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Fit for the future

What can the NHS learn about digital health care from other European countries?

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Executive summary

Digital health is a public policy priority. Given the rapid increase in the use of technology during the Covid-19 pandemic, it has gained renewed emphasis and urgency after years of slow progress.

Across the world, digital technology and data are considered essential for creating sustainable health care systems and improving the health and wellbeing of populations.

It is already very clear that digital health technology will be a fundamental part of recovery from the pandemic, and in preparing health care systems for the future. Understanding the factors that lead to success is important.

Building on earlier research into the use of digital technology in England's acute sector, we have examined the approach that five European countries have taken: Denmark, Finland, Sweden, Estonia and Portugal. Although solutions cannot be simply transposed from one country's health system to another, all five countries have successful experience that may offer useful learning for the NHS.

It became rapidly apparent during our research that those countries which have made significant progress, benefit from having an overarching policy focus on digital. Digital health is inseparable from the wider approach to digital in both public policy and society, with a clear link between digital health and wider societal and health care goals, wellbeing and prosperity.

Country context and culture are vitally important. We saw that in countries where digital technology is widely used to access public services, the use of digital technologies to support health care is less controversial, indeed is widely expected and accepted as the norm. Cultivating public confidence and trust in the use of health care data must be a priority.

Governance and leadership are also key. Many of the countries we studied have devolved regional responsibility for health matters, but clear governance of where data are held, how they can be accessed and by whom, is essential. It is important to establish clear and consistent national leadership, and to be clear about the roles and responsibilities of different stakeholders.

It is essential to ensure that digital health care solutions are co-designed and implemented collaboratively with end users. This should include a comprehensive focus on understanding the factors that support people (including both staff and patients) to use technology, recognising the importance of cultural and organisational change.

As with the NHS, the Covid-19 pandemic has had a significant impact on the use of digital technology in multiple countries. The existence of a digital health infrastructure has assisted countries' responses to the pandemic by providing, for example, a platform for accessing test results. Respondents reported that the pandemic had helped to highlight the benefits to patients and health care professionals. Helping to maintain this shift into the long term is a significant goal to aim for.

1 Introduction

There has been a continual focus on digital health in the NHS for a number of years, given renewed emphasis with the publication of *The Future of Healthcare* in October 2018 (Department of Health and Social Care, 2018) and the establishment of NHSX the following year (Department of Health and Social Care, 2019). Digital health is also a key feature of *The NHS Long Term Plan* (NHS England, 2019). With the Covid-19 pandemic, digital health has been given greater prominence with an acceleration in the use of digital and remote health care tools across the NHS (Hutchings, 2020).

Digital technology will also play a key role in supporting the operation of integrated care systems. New guidance – the 'What Good Looks Like framework' and 'Who Pays for What' – has recently been published, which sets out a framework for integrated care systems and NHS organisations to support their digital transformation, as well as a roadmap for how it will be funded (NHSX, 2021a; 2021b).

It has been repeatedly recognised that digital transformation is not just about technology – an enabling policy environment is also essential for progress and making the best use of the opportunities that digital can bring (OECD, 2019). Our 2019 report provided an overview of the policy approach taken since the launch of the National Programme for IT (NPfIT) in 2002 and its dismantling in 2011, documenting how the approach has evolved from one that was overly centralised, to one that creates an enabling environment for the NHS to make the best use of technology (Castle-Clarke and Hutchings, 2019).

But, the NHS has faced a number of well-established challenges in its journey – inadequate funding, outdated infrastructure and limited interoperability have all contributed to slow progress (National Audit Office, 2020). Alongside this, there can be barriers if digital transformation is treated as just an 'IT' project, rather than as a process of organisational change that requires (among other things) effective leadership and engagement (Maguire and others, 2018).
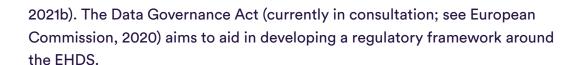
However, the NHS is not alone in facing these issues. Regardless of the health system, worldwide, digital is considered an important step in improving health outcomes but there are also a number of common challenges. A recent survey of clinicians across Europe highlighted bureaucracy, cost and identifying the right technologies as the top issues, alongside staff training and sharing patient data (Deloitte Centre for Health Solutions, 2020).

Although much activity takes place within individual countries, the significance of digital health has also been recognised at an international level – digital health is important for achieving the World Health Organization's (WHO) European Programme of Work for 2020–25 (WHO Regional Office for Europe, 2020b) and the United Nations' 2030 Agenda for Sustainable Development (United Nations General Assembly, 2015). The WHO Regional Office for Europe (WHO Europe) has included the Empowerment through Digital Health initiative as one of its flagship projects over the next five years (WHO, 2020a) This aims to complement and operationalise the WHO Global Strategy on Digital Health (WHO, 2021) through (among other things) finalising the European Roadmap for Digitalisation of Health Systems, developing a European Health Data governance framework and Charter to support the use of quality health data for decision-making in the health system and reviewing how digital health solutions have been used in response to Covid-19 (WHO Regional Office for Europe, 2020a).

The European Union (EU) has also played a significant role in advancing digital health. Despite health falling within the competencies of member states, the European Commission has taken steps to support members and harmonise approaches – publishing its first action plan for embedding technology within the health sector in 2004 (European Commission, 2004). Since then, the commission has led work on the Digital Single Market, launching the Digital Agenda for Europe in May 2010 (European Commission, 2010), which supports the aim of sharing information across borders.

There is now a comprehensive set of strategies at the European level on this topic including a digital strategy and proposals for legislation on the use of artificial intelligence (European Commission, 2021c and European Commission, 2021d). A key priority is the creation of a European Health Data Space (EHDS), which will pool health care data from all EU member states to enable research and analytics on big datasets (European Commission,

2021b). The Data Governance Act (currently in consultation; see European Commission, 2020) aims to aid in developing a regulatory framework around the EHDS.

The Covid-19 pandemic has accelerated the use of digital health solutions within and between countries. But, the extent to which these changes will remain is still to be seen – practices which may have been considered necessary during the pandemic could evolve once the immediate threat of Covid-19 has subsided. What is undoubtable is that digital health technology will be a fundamental part of the recovery from the pandemic, and in developing sustainable health care systems. Given this, understanding the factors that lead to the successful implementation of digital health technology is now even more important than before. In this report, we seek to build on the findings from our 2019 report by exploring the approach that other countries have taken to advance digital health.

We had four key research questions:

- How have policy-makers in different countries defined the objectives of digitalisation within health care?

- What policy approaches have been used in different countries to support and promote digitalisation in health care?

- What worked well, what were the challenges and how were they overcome?

- What are the implications for NHS digital health policy?

2　Approach

To answer these questions, we conducted a pragmatic review of the literature. Due to the inconsistency of terminology in this area, we predominantly used a snowballing approach – a manual hand search of references – to identify the most relevant academic, grey and policy literature. We also held scoping conversations with stakeholders from WHO Europe and the European Observatory on Health Systems and Policies to understand the progress of different countries, and used these and the literature review to identify key lines of inquiry.

Based on this initial work, we identified five countries to focus on: Denmark, Finland, Sweden, Estonia and Portugal – countries that are considered to have made substantial progress on digital health, and which represent different geographical regions and health care systems. It is important to note that these are all high-income countries; approaches in lower- and middle-income countries may vary.

We then conducted 17 semi-structured interviews with 18 individuals from these countries, representing academia, government departments, medical associations, patient organisations and non-governmental organisations. Interviews were conducted between December 2020 and February 2021. We used a coding framework to identify themes from the interviews relating to the various policies.

An overview of the context and digital health infrastructure of the countries we looked at is presented in Chapter 3. A more detailed exploration of some of the themes we identified, including a summary of the impact of Covid-19, follows in Chapter 4. Findings are drawn from the interviews, literature and stakeholder calls. To avoid the possibility of identification, where quotes are included they are anonymous.

Note on scope and terminology

The topics included within the digital health field are extensive, incorporating, for example, the development of electronic health records (EHRs), patient portals and e-prescriptions. In this report we identify common themes to illustrate relevant success factors that have been observed across several different countries and topics rather than provide a comprehensive overview of each element. Where we refer to a particular area of digital health (such as the secondary use of data) and its related policies, we specify this. There are a number of areas which we have not been able to explore fully but will play a crucial role in digital health policy in the future, such as cybersecurity, artificial intelligence and personalised medicine and genomics.

Throughout the report, we use the terms 'digital health' and 'digitalisation' – this recognises that digital transformation is an 'organisational and cultural process' (European Commission, 2019, p. 13). However, many different terms have been used in the literature and by our interviewees, including e-health and digitisation, the latter considered to refer to the more technical process of putting things into a digital format (European Commission, 2019).

