priority for most western

The overall top performing countries for hospital-based eHealth deployment	
Denmark	66%
Estonia	63%
Sweden	62%
Finland	62%

Figure 3: Denmark leads the way for hospital-based eHealth deployment

governments.¹³ In the UK, the NHS pledged that all patients would have EHRs by 2016 and will be able to contribute to them by 2020. According to the UK Health Service Five Year Forward Plan, evidence from other countries suggests that opening up access to your own medical record leads to a profound change in culture in a way that is transformative for people with complex or long-term conditions.

EHRs take record keeping to the point of care, with information becoming available as soon as it is entered. Putting the entire clinical record in a patient-owned electronic account means it is available wherever the patient is.¹⁴ Introducing this across any health service is not expected to require major operational or IT restructuring.

- Patients now expect more real-time information that is easily accessible¹⁵ and the ability to explore their health status. Better communication can help dissolve barriers and enable a joined up health system; EHRs are a step in the right direction. EHR benefits include:
 - The removal of boundaries between hospitals and primary care, and between generalists and specialists to promote continuity of care where the whole patient journey is tracked.

- An improvement of care coordination¹⁶ for people with comorbid conditions as they provide a sophisticated clinical information and contact system.
- The easy retrieval of information in a standard, legible and structured fashion.
- The improvement of multi-professional working and support models of care¹⁷ such as care pathways and clinical networks.
- Allowing retrospective analysis of patient records and trends to identify outcomes and for audit and research.
- Patients not having to duplicate forms and questions for different providers.

Virginia Mason hospital in Seattle found that the immediate availability of lab and imaging results in real time meant time saving and a speeding up of care. The overall conclusion in this case was real-time record sharing reduced care costs, improved safety and halved treatment waiting times.¹⁸ Primary care physicians practising in Alberta, Canada who use electronic medical records (EMR) said 94 per cent of patients receive test results faster and 86 per cent of patients are helped in the management of chronic conditions by tools resulting from EMRs.

In the UK, the Royal College of Nursing agrees that adopting EHRs releases time

for hands-on nursing care. Looking for and fetching paper records wastes time¹⁹ and does not support productive ward standards. In the UK, the professional code for nurses expects the update of records as near to an episode of care as possible.²⁰ Portable devices that give access to EHRs allow the update records while they are with the patient, whether at the hospital bedside or in the patient's home.

The changeover to an integrated electronic records keeping system will not be without its teething troubles. Two pertinent issues are staff getting used to the new system and the EHR system becoming unwieldy.

According to Medscape, it can take staff four to eight months to adapt to new systems;²¹ they will need time to get to the point where they can use the new systems as second nature. The second issue is the amount of data stored on a hand-held EHR device. If too much information is expected to be entered at the point of contact, it could detract from nursing care.

Joyce Sensmeier of the Health Information Management Systems Society believes systems must be designed for practitioners' needs and 'chief nursing officers must advocate for what is needed to make these systems right for nurses'.¹⁹ Because EHRs can be easily adapted and hold a great deal of information, managers must balance the benefits of extra data against time implications before adding data fields.

The EHR is now becoming a matter of necessity with governments across the world working towards this goal. In April 2016, India held its first consultation on Electronic health records in New Delhi involving both physicians and healthcare IT experts. India's Ministry of Health and Family Welfare is also setting up an Integrated Health Information Platform (IHIP) to establish better continuity of care, secure patient records, better diagnosis and to save money.

FIRST CONTACT: IMPROVING COST EFFICIENCY AND PATIENT EXPERIENCE

Better management of patient enquiries the first time they contact the health service can improve cost-efficiency and patient satisfaction, and ensure the right care from the most appropriate provider.

In the UK, according to an NHS England National General Practitioner (GP) Patient Survey,²² the majority of contact occurs in primary care but 'patient habits' dominate communication.

- Of patients, 87 per cent book a doctor's appointment by telephone.
- One in ten patients were unable to see or speak to someone at their GP's surgery.
- One in four patients do not find contacting their primary care physician easy. Only 2 per cent of the UK's population report any digitally-enabled transaction with the NHS.

Here, there is a clear opportunity to make improvements or patients automatically graduate toward hospital emergency departments and throw additional strain on secondary care providers.

There is a need for a dedicated and integrated modern call handling system using call-back, e-mail and text message to direct patients and help them make appointments. A centralised appointment contact centre allowing patients to book all consultations during one call rather than having to call individual departments, improves the patient experience and requires fewer staff.

In addition, communication via the Internet should be encouraged, empowering patients to make, rearrange and indeed cancel appointments, if required.

CARE IN THE COMMUNITY: INCREASING EFFICIENCY TO GIVE MORE TIME TO CARE

It is generally agreed that the use of mobile technology and electronic records in

healthcare can free up a great deal of time for community practitioners giving them more time to spend on patient care.

According to a Nuffield Trust report,²³ examples of digital innovations that can deliver significant benefits rapidly include:

- Apps that monitor vital signs and enable clinicians to identify and prioritise patients who require the most urgent attention.
- Apps that support staff working peripatetically in the community.

The Nuffield Trust reported in the same study that a community midwife team operating in London were able to save 5 hours per midwife per week by working using mobile technology.

Benefits of using mobile technology in community healthcare include:

- Practitioners being able to connect with colleagues remotely if required. Patients and administrators can determine if appointments are running on time.
- For both nurse and patient safety, an alarm can be raised if an appointment is taking too long.

CONNECTED PRIMARY CARE: MANAGE DEMAND, IMPROVE EFFICIENCY

According to the Five Year Forward View, around 90 per cent of all UK health service

contacts²⁴ occur in primary care, and the demand for these services is on the increase.

It is clear from this report that new models of care are required across the healthcare system to manage demand and improve efficiency especially in primary care. Traditionally, face-to-face consultation is the main type of activity in general practice—but it is not always necessary.

As most patients book appointments by phone, using improved call management could increase access to the most relevant care and advice while reducing demand for face-to-face consultations. Other, less urgent cases could be seen by a practice nurse, healthcare assistant, pharmacist or support group.

Several reports confirm the increase of demand on primary care. The GP patient survey of 2015 shows at least half of all GP appointments are attended by people with long-term conditions, which often require in-depth management, and the number of people with multiple long-term conditions is predicted to rise considerably.²⁵

The King's Fund report 'Long-term conditions and mental health: The cost of co-morbidities'²⁶ shows that around 30 per cent of people with a long-term condition also have a mental health problem; the figure is higher among those with several long-term conditions.

Many UK doctors' surgeries now routinely triage phone enquiries to control demand. At some surgeries, a doctor

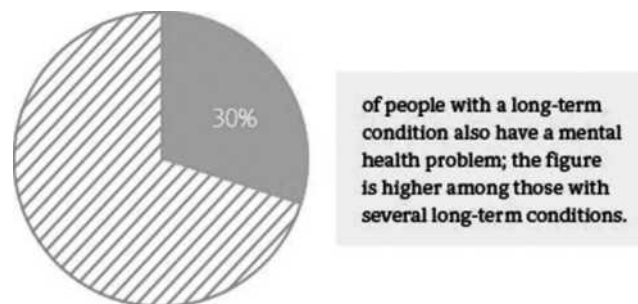


Figure 4: The link between long-term conditions and psychiatric health

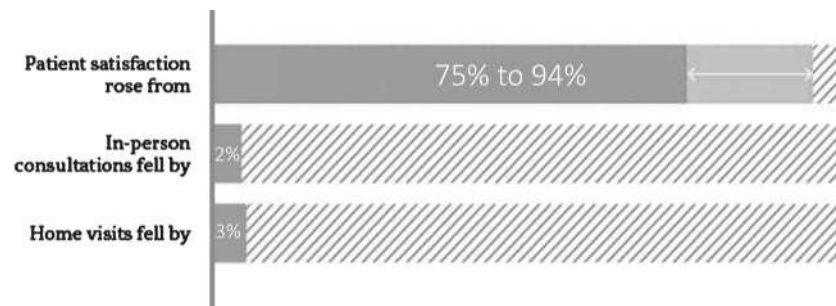


Figure 5: The effect of telephone consultations in primary care

trriages all incoming calls.²⁷ The Nuffield Trust reports that this has been shown to reduce face-to-face appointments, missed appointments and A&E attendance, while increasing capacity.²⁸