3 Country overview

Country	Country context	Key points
Denmark	Population 5,831,000; taxpayer-funded health care system; structural reform in 2007 created five regions, which are responsible for providing health care to citizens.	• **A Coherent and Trustworthy Health Network for All: Digital Health Strategy 2018–22** – has five main areas of focus: patient as an active partner; providing staff the knowledge they need on time; prevention; trustworthy and secure data; and progress and common building blocks. • Regions are responsible for EHR systems (currently two are in use: Epic and Systematic). • The patient and health care professional portal is called Sundhed.dk (development began in 2003), which operates as federated infrastructure that draws together data from national, regional and local levels of the health care system. Users can view EHR notes, personal medicine overviews and results from investigations such as laboratory tests. • A Shared Medication Record enabling e-prescription (in place since 2014) is mandatory across all care settings. • A national organisation drives forward the improved approach to the secondary use of data. • Well-defined governance for digital health is embodied in national institutions having delegated responsibility for service quality and continuity.

Finland	Population 5,530,000; 309 municipalities are responsible for providing health and social care services (autonomy over how to deliver strategic goals according to local priorities).	• **Information to support wellbeing and service renewal: eHealth and eSocial Strategy** – the objective is to support the… "active role of citizens in maintaining their own well-being by improving information management and increasing the provision of online services." • There is a legal requirement for providers holding information in an online format to submit it to the Data Repository (extended in 2015 to include information from social services). • At the core are 'Kanta services', managed by Kela, the Finnish Social Insurance Institution – an online portal where people can browse health information recorded in the Prescription Centre and Patient Data Repository. • All systems that produce information for national Kanta services must be certified as it is a legally binding requirement. This is a part of interoperability that is built into the Kanta systems. • A free National Code Server has been developed, which anyone can use to ensure that the information they develop is as required for the Kanta services. • E-prescriptions came into effect in 2007, required by law (in public health care from 2015 and private health care from 2017) with limited exceptions. • The dedicated data permit authority 'Findata' created by the Act on the Secondary Use of Health and Social Care Data 2019 provides a central access point to data from multiple data controllers.

Sweden	Population 10,353,000; Sweden's health care system operates through a federal model; Sweden's 21 autonomous regions are responsible for providing health care to citizens and local municipalities are responsible for elderly care; people have the right to seek health care in any region and their care will be reimbursed by their home region (to address variation in the quality of care); individuals are also taxed at a regional level for health care so the funding that each region has available varies.	- The **Vision for E-health 2025** states that the aim is for Sweden to be the "best in the world at using the opportunities offered by digitisation and eHealth to make it easier for people to achieve good and equal health and welfare, and to develop and strengthen their own resources for increased independence and participation in the life of society." - There is an agreement between the Swedish Association of Local Authorities and Regions (SALAR) and national government to implement strategy. - Regions and municipalities own Inera, a company whose task is to develop national e-health solutions. One of the things run by Inera is the national health information exchange platform (Nationella tjänsteplattformen), which provides numerous services to patients and health care professionals including: - a National Patient Portal (1177.se) where people can (among other things) access their medical records, prescriptions and sick leave certificates and have the ability to book appointments with health care providers. - a National Patient Overview, which means that – with the patient's consent – health care professionals are able to access data on a person from another region. The e-health service giving patients access to their medical records was developed from a service which originated in the Uppsala region, later integrated with the national health information exchange platform. - e-prescriptions, rolled out regionally since 2000 after an initial pilot in Stockholm – initially one national pharmacy provider, but deregulated since 2014. The Swedish eHealth Agency was established in 2014 to manage national e-prescription services, with responsibility for a number of e-health projects.

Estonia	Population 1,331,000; single public payer the Estonian Health Insurance Fund provides mandatory health insurance for nearly all the population.	• The **Estonian eHealth Strategic Development Plan 2020** sets out the e-health vision which states that by 2025, Estonia will have "a well-coordinated network of eHealth solutions at different levels and health care services." • EHRs have been in use since 2007, and e-prescriptions since 2010. • Every health care provider is required to connect to 'the **X-Road**'. This is the 'cornerstone' and is a data exchange layer, which means that organisations can exchange and see information about a particular patient via one central platform. Information is not stored in a central repository but remains with local providers. • A patient portal means individuals can see all of their medical information in one place. An audit trail is in place to record who has accessed what data about a particular person in order to support transparency – the purpose of this is to 'fully put the power in the citizen's hands'. • Estonia is also involved in cross-border work – as of early 2019, citizens have been able to access their prescriptions in Finland (and vice versa).

Portugal	Population 10,305,000; the national health service (SNS) provides universal health care coverage to citizens, mostly via public funding; Madeira and the Azores run regional health care systems although they are still required to follow the national SNS constitution; the five mainland regions are largely centrally run.	- The national digital health strategy '**ENESIS**' was originally published in 2016. An updated ENESIS 2020–22 aims to promote the digital transformation of the health sector in Portugal, building on the progress of previous strategy. - Rapid transformation has accelerated following an intervention from the European Commission, European Central Bank and International Monetary Fund – the Shared Services of the Ministry of Health (SPMS) was established in 2010, tasked with providing 'shared' or networked electronic facilities in the health service and it is responsible for the IT and procurement functions within the Portuguese health care system. - A National Platform for Health Data provides a central access point to data for physicians and patients. - E-prescriptions have been mandatory since 2016. - Portugal has had a strong focus on the digitalisation of health services and the integration of fragmented health services (for example, telemedicine) across regions. - As of June 2021, it was one of only seven EU member states to share health records cross-border within the EU. - In the Recovery and Resilience Plan submitted to the EU, a quarter of planned health investment is designated for digital health.

4 Findings – key themes

Achieving digital change in health is not just about technology – progress also depends on an 'enabling policy environment' (OECD, 2019b). Specifically, this includes a clear digital health strategy, clear governance processes and sufficient resources (OECD, 2019b). Other enablers include common standards, legislation, digital literacy among staff and patients and infrastructure supporting digital identity. This chapter explores just some of the key themes and success factors considered to have supported progress on digital health in the countries we studied.

Digital health strategy and leadership

An overarching digital strategy is a common feature in countries making progress on digital health (OECD, 2019b). A clear digital health strategy has multiple functions. For example, it demonstrates a common goal for stakeholders (Bertelsmann Stiftung, 2018). Essential elements of a successful digital strategy include clear priorities, measurable targets and thorough monitoring of progress (OECD, 2019a). The OECD (2019b) notes that strategies can also 'promote coherence across health care system siloes', especially in countries with federal health care systems.

Particular strategic priorities vary depending on the country context and existing digital maturity. A recent survey showed that in the UK and Germany, for example, EHR implementation is a top priority but is less so in Spain and the Netherlands (HIMSS and McKinsey, 2019).

All of the countries we studied have a dedicated digital health strategy. Objectives are linked to wider health care goals such as putting patients at the centre of their care and addressing the needs of an ageing population. For example, the introductory note to Portugal's Telehealth Plan notes that making use of technology is a 'natural way to leverage new solutions that best meet society's needs' (SPMS and Portuguese National Centre of Telehealth, 2019).

Many countries also consider secondary use of data as a strategic priority, including for research or planning. Within this, population health management is an important area of focus, supporting health care systems around the world to manage resources, plan services for their populations (Orlowski, 2019) and become learning health systems, where routinely collected data are continuously analysed to monitor outcomes and identify improvements in care (Scobie and Castle-Clarke, 2019). Orlowski (2019) has highlighted three of the essential building blocks that enable population health management to be done effectively: access to linked, integrated datasets, information governance processes and analytical methods capability.

Some countries also have dedicated strategies for particular projects, such as the use of health care data. In Denmark, a new strategy for the use of health data is in development, alongside the creation of a new life science strategy and a National Partnership and Advisory Board for Health Data. The aim is to set a strategic direction for better use of health data, and to work with different organisations and industry towards a common shared agenda for using health data for research and innovation.

The need to link digital to wider health care goals

Technology is therefore considered a way to achieve wider health care goals and countries have aligned their digital health ambitions with their overarching health care strategies. In Sweden, the digital health strategy aims to 'make it easier for people to achieve good and equal health and welfare and to develop and strengthen their own resources for increased independence and participation in the life of society' (Government of Sweden, 2016, p. 9). Interviewees noted that although exactly what this entails is largely undefined, it provides a clear vision, articulating digital health as a way to help make health care "equal, efficient, accessible and safe", with the individual at the centre. Other ambitions include strengthening primary care, delivering care closer to patients in the community, and supporting a cultural shift towards more preventative care. A strategic vision can also bring different stakeholders together under clear goals:

It's important to have a specific cause, to have strategies, and that when you develop the cause, [it is] after discussion with the health care organisation, the industry, the experts, the politicians, the regions, the county councils etcetera. So, this kind of collaboration is needed to find goals that are suitable to achieve in different countries.

A toolkit developed by the WHO and the International Telecommunication Union to support countries that were in the process of developing their health strategies, acknowledged the importance of linking e-health to wider goals for health care (WHO and International Telecommunication Union, 2012). Without this, Hamilton (2013) noted that the ability to develop an e-health framework will be undermined (Hamilton, 2013). For countries that are wanting to adopt digital health solutions, linking digital health to 'key public health, health promotion and disease prevention goals' is essential, providing an explicit focus on wider society, and the impact of using digital tools on health inequalities (WHO Regional Office for Europe, 2019, p. 12). This was also recognised by interviewees, who considered digital health and data important for proactively addressing wider societal challenges: "I think e-health for me is the beauty of it, is empowerment, to be one step ahead all the time."