In the BMJ Quality Reports 2013, one GP practice in Cambridge, UK reported that since it introduced telephone consultations:

- patient satisfaction rose from 75 per cent to 94 per cent,
- in-person consultations fell by 2 per cent, and
- home visits fell by 3 per cent.

Handling the increasing demand for appointments and services might include:

- Effective and sympathetic call management
- Consultation via phone or video phone
- Encouraging alternative booking methods (website or phone), which allow the patient to fit in consultations at a convenient time
- Improving access during office hours by phone, video calls or e-mail to reduce the demand for longer and weekend opening hours²⁹

The Canada Health Infoway Report³⁰ on clinicians embracing digital health cites digitisation in Canada was a huge success. Canada's provincial and territorial health ministers said in 2014: 'Electronic health

records are one of the most transformational innovations in health care in a Generation'.

Statistics show that 77 per cent of family physicians in Canada now use EHRs, which is three times the number in 2007 (24 per cent). In addition, 53 per cent of nurses who use digital health solutions, use them to view medications taken by a patient and 63 per cent enter and retrieve clinical notes electronically. Around 99 per cent of Canadian community pharmacists using a provincial drug information system say that access to patient information has improved.

In the US, the focus is now very much on 'patient satisfaction' and 'quality of care' with US\$1.36 billion invested in this 'digital health' area in 2015. The worry has been that doctors split focus between the patients' comments and entering data into their digital device and are paid for the number of patients processed not on treatment or outcomes.

The Affordable Care Act (ACA) has now changed that and 'quality over quantity' is the new mandate with the US Centers for Medicare and Medicaid Services (CMS) making 'patient satisfaction' as the essential indicator of value in a new 'Value-Based Purchasing' system. It is expected that digital connection including remote monitoring and wearable health devices will allow doctors to demonstrate patients are satisfied and treatment plans have a positive impact on their health.

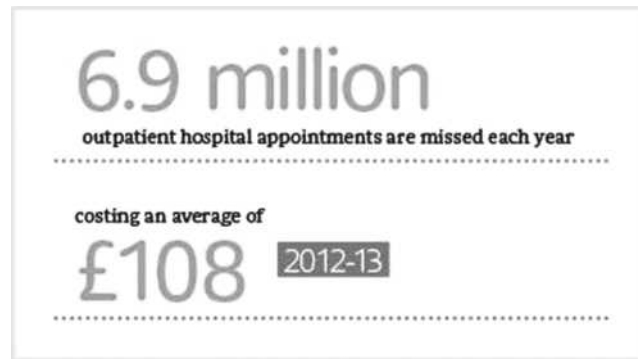


Figure 6: The cost of missed outpatient hospital appointments

MAKING APPOINTMENTS COUNT IN PRIMARY AND ACUTE CARE: REDUCING ‘DID NOT ATTENDS’ (DNAs)

The incidence of missed appointments³¹ in both primary and acute settings are a major cause of incidental costs. It was reported in 2014 that more than 12 million primary setting doctors’ appointments are missed each year, costing over £162 million.

In addition, more than 6.9 million outpatient hospital appointments are missed each year, costing an average of £108 according to 2012–2013 figures. Missed appointments are a major issue as they waste resources and block access to healthcare for other patients.

Initiatives towards self-service and automated customer care has allowed organisations in other industries, such as retail, to reduce costs while handling increasing numbers of consumer transactions efficiently.

The healthcare industry needs to adopt this model and provide patients with excellent care as well as choice and freedom to arrange appointments at a convenient time.

Beverly Bryant,³² director of digital technology at NHS England, is a strong believer in this and says: ‘It’s important that people realise that not turning up to appointments can have a big impact on the care and treatment we are able to give other

patients. It wastes doctors’ and nurses’ time too, which costs taxpayers money. . . . We are doing everything we can to make our service match with people’s lifestyles and the technology they use. We hope the public will do their bit too by making sure they attend or cancel appointments in good time. That way, everybody benefits’.

Patients are becoming increasingly used to consumer-based models of communication and interaction.

Many clinics and primary care providers have adopted a system where they send e-mail and text reminders to patients, and this has reduced outpatient DNAs significantly.

In a recent study³³ by the Institute of Global Health Innovation at Imperial College London, their Department of Health and the Behavioural Insights Team shows that patients are less likely to miss appointments if they are warned of the cost.

A text message clearly stating how much the appointment would cost if the patient fails to show is believed to be one of the most powerful strategies to reduce the number of missed appointments. The strategy stops short of charging patients for missed appointments as they might be difficult to implement, but there is strong evidence to support adopting the reminder approach across the UK could prevent 400,000 missed appointments a year.

A study³⁴ conducted in the Northern Armed Forces Hospital, King Khalid Military City Hafr Al-Batin, Saudi Arabia concurs supporting the use of text messaging to remind patients of their obligation to attend the appointments they booked.

ACHIEVING IMPROVED OUTCOMES IN ACUTE CARE: PATIENT EXPERIENCE IS PARAMOUNT

Currently, more emphasis is being placed on patient choice, with the provision of a good patient experience of the utmost importance.³⁵

Patients increasingly resemble consumers and as such have higher expectations of service standards. In the US, according to a 2010 report in the *New England Journal of Medicine*, some doctors place very high importance on patient experience when making referrals.³⁶

In the report ‘Patient Empowerment: for better quality, more sustainable health services globally’³⁷ the UK government argues that patients should all have the chance to:

- understand what is wrong,
- be involved in making decisions about treatment, and
- take responsibility for managing the parts of care they are able to.

Hospitals and care providers can provide better patient experience by improvement in communication and technology:

- An advanced telephony system can cut waiting times and resolve enquiries at first contact.
- Ill health can be ‘profoundly disempowering’³⁸ but providing knowledge through technology can help.
- Access to records and health information via a bedside console helps with care planning, improves outcomes and reduces stress.

- Making records no longer the preserve of experts also helps bridge the patient–professional divide.
- Staff efficiency is crucial to the patient experience. With a bedside console, patient records can be updated in real time to support multidisciplinary team working and shorten care pathways.
- Room status, patient status, wait times, staff status and equipment location can be tracked by technology to increase efficiency.³⁹
- Feedback and spot surveys can be included in bedside consoles; putting causes of dissatisfaction right may improve concordance with treatment.⁴⁰
- Following discharge, support is important to reduce readmission. Medication reminders and follow-up appointments can be sent to a patient’s personal digital device (smartphone or tablet).

It is important to understand the meaning of ‘patient experience’. The US-based 2014 report ‘Defining Patient Experience’⁴¹ puts the issue into perspective: ‘[T]he patient experience reflects occurrences and events that happen independently and collectively across the continuum of care. . . . [I]t is important to move beyond results from surveys, for example those that specifically capture concepts such as “patient satisfaction”, because patient experience is more than satisfaction alone. Embedded within patient experience is a focus on individualized care and tailoring of services to meet patient needs and engage them as partners in their care. . . . [T]he patient experience is strongly tied to patients’ expectations and whether they were positively realized (beyond clinical outcomes or health status)’.

REDESIGNING PATHWAYS: PATIENT RESPONSIBILITY AND EMPOWERMENT

Healthcare faces a number of challenges in the coming years and some of these issues are directly relatable to patient responsibility.

By empowering patients to take more responsibility for their current health and also streamlining care systems to eliminate waste, the future will be more sustainable.

The drive by healthcare organisations currently is to allow patients more autonomy in their care to foster a more productive relationship between patient and clinician.