Often, these overarching aims have remained unchanged but the wider context and technical capability have moved at a rapid pace. Sweden, Finland and Denmark have had multiple digital health strategies, which have evolved from technological goals to concentrate more on governance and stakeholder engagement and to focus on technology supporting the achievement of a wider health policy goal (Nøhr and others, 2018). Strategies have also evolved to take account of progress and shifting priorities. In Finland, although the main ambitions from earlier strategic visions remain current, the 'information society readiness and technological possibilities' to reap the benefits have increased (Vehko and others, 2019, p. 26).

The overarching goals have also influenced the steps taken to implement particular digital health services. Aanestad and others (2017), in a study of Denmark, Sweden and Catalonia, noted that each country had varying aims that led to the development and introduction of EHRs: in Denmark, the focus was on supporting better coordination between health care services; in Sweden, it was on promoting citizen responsibility and participation; and in Catalonia, the aim was to achieve a vision for a new role for citizens, and improve efficiency. In the context of e-prescriptions, multiple interviewees noted the need to improve patient safety and prevent medicines mismanagement as key drivers.

In Denmark, as in other health care systems, there has been a focus on supporting people to live with long-term conditions. At a strategic level, this has led to a situation where people are considered "equal partners in their care". Digital tools can play an important role in supporting this, and this significance was described by one interviewee:

We talked about self-management, then we talked about patient centricity, and then we talked about patient responsibility. And at the moment, we are trying to make the patient one of the experts in the team making solutions… it's not centricity because the problem, the concept of centricity is that you see this picture of a patient with a lot of health care professionals around them. And that's the wrong picture; it transfers too much responsibility to the patient. There should be a group of experts where the patient is one of them.

These goals extend across the Nordic countries, where digital solutions have been developed to support patients to 'monitor and manage their own conditions;… improve treatment and diagnostics; and… facilitate cooperation, shared information, and shared decision-making between patients and healthcare professionals' (Nordic Innovation, 2019, p. 3).

The challenge of identifying indicators to measure the impact of digital health

The importance of articulating clear goals is well established, and having an overarching strategy clearly has value. But, several interviewees noted that articulating clear measures of success and monitoring progress were a challenge. Effective evaluation, which identifies success and failure, is essential for ensuring that strategies are based on continuous learning and improvement (Villumsen, 2019). In Finland, the National Institute of Health and Welfare is regularly commissioned to assess the status of e-services at a national level through surveys of citizens, health care professionals and social workers, the results of which are timed to provide data to support the development of e-health policy goals (Vehko and others, 2018). This regular monitoring was considered a distinctive approach compared to other countries and provides a way to assess changes over a longer time period.

However, measuring progress or impact in a meaningful way is challenging. Where measures do exist, these are often structural, focusing on the availability of digital health tools (such as the existence of a licence for particular software), which does not necessarily identify whether or not they are used. Villumsen and others (2019) noted that adoption is often used as a 'proxy measure' for actual use, despite not necessarily showing this. Measures such as this also do not necessarily explain how far they are useful (such as how far digital information is structured) or trusted, which could affect their use or the level of engagement from patients and health care professionals. Similar issues apply to data – prevalence of digital data does not automatically lead to high levels of digital maturity (HIMSS and McKinsey, 2020). The same applies to measures of patient uptake or use of citizen-facing tools. It follows therefore that measures of adoption do not always realistically demonstrate how digitally mature a system is. As one interviewee noted: "It's very easy to buy software, but to get it implemented and actually put it into use, it's a lot more difficult."

Interviewees considered that in the context of measuring the impact of digital health tools, outcome indicators are the "ideal". But for a number of reasons this is also challenging – identifying the causal links between the use of digital health tools and clinical outcomes is not always straightforward, as digital forms just one part of a much wider pathway of care.

As discussed in the Nordic context, strategies have evolved to focus on how digital health can best serve citizens' needs, including making information more integrated, supporting health literacy and enabling communication with the health care system (Hyppönen and others, 2017). Given this, Hyppönen and others (2017) suggest that indicators should be based on (among other things) the trustworthiness and understandability of e-health services from an end-user perspective. Other approaches include measuring patient experience with regards to remote care – see, for example, QualityWatch (2020), which looked at this within the context of the Covid-19 pandemic in England.

As well as this, realising the benefits of digital health can take a long time (Villumsen and others, 2019), which can cause particular issues for demonstrating cost-effectiveness and the economic return on investment. From a financial perspective, a key theme in our research was that digital health needs to be seen as something that the system invests in to improve care quality and effectiveness overall, rather than to save money. As a result, purely explaining expenditure levels or savings is not necessarily a good indicator of success – this is explored more in the section 'Long-term, sustainable investment' later in this chapter.

These issues also present challenges for comparing progress between countries, where information is recorded differently and terminology is not necessarily consistent. The Nordic eHealth Research Network is a collaboration of researchers from across the Nordic countries whose task is focused on identifying indicators to measure progress on e-health (Hyppönen and others, 2017). Members of this group noted the importance of collaboration and transparency between the government and the research community for providing a structured approach to measuring progress.

Political will and leadership

A clear strategic focus can also be reflective of a wider political will to achieve digitalisation. The Organisation for Economic Co-operation and Development (OECD) suggests that an overarching digital strategy reflects 'resolute action from the government' and this should ideally be aligned with a wider cross-sector strategy that goes beyond health care (OECD, 2019b).

In 2017, the Portuguese Council of Ministers issued a resolution supporting digital health alongside the publication of its first written digital health strategy, which was considered a 'shift in momentum' (Postelnicu, 2020). A dedicated organisation – SPMS (Shared Services of the Ministry of Health) – exists in Portugal, with responsibility for IT and procurement. The approach taken by this organisation, alongside leadership from the Ministry, was considered important for the rapid progress Portugal has made in recent years. SPMS focused on getting 'boots on the ground' and also embraced a culture of failure-acceptance, rapidly scaling up solutions once they were implemented. As one interviewee noted: "If you can't fail, you can't innovate… And we often failed, but we often recovered. That's why we went very, very fast."

In Estonia, health is just one element of a wider approach to e-government and digital technology is a key component of all public services (Bertelsmann Stiftung, 2018). Alongside this, "visionary" leadership was noted as important to Estonia's digital success. Digital development and innovation is a priority across government and, annually, a proportion of the state budget is allocated to developing and maintaining Estonia's digital services.

Where historic data exist, such as in Denmark, the political will to 'legitimise' this through developing the patient portal was seen as an important success factor. Similarly, in Finland, the development of Kanta services was accompanied by a long-term government vision (and investment) from the government, which was important for establishing trust:

The political will was set early, and that's… I would say a marking of trust. So, we have made this decision at the parliament and government level, they follow [through to ensure] that the things are progressing and they give money to do [them].

Implications for the NHS

The NHS Long Term Plan has clearly set out the role that digital technology can play in supporting overall aims for improving health care (NHS England, 2019) and the draft data strategy published in September has outlined steps to improve the use of data within health care (Department of Health and Social Care, 2021a). This has built on *The Future of Healthcare*, published in 2018, which set out a vision for data and technology across the system (Department of Health and Social Care, 2018). While Covid-19 may not have altered the fundamental goals of previous strategies and policies, it has helped to demonstrate the huge potential that digital tools have to transform the way the NHS delivers care by making health care more flexible and personalised for both health care professionals and patients.

The recently published 'What Good Looks Like framework' sets out seven success measures for integrated care systems and NHS organisations to meet regarding digital transformation (NHSX, 2021). This includes a focus on (among other things) leadership, including the importance of individual organisations and integrated care systems having a clear strategy for digital transformation. A digital assessment framework to go alongside this and support organisations to measure progress and identify gaps will also be published.

Country context

Country context is also relevant to understanding the progress countries have made on digital health. In the context of e-prescriptions, success in a country has been dependent on the country's historical features and is closely related to its vision for digitisation and wider culture (Deetjen, 2016). In Denmark, Bertelsmann Stiftung (2018) noted that a willingness to compromise and a high level of trust in the state had a positive impact on digitalisation. A long history of using digital tools in many areas of public life was described by one interviewee as the "most fundamental" thing behind Sundhed.dk's success because it had created a "culture of confidence" around the use of data:

We stand on this long tradition of digitalisation, and public digitisation. We have, for instance, the personal identifier, we have a long tradition for having electronic health records, we have historical data back to 1977. So, when we made the portal in 2003, we really didn't have to find out where to get data. [It was] there, we just had to build this integration engine, putting data together in a safe and user-friendly way. It's a political will to use those data and to legitimise and make it a natural thing.

Although it is not necessarily possible to replicate this, what is important is understanding a country's particular culture and how to build a digital health infrastructure on top of it. The significance of this in contributing to the success of digital health programmes should not be underestimated. One recommendation was to highlight specific success stories, even if they might seem minor:

I would say, do what is possible. For instance, if you have laboratory data, then start with it, get a success, tell the public that users are happy having that data, that now that data can be seen in both the hospital and also in the municipalities. And it's a fantastic victory. So, start from where you are, and use the real-life experiences, and show that the patients are [happier] and having that data is the best way to go… So, make a cultural picture before you go on with the technical solutions. That's maybe the best advice.