According to the World Health Organization (WHO),⁴² patient empowerment is 'a process through which people gain greater control over decisions and actions affecting their health', and this needs to be considered both as an individual and a community process.

Four areas are fundamental to the patient empowerment process:

- Patient understanding of his or her role
- Patients acquiring sufficient knowledge to communicate well with the healthcare provider
- Patient skills (can they monitor themselves or follow instructions)
- A facilitating environment and relationship

Based on these four principles, empowerment is defined by WHO as:

'A process in which patients understand their role, are given the knowledge and skills by their health-care provider to perform a task in an environment that recognizes community and cultural differences and encourages patient participation'.⁴²

A good example of the new strategy is University College London Hospitals NHS Trust's Productive Outpatient Programme. This plan introduced the review of results without the patient having to attend the clinic by using telephone consultations and one-stop services, leading to reductions in waiting times for appointments in clinics, and less DNAs.⁴³

In January 2014, the same programme was applied to Barts Health NHS Trust and was found to significantly shorten clinical pathways and provide increased capacity for

new patients.⁴⁴ Several one-stop services were set up, and some cancer patients now receive telephone follow-up at home rather than having to attend a clinic. A new emphasis on patient empowerment where people can understand their condition, be involved in decisions and manage aspects of care⁴⁵ is the way forward.

The benefits⁴⁶ to empowering patients include:

- Improvement in care and concordance
- Reduction in the use of services and time spent in hospitals
- Improvement of patients' experience

People with the knowledge, skills and confidence to manage their health are less likely to need hospital care. In the UK, patient empowerment has been an objective of successive governments with recent initiatives including new networks of local patient groups and support for greater self-management of chronic conditions.

Four actions are suggested by the Patient Empowerment report:⁴⁷

- Make empowering individuals in their own care a top political priority—and align incentives for a whole-system effort across the health and care sectors.
- Revive the revolution in decision support tools as part of a systematic drive on shared decision making led by government, the NHS and professional bodies.
- Give patients coownership of their records, not just access.
- Encourage patients to ask more questions about their care through a national campaign targeted at people with long-term conditions and greater access to structured education on self-management.

According to a British Medical Association report 'Quality first: Delivering safe patient care'⁴⁸ published in January 2015, self-care is essential to sustaining the UK healthcare

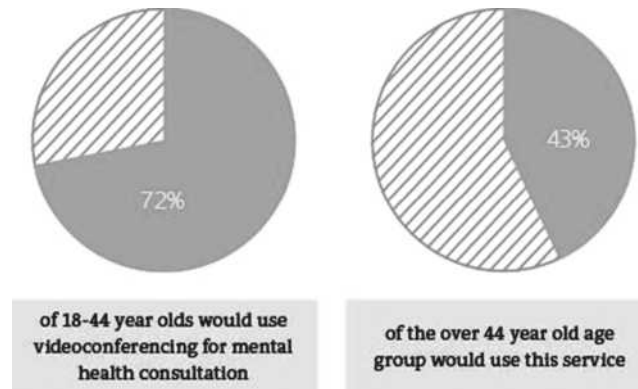


Figure 7: Video conferencing for mental health consultations

system, and patients can often manage problems from minor illnesses to long-term conditions.

The Adult Inpatient Survey 2015⁴⁹ conducted by the UK's Care Quality Commission concluded the desire for involvement exists.

Half of inpatients are not involved in their care as much as they would like—a figure that has not changed in 10 years. In addition, 93 per cent of people are confident they can manage their own health. The Nuffield Trust report 'Delivering the Benefits of Digital Health Care'⁵⁰ reports a study that was conducted using a dummy patient information portal with contact and self-management information. This use led to 18 per cent of patients managing an issue for which they had previously planned to request a doctor's appointment.⁵¹

A growing body of evidence from BMJ⁵² shows that a more engaged patient experiences better health outcomes and lower use of healthcare services. The study found that about half of US hospitals were fully engaged in nine or more of 25 patient and family engagement (PFE) strategies. It concludes that there is a large variation in hospital implementation of PFE practices, with 'competing organisational priorities being the most commonly identified barrier to adoption'.

More and more patients are now digitally aware and appropriate patient networks

and information websites, facilitated by technology, are becoming a sought after source of advice and information.

Even when facing issues as important as mental health, studies have found that people with mental health problems benefit from website and online forums, which are convenient, easy to administer and allow valuable interaction with patient peers.

A number of mental health services now provide on-demand therapy, support and advice directly to users via web, telephone, instant chat, and text messaging. Social media has also been mooted as a valuable tool for patient empowerment.

PwC reported the findings of an HRI consumer survey in 2016⁵³ showing that 72 per cent of 18–44-year olds would use videoconferencing for mental health consultation while only 43 per cent of the over 44-year-old age group would use this service.

A study at Durham University examined a model for using EHRs in the recruitment of patients for mental health studies. The researchers used the South London and Maudsley NHS Trust Consent for Contact model (SLaM C4C) for gaining patients' consent to contact them about research. This is actually built around a de-identified EHR database and all patients were potentially eligible. The SLaM C4C model offered an effective way of improving recruitment

into health research through the EHR. The method reduces the gatekeeper function of clinicians, gives greater patient autonomy in research decisions and promotes a culture of active research participation. Of 2,106 patients approached by 25th October, 2013, nearly three of every four gave consent for contact (1,560 patients; 74.1 per cent).

The 2015 NHS England's National GP Patient Survey highlighted the issue of people in deprived/rural areas developing multiple long-term health issues earlier than the norm and often being harder to reach.⁵⁴

People in this category who do not use the services available to them could be attracted through social networks. The BMJ Quality Improvement report 'Improving patient outcomes with technology and social media in paediatric diabetes'⁵⁵ concluded that social media minimised the length of hospital stay, reduce complications and improved patient satisfaction in diabetes care.

This was achieved by the use of integrated technologies⁵⁶ to help identify trends and tailor individual responses as well as supporting collaborative efforts to manage patients' diabetes effectively.

Involving patients in their own care and encouraging healthier lifestyles is a priority for many governments. UK's Five Year Forward View is clear that patients need to take responsibility for lifestyle issues, recommending 'a radical upgrade in prevention and public health'.⁵⁷

Diabetes UK figures show that diabetes costs the healthcare system about £10 billion a year; the Five Year Forward View believes 'as the nation's waistline keeps piling on the pounds, we're piling on billions of pounds in future taxes just to pay for preventable illnesses'.

The UK's NHS provides accredited 'apps' to encourage healthy living, such as the Change4Life Drinks Tracker, which gives advice on carbonated drink consumption. More accredited health apps are planned to address other lifestyle health issues.

PwC reported in 2016⁵⁸ that mobile health app use has increased to 32 per cent since 2013. In the US, Omada Health has introduced an online behaviour change programme called 'Prevent'. This involves the use of a connected wireless scale at home along with an activity tracker. These devices stream data to the 'Prevent' app and simultaneously to a personal health coach who can make recommendations and set objectives.

In May 2016, Yale School of Medicine researchers announced a new mobile healthcare app called Hugo. It allows patients to collect health data and participate in studies by sharing the data with studies and research projects. The Hugo system will be a cloud based personal health platform, which will allow patients to collect data from multiple healthcare EHRs as well as personal wearable devices and questionnaires.

Hugo is a cloud-based system which aims to help patients collect their medical data from multiple health care system EHRs as well as from wearables and questionnaires. The app will organise the data that it collects and then synchronise it with a research database. Dr Harlan Krumholz, the director of the Center for Outcomes Research and Evaluation (CORE) at Yale-New Haven Hospital and who leads the research, has great hopes saying, 'This could be a game changer. . . . Hugo harnesses the very latest in digital health technology and puts patients in the center, making them true research partners'. The study could provide a new model for patient recruitment into clinical trials by making them true stakeholders.

A US based Xero Harris poll of 2,017 (18 years and over) patients in 2015 indicated that although patients may tell some untruths when giving information for EHRs, they still have high expectations from them. Across the US, doctors' offices have been encouraged to adopt electronic records, including a US\$25.8-billion investment as part of the 2009 American Recovery and Reinvestment Act.