Specific situations can also lead to change. The financial crisis in Portugal – although not specific to digital health – has been noted as creating an important context. Elements of digital transformation were included in the Memorandum of Understanding between Portugal and the European Commission, European Central Bank and International Monetary Fund as part of its recovery. At the time, Portugal's infrastructure was largely unstructured and outdated – restoring the sustainability of the national health

service (SNS), along with fighting fraud and waste, were therefore important goals (Martins, 2020). Hospitals in particular were facing substantial budget restrictions and were therefore reliant on central support from the new digital health agency (SPMS), which had funds to support the development of the wider infrastructure, as well as to purchase hardware for providers.

Digital in wider public policy

This cultural context also highlights the need to recognise the importance of digital in wider public policy. The OECD notes that digital health transformation is not an end in itself; rather it is a 'means of achieving a set of agreed public policy objectives more effectively and efficiently' (OECD, 2019b). As such, drawing on lessons and the existing infrastructure used in other sectors can be helpful. Interviewees noted the importance of digital to enable health care to work in a joined-up way with other parts of the system (such as employment and welfare) to proactively support people.

In Estonia, digital solutions are a fundamental part of the way all public services operate. Their overall approach is citizen-centric, recognising that digital tools are an effective way to give citizens across a widely dispersed area access to the services they need in the easiest way possible. Digital tools are prevalent in areas such as voting, education, pensions, tax returns and renewing documentation such as driving licences. The 'cornerstone' of this is the 'X-Road', which provides an infrastructure for connecting digital information.

Where digital technology is a key part of public policy, this existing infrastructure and process has provided the foundation for digital health. Interviewees noted that this was an important enabling factor. Key to this is a unique personal identifier, which exists in countries including Denmark, Sweden and Finland and was described as a "window" to the use of digital services. This provides a way to link data, as well as for individuals to identify themselves digitally (such as 'Mobil Bank ID' in Sweden). Interviewees in these countries highlighted that it was not just the *existence* of this identifier that was important, but also that it is *accepted* by citizens who have confidence in the way it is used. "This has been the case for forever – we've always been living in that way, in this social democratic system, where everything is very controlled in a positive way."

Alongside this is a tradition of collecting health care data, which provides a foundation for developing tools such as patient portals, and for the secondary use of data. In Denmark, the long history of digital tools meant that a lot of high-quality health data already existed in digital form, supported by the unique personal identifier – the role of Sundhed.dk was to bring it all together. Although the goals around doing this – improving health care and research and developing more personalised treatment for patients – have not changed, the emergence of new technologies and data generated from citizens via, for example, wearables, devices and apps have introduced a new dimension to the use of health care data. A key focus now is therefore on enhancing this infrastructure to make use of citizen-generated data, to work alongside the existing public registries.

Finland is considered to be leading in the field of secondary use of health care data (see sub-section 'Legal frameworks which support the secondary use of data'). The country already had an infrastructure in place to support this, including the personal identification code and the existence of multiple quality registries (the cancer registry was created in 1952). Data are stored in multiple systems and the Kanta services exist to bring these all together as an 'umbrella' layer. This existing infrastructure means people already had some familiarity with the processes for using health care data, and had been able to see the benefits of it. This was considered essential for enabling public trust and confidence. The cultural history in Finland has also meant that citizens have a generally high level of trust in the authorities, and the use of data has traditionally been transparent. Taking account of how culture may impact on digital health use is important.

"I don't think it's something that you can just copy, paste and move to a different country because they all have their own history and their own cultures."

Implications for the NHS

Improving the use of technology in health care must be backed by a comprehensive and strategic focus on supporting the use of digital technology across public services and government more broadly. Given the significance of digital technology across multiple areas of public life and its increased

use during the Covid-19 pandemic, it is essential that in the aftermath of the pandemic, there is a national focus on making sure everyone can use the opportunities that digital technology can provide. Although the pandemic has undoubtedly highlighted the opportunities of technology, it has also shone a spotlight on the 'digital divide'. Organisations such as the Good Things Foundation (2020) have set out what needs to happen for this to be addressed.

Scotland and Wales have both recently published refreshed digital strategies, which set out a number of priorities to support the use of digital in light of the pandemic – on infrastructure and internet access, digital skills and inclusion and building public confidence in the use of data (Scottish Government, 2021; Welsh Government, 2021). The UK government is also intending to publish an updated digital strategy in 2021 (UK Parliament, 2020) and in the meantime, the Department for Culture, Media and Sport (2021) has articulated its '10 tech priorities' for Covid-19 recovery. A number of issues must be addressed which have relevance outside of just health care, such as greater transparency around data-sharing (Freeguard and others, 2020). Action on these wider issues is essential if we are to make the most of digital in health care.

Governance and stakeholder engagement

Governance is fundamental to the success of digital health. This includes managing the involvement of different stakeholders, being clear about respective responsibility, accountability and providing an environment which supports collaboration.

In Finland, responsibility for overseeing and coordinating the implementation of its digital health services rests with the National Institute for Health and Welfare (THL), under a legislative mandate from 2010. The institute works closely with other national bodies, providers, suppliers and Kela. Kela is Finland's social insurance institution and has the operational responsibility for developing and managing the technical infrastructure, including the Kanta services (Vehko and others, 2019). The Ministry of Social Affairs and Health is responsible for setting the overarching 'steer', as well as the budget. Setting out clear roles, and in the case of THL, putting this into law, was considered by interviewees as important for ensuring there was a clear distinction between strategy and implementation.

In Estonia, government works closely with the private sector, industry partners and academia to make sure they are all 'sitting at the table' in order to share expertise when developing digital solutions. But, the importance of this extends beyond just those working in digital health. Working closely across government is also key – education is especially important to ensure that, at every life stage, citizens are able to develop the skills they need to use digital tools. Specifically, for health care professionals, this includes knowledge of and the confidence to work with digital tools, understanding data protection and knowledge of cybersecurity.

I haven't seen any country in the world who would be able to do things alone in the public sector. No one has enough knowledge or money or time even especially these days, so definitely the partnership and working together with different parts of the state is so essential.

Bertelsmann Stiftung (2018) noted that involving all relevant actors in a *timely* way increases the likelihood of compromise, which was said to have a positive impact on digitalisation. Collaboration and cooperation are therefore key. In Denmark, since 1994, an organisation called MedCom has acted as a 'national bridge builder' and has the specific role of facilitating cooperation between organisations linked to the Danish health care sector. It has been responsible for developing things such as standardised messaging based on the core values of dialogue, user focus, pragmatism and openness (Hansen and Rasmussen, 2019). One interviewee described MedCom as "the most significant institution to reach the goals that we have in Denmark". MedCom has taken the lead in a number of digital health projects and its approach focuses on bringing all the stakeholders with an interest in the area together. This includes national government, regions and municipalities, which are all represented, and which also contribute to MedCom's funding. Although it was acknowledged that these stakeholders might have different interests, there was also agreement that they need to come together to address technical issues. The standards developed by MedCom are effectively mandatory, meaning any digital health supplier must meet them in order for their product or service to be used: "To create an atmosphere where people could be in the same room [to] actually develop these standards. And if you do that, if everybody has been part of building them, they are a lot easier to implement."

For example, MedCom was responsible for stakeholder engagement from the beginning, setting standards and working with users on the benefits of e-prescriptions to enable the right culture before mandating their use (Deetjen, 2016). This way of working was felt to be consistent with a wider collaborative approach to health care present in Denmark where the national, regional and local systems work together, with responsibility for different elements of delivery (Hansen and Rasmussen, 2019). This has been important for the success of other elements of Denmark's digital health infrastructure: Sundhed.dk works closely with the three levels of the health care system – the state, regions and municipalities – in partnership, and its funding comes from a combination of all three. This means it is "owned" by all of these stakeholders, which was considered a key "strength" because it "breaks down siloes" and allows the portal to access data from each source. Given that a lot of the work to gather the data has been led by the regions, having them play a key role was important for ensuring the project would run successfully.

This cultural approach to collaboration is also present across the rest of Scandinavia - these countries are 'well-developed democracies with relatively small economic differences... At the core of the Nordic welfare model lies the principle of universalism and broad public participation... [and] decision-making is partly decentralised' (Nordic Innovation, 2018, pp. 5, 6).

Dedicated digital health organisations

Some countries have organisations with particular responsibility for digital health. Clearly setting out the roles of these organisations and how they relate to other parts of the system is important. For example, the Swedish E-Health Agency was established in 2014. Originally set up to manage e-prescriptions, it is also responsible for monitoring worldwide developments in digital health and advancing particular projects (such as standards) that would benefit from a national approach. A key role of the agency is to support the coordination of different stakeholders. But, interviewees also recognised the importance of effective leadership to make decisions.