Around 53 per cent told the poll they had ‘noticed an improvement in care since the healthcare provider ha[d] moved to EHRs’. Patients also indicated that access online to their own EHR could make them more engaged in their own health. In addition, 41 per cent said they would be interested in personalised health-improvement information, 55 per cent said they would like to use EHRs to ask doctors questions, 56 per cent wanted to use them for prescription refill requests and 36 per cent for referral requests. Clearly, patients are motivated by a close participation with their health records and this survey indicates some of the potential benefits.

Despite initial positivity about EHR’s and patient involvement, there is also an issue with data protection. By 2024, the US Department of Health and Human Services wants to establish interoperability between disparate EHRs systems across the country. In the US, however, there is still much debate about interoperability across EHRs from different vendors and Health Information exchange (HIE) systems as well. Despite the Health Information Technology for Economic and Clinical Health HITECH Act of 2009 that established a grant programme for the establishment of state-wide HIE programmes, there is still some reluctance, and technical and cost issues including data blocking and exchange fees.

TELEHEALTH: CARE AT A DISTANCE

Telehealth is a concept that allows patients to be monitored and to monitor themselves at home instead of having to attend a clinic. They can view and control their EHR and consult practitioners from home by telephone, videoconferencing, e-mail or on the Internet.

The 2016 report from the Nuffield Trust ‘Delivering the benefits of digital health care’⁵⁹ shows that telehealth is particularly useful in large, sparsely populated rural areas where visits to a doctor or other primary care provider might be difficult.

A recent news report in PoliticsHome revealed the UK government would like to see 25 per cent of the people with long-term conditions such as diabetes be monitored remotely by 2020.⁶⁰

The PwC report ‘Top health industry issues of 2016: Thriving in the new health economy’⁶¹ indicated 60 per cent of consumers would have a video appointment with a doctor and 21 per cent have used a mobile device to order a prescription. In addition, 81 per cent of clinicians said that mobile access to patient information helps coordinate care and 38 per cent use e-mail to connect with chronic condition patients.

The UK government is now offering its expertise⁶² on telehealth globally. It cites the findings of the two-year Whole System Demonstrator trial, set up by the Department of Health to:

- show just what telehealth and telecare is capable of;
- to provide a clear evidence base to support important investment decisions; and
- show how the technology supports people to live independently, take control and be responsible for their own health and care.

The trial was the largest randomised control trial of telehealth and telecare in the world, covering patients with diabetes, heart failure and chronic obstructive pulmonary disease and concluded that telehealth can reduce:

- Mortality rates by 45 per cent
- A&E visits by 15 per cent
- Emergency admissions by 20 per cent
- Elective admissions by 14 per cent
- Bed-days by 14 per cent
- Tariff costs by 8 per cent

For trial design, the UK Government notes, ‘The WSD Programme is a randomised control trial. This means that participants are randomly allocated to either a control or

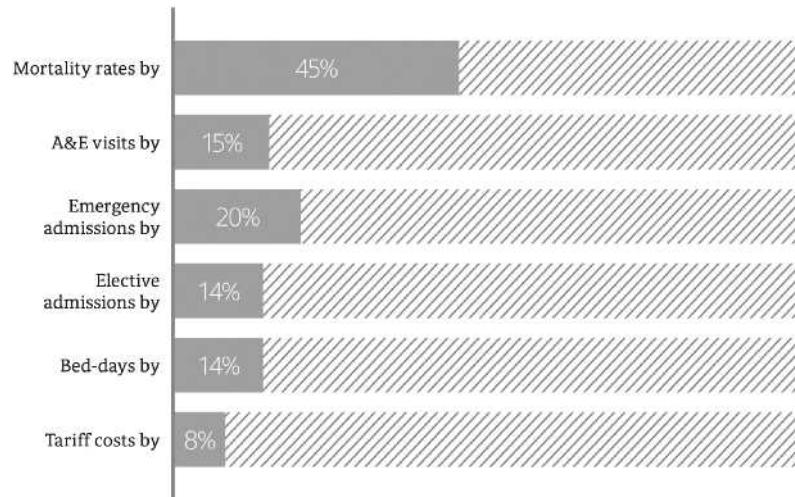


Figure 8: The gains were the result of both yield improvement and cost-to-collect improvement