In Portugal, the SPMS (Shared Services of the Ministry of Health) is accountable to the rest of government, and must negotiate an annual budget based on particular digital health projects, and account for its progress. The agency comprises a large interdisciplinary team, including health care

professionals and individuals with expertise outside of health care. The existence of this "strong, competitive" national agency with a "well-driven team" was considered important for driving forward Portugal's digital health development. When it was first formed, the agency hired a strong, core team and board comprised of individuals from multiple sectors, including health care, to bring "expertise, perspectives and processes". The SPMS also has responsibility for procurement and its procurement process means that suppliers must meet a particular set of interoperability and cybersecurity standards. The agency is also afforded a high level of scrutiny and each year must negotiate its budget with the central funding agency, based on detailed objectives and deliverables. This was considered positive and important to ensure accountability and transparency in its work. But, while having a strong national agency is important, it was felt essential that this does not become a "bottleneck" for new, innovative projects: "One of the dangers with our model is that if the agency stops innovation and stops to be innovative, it can become the problem of the system."

Balance between centralised and regional approaches

In many countries, digital transformation includes managing the governance between central and local parts of the system. This is an ongoing challenge in many countries, particularly where health care is delivered with more regional autonomy (such as in Sweden, Denmark and Finland). Bertelsmann Stiftung (2018) noted that countries with a regionally organised health care system displayed a noticeably higher state of digitisation than those that were centrally organised. But, establishing the right balance between national and local responsibility is important. Our previous research noted that within the NHS, this approach has fluctuated over time and is a constant balancing act – recognising the value of nationally supported programmes but also taking account of local variation (Castle-Clarke and Hutchings, 2019).

Health care in Finland is delivered at a local level, predominantly through municipalities, which have a high degree of autonomy over the services they provide. A national health strategy exists stating particular goals and requirements for municipalities, but they have a large degree of flexibility over how to operationalise these, depending on their local priorities and population. Similarly, in Denmark, the regions have the same overall responsibilities but their budgets and particular priorities depend on their

local population. Although there is value in this, interviewees noted the risk of a situation where local areas were resistant to adopting solutions from elsewhere. However, some also noted that the Covid-19 pandemic had demonstrated the value of being able to quickly implement and scale evidence-based solutions even where they had not been developed in particular regions.

Where regions have been responsible for developing digital health solutions, countries have taken steps to draw these together. The Portuguese Telehealth Plan, for example, noted that there were many local initiatives in Portugal but only through a national strategy with a clear overview could the potential be realised – an 'articulated and synergistic system, which is more than the sum of its parts' (SPMS and Portuguese National Centre of Telehealth, 2019).

Sweden has a strong tradition of self-government – this means that each region has different priorities and has progressed in different ways. In Sweden, the current digital health strategy is based on an agreement between the government and the Swedish Association of Local Authorities and Regions (SALAR). This decentralised organisation means each county council has choice over which services to focus on and which EHR system it uses – many different systems are in use and interoperability between them has traditionally been low (Hägglund, 2017). Two specific enablers exist to try to bring this information together: the national patient portal and the national health information exchange (HIE) platform. The purpose is to enable a single point of connectivity, making all Swedish EHRs appear as one national EHR (Hägglund, 2017). Likewise, in Estonia, being able to transfer data between services was considered fundamental to enabling patients to self-manage and become activated and engaged (Willis, 2018). Regardless of geography and type of system, it is the ability to transfer this information and access it that is important. As well as supporting patient experience, it means that regardless of where the patient is moving throughout the system, providers are able to access the information they need.

Providing a framework for drawing together regional infrastructure and interoperability

In Denmark, the health care system underwent structural reform in 2007 – before this there were almost 40 EHR systems in place, which were limited

in how far they could communicate with each other (Kierkegaard, 2015). The 2007 reform reduced the number of regions to five, each responsible for their own EHR system. Currently, two are in use: Epic and a Danish solution called Systematic. Action in recent years has therefore focused on integrating and streamlining the way patient data are accessed and shared. In 2010, an agreement between the national government and regions led to a clear division of labour, stating that the Ministry is responsible for overall development and national coordination and prioritisation, but within this, the regions are responsible for investment in and the implementation of specific solutions (Kierkegaard, 2015). At this time, the Danish National Board of E-Health was established to advise the health minister, comprising representatives from the government, regions and municipalities. Its role is to coordinate overall strategy. Bertelsmann Stiftung (2018) argued that there is no strong political will for a *national* EHR, and instead responsibility for the development of EHRs remains with the regions.

In attempting to strike this balance, there can be challenges. In Sweden, despite the existence of the HIE and patient portal, the way that patients access information is decided by the regions – this means that there is variation between the regions regarding the amount of information that patients are able to access. One of the key challenges in Finland results from the localised infrastructure where municipalities have responsibility for delivering health care services, and choice about how to implement digital solutions. Interviewees noted the risk that this could lead to a fragmented system, where multiple systems are in operation across different parts of the country – as a result of their small size, the municipalities do not necessarily have the ability to negotiate with larger companies.

This therefore highlights the importance of interoperability. Kierkegaard (2015) noted that the key is to ensure systems communicate and work together, rather than desirability for either a local or national EHR (Kierkegaard, 2015). With countries that have made a lot of progress, they can be stuck with a 'forerunners dilemma' – dealing with multiple legacy systems which do not necessarily reflect modern standards. This means getting a balance between adopting standards that are flexible enough to accommodate new solutions, and ensuring 'coherence' with existing solutions and information. Aligning terminology will be an integral part of this. Another challenge of legacy systems is how to ensure that all of the old information can

be transferred to the new one. However, a positive feature of this is that these systems often also come with the data – in the case of Portugal, they also came with business knowledge.

Some interviewees felt that in certain situations, greater centralisation or national intervention could be beneficial in order to provide a clear and consistent framework for everyone to follow. Regarding secondary use of data in Denmark, for example, bringing together the existing cluster initiatives in a more centralised way was considered to "make sense" given that the clusters share and serve the same goals and ambitions.

Implications for the NHS

The NHS has been in a state of continual change regarding its organisational structure, both at a national and regional level. Where regional entitles do exist, unlike in other countries, they do not correspond to other areas of local government or public services. The Covid-19 pandemic has been noted as conducive to supporting collaboration as organisations and individuals have been required to come together to respond quickly to the various challenges. The NHS Bill is set to build on these 'unprecedented levels of collaboration' through developing the role of integrated care systems (Department of Health and Social Care, 2021b). At a national level, NHSX is responsible for leading digital transformation across health and social care, ensuring that it is a key feature of other health care transformation programmes (Gould, 2021).

By April 2022, integrated care systems will be required to determine locally the best way to develop digital capabilities, acknowledging the role that digital will play in supporting transformation and the delivery of services at a local level (NHS England, 2021b). The new roles of integrated care systems raise questions about what this will look like in practice, but it does signal a shift towards a more localised approach to developing solutions, recognising the importance of using data and developing digital capability to support integrated care. Our work has highlighted that it is important to be clear about where responsibility and accountability for the digital health strategy and implementation lie, and what the roles of different stakeholders in the system are, as well as the need for collaboration.

Long-term, sustainable investment

The average European health care provider spends between 2.9% and 3.9% of total expenditure on digital products and services (HIMSS and McKinsey, 2020). In the countries we studied, funding for digital transformation has come from a number of sources, including state-level investment, regional budgets and one-off cash injections (for example accompanying pilot projects). Where health care is organised regionally, interviewees noted that funding variation *between* the regions is one factor which has led to variation in the availability of digital services.

In the early stages, specific financial incentives to encourage technology adoption can be beneficial (Ross and others, 2016). But, digital transformation can take a long time – it is not a one-off event but a continuous cycle of adoption, testing and improvement (Castle-Clarke and Hutchings, 2019). That means that not only is investment needed to fund adoption, it is also required to keep up with new technologies that will become available. And implementation goes beyond just the technology to include things such as workforce education and training. This can be challenging given that much of health care is financed through short-term, annual budgets, a challenge not unique to the NHS. This can make it difficult to plan ahead, particularly given that technology is competing with other priority areas:

Of course, you need to invest in technology. And it's not only the investment you need in the first year – if you need to improve technology, you need to update technology. You need to educate personnel, educate individuals, etcetera. And as long as you don't have specific budgets for these, the progression in the area is not so clear.

Sustainable funding models are therefore essential and interviewees gave examples of how countries are attempting to address this. In Portugal, the SPMS did a lot of "insourcing" and "contra-cyclical investment" by reaching out to companies to enable internal staff to have the skills and knowledge to maintain the particular software, thus recovering a lot of money. The SPMS is also responsible for procurement. Although the cost is borne by providers, any purchase over €10,000 is procured by the national agency:

We use procurement in a very strategic way to make sure that we impose standards, and we impose harmonisation. Because we do the contract centrally, we can include [things like] cybersecurity and interoperability. This also gives us visibility on the costs, because we know exactly how much money they spend, because they have to spend it through our procurement unit.

Investment was also considered key to making the Finnish National Archive and Kanta services project (including the Patient Data Repository) a success, with the state investing heavily in both services. In the long term, while the state covers the development costs associated with Kanta, the running costs are borne by multiple stakeholders, including the municipalities, pharmacies and health care providers. Interviewees felt this was important for ensuring that the state can invest on a long-term basis in the continual development of the project, knowing that the running costs are shared by other stakeholders. It also means that multiple stakeholders have an interest in keeping the Kanta services working effectively. Similarly, in Denmark, the funding Sundhed. dk receives from each partner is proportionate to the funding they get for delivering health care services, with the bulk of the money coming from the regions – as acknowledged above, having all the partners "own" the portal was considered a strength.

Implications for the NHS

Our research identified a number of issues regarding funding for digital transformation in the NHS, including the implications of using capital funding rather than revenue, uncertainty around how various funding initiatives join up and limited investment in digital compared to other sectors (Castle-Clarke and Hutchings, 2019). For trusts that had been allocated funding through the Global Digital Exemplar (GDE) and Fast Follower programme, there were particular concerns around how to *sustain* the progress they had made without additional funding once the programme ended. Similar issues were raised by the National Audit Office, which noted that trust expenditure on digital varies widely and is consistently less than the 5% recommended by NHS England and NHS Improvement (National Audit Office, 2020).

Current policy is aiming to address some of these issues. NHSX (2021b) has recently published a draft framework entitled 'Who Pays for What', which intends to tackle some of the barriers by clarifying funding routes for digital transformation and who is responsible. Initially, this will be via the Unified Tech Fund (2021/22). From 2022/23, funding will be allocated directly to integrated care systems, which will be responsible for their own digital transformation programmes, and in theory provided with greater control of the resources they have and how to spend them. The guidance also aims to clarify what will be funded at a national level (including products such as the NHS app). An additional £2.1 billion of capital funding for digital technology was also announced in the October 2021 budget (HM Treasury, 2021).

The key learning we have identified from this and previous research is that the focus must be on long-term and sustainable investment, recognising that digital is not a one-off cost, but rather must be integrated with wider spending and become 'business as usual'. Organisations need to be able to plan for the future. It is hoped that clarity on funding arrangements will assist with this, but whether this will happen in practice remains to be seen.

Legal frameworks and data protection

Legal frameworks which underpin digital health infrastructure are key. In Finland, legislation was enacted to set out the data access processes within Kanta services. Similarly, in Portugal, when designing the patient and health care professional portal, the Ministry of Health and SPMS worked closely with the National Data Protection Authority in an iterative way to ensure that the system was secure and met all the necessary regulatory approvals.

In Estonia, services are built on three pillars: confidentiality, availability and integrity. Regarding confidentiality, all citizens have a unique electronic ID. Availability of information is strictly controlled and organisations are only able to access information relevant to them. Data are decentralised in order to reduce the risk of centralised cybersecurity attacks, but from a customer experience point of view it means that citizens only need to submit information once. On integrity, ensuring data is moved securely is a priority and a Cyber Defence League exists to protect the state from cybersecurity attacks.

It doesn't matter what subject we're talking about, if it's online services or e-health services, the key element is that if you want to get access to a service it has to be provided in the safest way possible.

In both Denmark and Estonia, activity is also logged and citizens can see who has accessed their information (Nøhr and others, 2017). This supports citizens to have confidence in the security, privacy and management of their data (Nøhr and others, 2017).

In Sweden, the Patient Data Law was passed in 2008 in order to provide the legal basis for giving patients online access to their records. Originally, patients had more control over which parts of their medical record they could share with others. However, this was prevented because the law states that it is the 'health care providers' responsibility to protect patient data from being used in irresponsible ways'. Although the law is therefore very restrictive, interviewees also felt that this helps people to consider the consequences of implementing new technology too quickly. Considering the speed at which technology develops, it was recognised that the law does not always "keep up" with what technology enables people to do. This is, however, a constant balancing act:

The legislation, I think it's really good, that people are forced to think things through because sometimes we're very enthusiastic and ready to rush ahead, we come up with great ideas, and we're innovative and new. And we haven't always thought through all the consequences this might lead to in the long run. But it is a bit of a battle between legislation making sure that we're doing things in a good way and then the technical development.

Using a federated model to store and access information

For multiple countries, a key principle of their digital health infrastructure is that information is not stored centrally. For example, the Sundhed.dk portal does not store information itself – instead it draws on data which is kept in the 170 local, regional and national sources. An area called 'my log' shows a list of organisations which have access to the individual's data via the portal, which was considered essential for supporting transparency:

It's very important to understand the security model because when you log in, data are displayed in a glimpse for use, and not stored, so there's no publication. And this is what made the system unique and time saving and secure.

This approach is also in use in Estonia where the 'X-Road' provides a way to connect the data, but does not store it in a central repository. Portugal also uses a federated model – information remains in local systems and is not stored on a central platform. While developing the platform, ensuring security and privacy of data was seen as the basis of the trust 'necessary for the new social contract' (Martins, 2020). SPMS was also involved with international projects such as the development of the General Data Protection Regulation (GDPR) and could draw on its familiarity with concepts such as federation and minimum sharing to support the development of its domestic infrastructure.

Legal frameworks which support the secondary use of data

Legal frameworks have also been used to support the secondary use of data. Finland is considered a 'pioneer' on this, by having a dedicated legal framework and process for enabling the more straightforward use of data for secondary purposes (Deloitte Legal, 2020).

Findata is the 'data permit authority for the secondary use of healthcare data' in Finland (Findata, no date). It is an independent organisation, operating within the Finnish Institute for Health and Welfare and created by a specific law in May 2019 (Act on the Secondary Use of Health and Social Care Data 2019). Findata issues permits for requests for data that come from multiple

sources or registries, or from private service providers. Data sampling is done by the data controllers and Findata's role is to link the data using the personal identification code. If the permit is granted, researchers get access to the linked, pseudonymised data via Findata's remote secure environment. There are no specific restrictions on *who* can apply to access the data – instead, Findata looks closely at the *purpose* for which the data are being requested, to understand whether the request meets the requirements for each purpose. Findata has a duty to refuse access if it sees misuse of data, but overarching responsibility for supervising health care lies with a separate organisation, Valvira.

Findata was created to make the process of applying for data for secondary use more efficient, as well as to update the legal framework and incorporate the GDPR. The Act on the Secondary Use of Health and Social Care Data 2019 therefore provided an opportunity both to *enhance* data protection, making it safer for patients, and to streamline the process to make it more *efficient* for researchers. Although health care data had been used in Finland for secondary purposes for a long time, the legislation was quite "scattered" and organisations had different processes for granting access to data and sharing them. Researchers would need to go through multiple, often different, processes for getting data from the different registries. The Act clarified existing rules and consolidated them into one piece of legislation. It also made the process much quicker, and a maximum time limit for application processing is set out in the legislation.

Other initiatives to support the secondary use of data

Initiatives also exist in other countries to enable the secondary use of data, but interviewees noted that more restrictive legal frameworks (such as limiting data-sharing beyond primary use) make it more challenging to enable secondary use. A recent report found that despite the importance of enabling the secondary use of data, existing initiatives in EU countries are fragmented and the infrastructure to support it is limited (Boyd and others, 2021).

Like Finland, Denmark also has a long history of collecting data in digital form, supported by the unique personal identifier. A key focus now is therefore on building an infrastructure to use citizen-generated data, to work alongside the existing public registries. The National Health Cluster for Life Sciences

and Welfare Technology brings together the five existing regional clusters to centralise efforts in health care. It is funded jointly by the Ministry of Higher Education and Science and the Danish Board of Business Development. The ambition of the new national cluster when it comes to health care data is:

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to function as a nationwide public–private collaboration platform with the purpose of both facilitating, developing and disseminating new solutions [and] business models for safe and ethical use of health data within life science and welfare technology for the benefit of patients, health services, research and the industry.

One of the 'lighthouse' initiatives of the new national cluster is Data Saves Lives. This is a public–private partnership that works to improve the use of health care data in Denmark. This involves a combination of presenting specific value-adding solutions to health data challenges, creating an overview of the health data landscape and increasing transparency by fostering a public debate around the risks and benefits of using health care data in research and innovation. Another role of the initiative is to share and learn from other countries, for example through an international network of stakeholders who focus on improving the secondary use of health care data.

One of the key responsibilities of the national cluster in 2021 is to conduct three analyses around better use of health data. One of them is assessing the legal framework needed to underpin a new access point for health data with guidance and support services. At the moment, legal issues are open to interpretation by different organisations within the system, which results in a lack of clarity and difficult processes that researchers must go through in order to access health care data. This is reflective of one of the current challenges present in Denmark:

Data is very fragmented and siloed. The different regions have different frameworks and processes so it's very difficult for, especially private researchers and innovators, to comprehend how to access the data, due to the fact that the different levels and authorities interpret the law differently.

Nordic Innovation is one of 11 organisations set up by the Nordic Council of Ministers to support collaborative working across the Nordic Region. The Nordic countries have a long history of collaboration, and the aim is to combine the countries' expertise in order to support innovation to flourish within the region, and to be exported around the world. The Health, Demography and Quality of Life programme has a vision of a more preventative health system, whereby investment is more balanced between treatment and prevention. The Nordic Vision states that by 2030 the Nordics will have 'the most integrated health care system in the world', with 'the best possible health care for all' (Copenhagen Institute for Futures Studies, 2019, p. 74).