intervention group. The unit of randomisation is the GP practice. In other words, the GP practice that an individual belongs to will determine whether they are allocated to the control or intervention group and have the equipment installed now or in 12 months' time. The GP practices that are a part of the trial have been randomly split by the evaluation team into four groups which are matched to provide a balanced mix of practice sizes, disease prevalence and demographics'.⁶³

Currently, the expansion of telemedicine is gaining more support in Germany. New legislation in Germany passed in 2016 has established the Secure Digital Communications and Applications Act, or E-Health Act. This new legislation was put into force to help speed up the progress of digitisation in healthcare.

At the 2016 Telehealth and MHealth World Congress in Boston, the CIO of Barnabas Health Luis Taveras said that they are on a 'process of reinventing care through technology.' "We need to think about the way we deliver care. . . . We expect people to come to us. We have to flip that around and think about going to them. Don't think from the hospital out, think from the consumer in'.⁶⁴ He gave an example of a telehealth programme where a smart television is

placed in patients' homes and messages/reminders can be sent. He said, 'We'll break into their show and say "By the way, it's time for you to take your medication". It's a great way to get to the patient where they are'.

Telehealth clearly has an important role to play in the care and involvement of patients in a modern healthcare system.

RIGHT CARE, RIGHT TIME, RIGHT TECHNOLOGY

Technology is now available to help healthcare organisations work much more efficiently, with fewer errors⁶⁵ and allowing the introduction of working practices that are easier and more convenient for staff. The implementation of digital technology into existing healthcare systems does pose some potential issues and also some serious risks, such as confidentiality breaches, identity theft, and also technological breakdowns and incompatibilities. These issues need to be addressed in a meaningful way with safeguards and systems to guarantee security and establish trust from both patients and physicians.

Healthcare organisations need to understand in a more meaningful way what technology and connecting patients can

achieve. The 2016 Nuffield Trust report⁶⁶ concludes that ‘working more efficiently, with fewer errors and in a more convenient, easier way would get many organisations a long way’. A recent study by the Office of the National Coordinator (ONC) in the US examined the user centred design (UCD) process for EHR development. This was because the usability of EHRs continues to be a point of dissatisfaction for providers.

Poor usability of EHRs not only results in an increased level of clinician frustration, it can also lead to errors, posing serious threats to patient safety. Some clinicians believe that systems do not fully support cognitive workflow or information needs and can often display data in a manner that inhibits clinicians from drawing insights. The ONC study team visited 11 different EHR vendors in order to analyse their UCD and not usability. The study concluded that seven out of 11 EHR vendors had some UCD problems and consequently, their EHR software design was not optimum.

CONCLUSION

Digital technology is set to define the way humans will live in the future. It will help to make resources more available to patients of all ages and allow physicians to treat more patients than ever before. It will however require some radical rethinking of methods, a better relationship between physician and patient and a leap of faith toward technology, particularly for older age groups. Medicine is not a simple process and we cannot expect technology to have all the answers, but the future will have a larger role for digital healthcare in sharing resources, saving money, increasing efficiency and providing better all-round healthcare for the public.

Deborah Lupton in her paper ‘The Digitally Engaged Patient’ made a sobering point when she said, ‘It is argued that the techno-utopian discourses articulated in the mainstream healthcare policy literature concerning the possibilities and

potentialities afforded by digital health technologies do not acknowledge the complexities and ambivalences that are part of using self-monitoring and self-care technologies for monitoring health and illness states, both for patients and for healthcare providers. These include the surveillance and disciplinary dimensions of using these technologies, the emotions and resistances they provoke, their contribution to the burden of self-care and the invisible work on the part of healthcare workers that they require to operate’.

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