If there is a change that needs to take place in order for the public health care services to be relevant, and that is certainly the aim – not to disrupt public health care. Not at all. The aim is to ensure that it is still relevant in 10 years' time.

Secondary use of data is a key ambition for the Health, Demography and Quality of Life programme – supporting health data-sharing between the Nordic countries to facilitate a more integrated and personalised health care system, both now and in the future. This extends beyond data captured by health systems, drawing on insight from social and environmental data as well, such as on air pollution and road traffic, to ultimately result in improved population health systems. Although not a panacea, ensuring the effective transfer of health data was seen as a key tool for achieving broader goals for improving individual health care:

I don't think digitalisation or the transfer of health data is the thing that can solve everything, but I think it is something that is very helpful. I think that we need to have a data-driven health care system to [a greater] degree than what we have today. That's to come up with new solutions, to ensure that we have better access to health care to help individuals live a healthier life.

Public trust and data-sharing

Attitudes to data-sharing and how far people are comfortable with their data being shared for health purposes vary between countries (Vodafone Institute for Society and Communications, 2016). In order for countries to be able to make the best use of health care data, engagement with the public is therefore crucial – the Recommendation of the OECD Council on Health Data Governance set out the elements that countries need in order to manage personal data and also highlights the importance of engagement, participation and transparency (OECD, 2017). This requires a discussion of the opportunities and the risks (dispelling the notion of a trade-off between data protection and data use) – and key to this is establishing trust through transparency about who is using the data and how they are being used, as well as decisive leadership if breaches do occur (OECD, 2019b). This has also been recognised as necessary by WHO Europe, which has noted the need to 'move [the debate] from a focus on data protection to a more nuanced and sophisticated consideration of risk–benefit equations' (WHO Regional Office for Europe, 2018, p. 4).

Interviewees noted that the Finnish approach, which focuses on the *purpose* of using the data, helped to have such a 'sophisticated' conversation about secondary use. This was in contrast to other more restrictive approaches focusing on *who* can access the information. This was felt to emphasise the need to have a conversation about *why*, as well as – in theory – make the process more transparent by enabling anyone to be able to access the information. Linked to this was ensuring there was transparency around the whole process – about not just how Findata works operationally, but also the wider legislative context and the rights citizens have and how they can act on them (for example, under GDPR).

Building public awareness, confidence and trust in the use of data is therefore essential. One element of this is demonstrating the benefits of using health data to citizens. It was felt that the Covid-19 pandemic had in some way helped to highlight this, but the legal and ethical public debate remained a live challenge. In Denmark, one of the goals of Data Saves Lives is to develop "tangible" case studies to highlight the benefits of sharing health care data from a patient experience. Although there was a generally high level of trust and public appetite for the use of health care data in research and innovation before the pandemic, it was felt that the pandemic had highlighted the benefits in a more transparent and obvious way:

It has taken up so much space in the news and the media. So I guess that it has created more transparency and debate based on a specific case and common foundation. I think many people have been more aware about data after Covid-19 and [its] possibilities, and the importance of actually sharing your data to be able to develop new medicines much faster.

The link between health and wider public policy here is also important. As outlined earlier, a long tradition of using digital tools and data was considered a significant element in creating a culture where citizens are more confident and accepting about how their data are being used.

Implications for the NHS

Historically, initiatives to support data-sharing in the NHS have been challenging. Willis (2018, p. 5), in comparing the NHS with Estonia, noted that part of the challenge in NHS digital health infrastructure is resistance to any form of national identity card, as well as 'multiple public information and communication technology blunders'. This has been seen previously with the closure of care.data (Department of Health and Social Care and Freeman, 2016) in light of a review by the National Data Guardian, which noted the need for extensive dialogue with the public about how their information can be used (National Data Guardian, 2016). Similar findings were highlighted by the Care Quality Commission (Care Quality Commission, 2016). More recently,

concerns have arisen with the planned General Practice Data for Planning and Research (GPDPR), a database of primary care data, which was due to begin on 1 July 2021. This has now been delayed as a result of concerns from health care professionals and the public about (among other things) a lack of public engagement, communication and transparency and the need to build trust in the use of data (Burki, 2021). As a result, a different approach has been adopted, which sets out a number of tests which must be met for data collection to begin (NHS Digital, 2021).

Other research has also emphasised the importance of this. For example, a report from the Hopkins van Mil (2021) highlighted the importance of transparency and engagement at all stages of the data 'life cycle' and that transparency cannot be considered separately from public benefit – it is a prerequisite. Another study used citizens' juries to explore the public's attitudes to three data-sharing initiatives that began during the pandemic. Overall, although jurors were supportive of the introduction of these initiatives, there was concern about a lack of transparency, which along with governance was considered essential despite the pandemic (Oswald and Laverty, 2021). Organisations such as Understanding Patient Data have also been conducting extensive work in this area, such as creating resources for patients and health care professionals to explain how health care data are used (Understanding Patient Data, no date).

Patient and public engagement

Putting patients at the centre of their care is considered a key objective of digital health. Equally important is understanding more about equity in digital access, and the readiness of the public regarding digital services more widely can affect how successful digital health projects can be – Deetjen (2016) suggests that in Estonia, Sweden and Denmark, citizens are accustomed to and expect e-services, an important enabler for introducing new e-health programmes such as e-prescriptions. Interviewees noted the importance of co-design and focusing on customer experience, making sure that using digital tools is "attractive", that is, easy to use, cheaper and more efficient from the point of view of the citizen, as well as accessible.

Engagement with the public more widely can also improve uptake of digital services and some countries have used campaigns to advertise these. Presenting information in a user-friendly and accessible format can help facilitate engagement with patient-facing tools (Suzuki, 2019). Sundhed.dk is a portal for both health care professionals and citizens and a core value in its strategy is to be a 'user-friendly universe' for both, who are considered equally important users of the portal. Sundhed.dk is therefore involved in campaigning to encourage both groups to use the portal, for example through posters and short commercials, and encouraging health care professionals themselves to talk to citizens about the portal.

In Sweden, although providers use different EHRs, patients see the same interface (Moll and others, 2018). This ensures a more 'uniform user experience' (Aanestad and others, 2017). Similarly, in Denmark, services were designed so that patients would see one platform, despite containing data from multiple records. Strong branding was also considered to support public engagement with digital health tools.

In Portugal, two key things have been done to support citizen engagement with the National Platform for Health Data. First, the patient platform was developed before the professional one. Instead of creating a new system, existing systems (such as online booking) were "zipped" together into a "one-stop shop", which was considered important for enabling citizens to continue to engage. Second, user engagement is at the centre of ongoing development. The platform has gone through several iterations and, at each stage, citizen feedback has been sought through a combination of surveys, the involvement of patient and user organisations and creative design workshops. Later versions also make use of usability data to improve the user experience. A key element has been using the platform for education by including a 'patient dictionary', which supports people to understand health terminology.

Prioritising digital inclusion

Given the increasing importance of digital health (particularly since the Covid-19 pandemic), recognising the impact on patient experience and access to health care services is crucial – countries are conscious of the risk that widespread use of digital health tools could end up exacerbating existing health inequalities. Even in countries with high digital readiness, there is wide

variation in the levels of citizen engagement in digital health services. This includes people who do not have the skills, access or confidence to use them, but also individuals who are not aware of the option or possible benefits.

Vehko and others (2019) acknowledged that even though Finnish health and social care services are already highly digitised, more effort and investment is needed to ensure equal access to e-services, and to prevent digital exclusion. Similar issues have been recognised in Portugal, including the importance of empowering people to use digital health tools through developing skills and raising awareness (Postelnicu, 2020). The SPMS launched a number of digital inclusion initiatives, such as involving city councils in teaching people how to use the patient portal and working with schools so that younger people can support their relatives. Interviewees acknowledged the risk of digital tools becoming more mainstream (such as in banking), leaving fewer options to support people who need physical interaction, making services less accessible:

We talk a lot about personalised medicine. But perhaps we should also talk about personalised communication or personalised ways of accessing and communicating with health care. And I don't really see that we're there yet… It's one shoe fits all and the shoe has to be big enough to fit those with the biggest needs. If we can make it a little bit more flexible, so that those who can and want to, do [that would be beneficial].

The Danish Committee for Health Education (DCHE) (see www.dche.eu) was established in 1964. It is an independent body comprising all of the major health care organisations in Denmark. Its purpose is to provide health care information and education to health care professionals, patients and the general public. In recent years, the DCHE has focused extensively on the concept of empowerment. Its work focuses on facilitating group-based interventions for people with a non-communicable disease to help them live with the long-term management of their condition. As a result of this work, the DCHE has been exploring ways to work with people who have traditionally been difficult to engage with services, and this has included using digital tools. The DCHE has used "blended learning" by utilising e-learning and

live webinars, to transfer its physical programmes online. This has included for some groups, an online group meeting where people have their cameras off and use the chat function, supported by a facilitator. This intervention, although requiring a lot of preparation, time and investment, provides an opportunity to engage with people in more innovative ways. To support people to engage, two key actions were considered important. The first was onboarding, which supports and motivates people to participate, and the second was using each intervention as a way to increase individuals' digital skills and confidence more generally. Linked to this is "humanising" digital solutions and making sure there is always support available for people to use digital tools. The Covid-19 pandemic has demonstrated just how important this is.

Addressing digital exclusion is an issue that extends beyond health, and interviewees highlighted the need to address this at a societal level. Sweden has a wider strategy for digitisation, which aims to enable people to use digital tools through, for example, access to broadband. Existing use of internet services is already high in Sweden, and this is increasing across multiple age groups, including the over 65s (Swedish Internet Foundation, 2020). Public organisations such as hospitals and libraries have a responsibility to support people to use digital tools. Although Denmark is generally considered to be a digital society (with most public services operating digitally), ensuring that people are not excluded is essential, recognising the importance of both *skills* and *trust* – the latter including trust in the wider system, as well as the particular digital intervention itself.

Implications for the NHS

The Covid-19 pandemic has led to increased use of technology across the NHS, including patient-facing services such as the NHS app (Hutchings, 2020). But, concerns have been expressed about the impact of the increased use of technology in terms of the potential risks of digital exclusion, widening health inequalities and reduced quality of care (Healthwatch, National Voices, Traverse and PPL, 2020) and there has been dissatisfaction among health care professionals about the impact of remote working on their role (Campbell, 2021). NHS England has identified mitigating against digital exclusion as one of the priorities for addressing health inequalities during the recovery from Covid-19 (NHS England, 2021a). This must include addressing the multitude

of factors which affect people's ability to engage with digital services, but also requires a concerted effort to understand exactly when and how digital services are beneficial and appropriate for different people.

Co-designing solutions with users must therefore be a priority. The Widening Digital Participation Programme led by the Good Things Foundation has been integral to this, supporting digital inclusion across health care services (Tinder Foundation, 2016). The NHS Digital Service Manual's Design Principles include being transparent, understanding underlying behaviour and challenging assumptions, and doing it in an environment where people feel comfortable and safe (NHS Digital, 2018).

It will also be essential to understand the impact of the pandemic on patient experiences. This has been recently explored in the context of providing people with online access to their medical records (McMillan and others, 2021). Work to explore this in specific settings such as primary care is ongoing, highlighting that this is a complex area affected by clinical, sociocultural, technical and organisational factors (Greenhalgh and Rosen, 2021).

Workforce development and education

It has been found that, across the OECD, 30–70% of health care professionals reported gaps in the knowledge and skills needed for the safe and effective use of digital tools (Socha-Dietrich, 2019). Education and training on the use of digital health tools is therefore key and multiple interviewees acknowledged the need to *embed* this comprehensively within education.

In Denmark, one of the DCHE's key roles, alongside citizen engagement, is working with health care professionals directly through education and training. Interviewees noted that there is variation in how digital health is taught, and it is often part of optional courses rather than systematically included in medical courses. Multiple interviewees noted the value of an initiative such as the NHS Digital Academy.

Effective professional leadership and communication, and champions, are also key to making progress. An e-health interest group exists within the Swedish Medical Association to address some of these challenges. The

purpose of the group is to raise awareness of digital health issues, to engage with health care professionals about different topics and to develop digital health in education. Recently, there has been a mandate from the government for universities to include digital health within the curriculum, but it is up to the universities to decide how to do this. Sometimes it is considered something that is for practical placements, which risks people having negative experiences of poor technology rather than being shown the possible benefits. Sometimes digital health exists as an elective module, but this risks only attracting people who are already interested in the subject. Embedding digital health into education for all is therefore important.

In Finland, while there is now an emphasis on providing training on digital health for people going through medical school, interviewees also noted the importance of continuous medical education for people already practising, to ensure that they can develop the skills and confidence needed to work with digital health tools effectively. As well as the Finnish Medical Association, most health care professionals belong to another organisation called Duodecim, whose work was considered important for supporting health care professionals to use digital health tools (see www.duodecim.fi/english). This is a scientific and professional association which develops professional skills and clinical practice through education, guidance and research, and provides medical information to both health care professionals and the general public. The most widely used service is Terveysportti, which is an internet portal bringing together essential information for the everyday work of health care professionals:

They have developed important and widely used digital tools for health care professionals. There are a few medical doctors working there who are very innovative and good people to sell those solutions for our profession. Without this direction, and their services, I think we would be much more conservative as a professional for digital services.

Education was not the only limitation cited with workforce engagement. Another challenge was that many health care professionals have negative experiences of using digital tools – in Portugal, for example, it was felt this

was in part a result of a historic, continued underinvestment in health care, meaning people are stuck using outdated pieces of hardware:

There's differences, some [health care professionals] are really excited, they love new technology, and they want to start using it. But others are a little bit more hesitant and worried about it… I think my experience is also that health care professionals have a lot of bad experiences of using e-health with poor usability, and a lot of technical issues. It's not really adapted for their work so they're a little bit burned from experiences.

Addressing these challenges at a system level is therefore key, including recognising the value of time for reflection to optimise the implementation process:

There's just no room in the schedule for changes. There's no time to sit down and reflect on 'How do we do this?' [These] are such important parts of any implementation project, you need time to go through that change process. Very often that is not budgeted for, it's just start, we're using it. And then it doesn't really work. And it just becomes an additional [burden] on the health care professionals, which of course creates more of a resistance to in general towards these kinds of solutions.

Implications for the NHS

Supporting the workforce is an essential part of digital transformation, and in the NHS, there are many initiatives which aim to address this, including leadership roles supporting clinician engagement (such as chief clinical information officers). Multiple interviewees in this project noted the NHS Digital Academy as an exemplar for supporting the workforce to develop skills and expertise in data and digital. Health Education England has a strategic responsibility for driving forward this agenda with regards to workforce,

based on the ambitions in *The NHS Long Term Plan* (NHS England, 2019) and the *People Plan* (NHS England, 2020). NHS Providers (no date) has also developed a package of support to help increase the digital capability of boards. The 'What Good Looks Like framework' includes workforce and skills development within its success measures (NHSX, 2021a).

This is especially important given the increase in digital tools as a result of the Covid-19 pandemic. Our evaluation of the Care City test bed identified a number of recommendations in relation to this, including the importance of effective project management, time and capacity, identifying ongoing training needs and understanding the motivations and barriers surrounding the use of technology (Sherlaw-Johnson and others, 2021). While the pandemic may have helped to alleviate some of the concerns people had about using technology, it is important that this is now backed up with the requisite resources and support to enable people to implement technology effectively. This includes recognising the importance of the non-clinical workforce (such as project managers and data analysts) in supporting digital transformation (Castle-Clarke and Hutchings, 2019).

The impact of Covid-19

We have previously described the impact of Covid-19 on the use of digital technology in the NHS, such as an increased use of remote consultations (Hutchings, 2020). Multiple countries have also experienced this, although many already had structures in place for enabling these consultations before the pandemic (Richardson and others, 2020). Sweden, for example, had a long history of using telemedicine, but its use has "bloomed during the pandemic". Previously, it was mostly used in specialised care or in parts of the country which were very remote, and driven by private care providers. Since Covid-19 there has been a push for regions to launch their own online services to limit the numbers of people attending health care settings, and for consultations that do not require a physical visit – this has meant that telemedicine has "taken off quite substantially" in routine health care. In Denmark, there was also already a platform in place for virtual consultations, which had additional capacity built into it to enable multiple consultations to occur simultaneously.

Use of existing digital tools and services has also increased. Sweden, for example, saw an increase in the use of its national platform, in part because people book their Covid-19 test and get their results via their online medical record. This has meant that people have been using the platform who might not otherwise and it was hoped that this had helped them see the value of online tools. Whether this will continue in the long term is, however, still uncertain:

A lot of people who there wasn't really much point for them, and they didn't really see the value of using these online services, they were perhaps healthy, or they just felt that it was too challenging or too difficult. It was easier for them to pick up the phone but now they've been pushed to use the online tools more. So [it will] be really interesting to see what happens when both health care professionals who were pushed into [it] and patients who were a little bit pushed into it, if we go back to more traditional care if the virus is at some point less of a threat? Will these changes remain because we've gotten used to them?

Greater interest in digital tools has also been seen from local providers and the wider system. This has reinforced the need to share best practice about solutions that have worked effectively in one place and could be implemented elsewhere:

I think it does show that, not only individuals, but also government, municipalities and other parts of the system have taken this on board… It has opened the eyes for quite a few municipalities… now, they've certainly had the option to say: 'Okay, here is a list of at least 10 solutions that we know have already been tested in one of the Nordic countries, with similar problems to what we are facing here. So maybe we can fast track this and just introduce it here.'

Interviewees felt that the pandemic had helped to change attitudes towards the use of technology among both patients and health care professionals because it had enabled them to see the benefits. Before the pandemic, one of the key challenges was around engaging health care professionals to use digital solutions and see the benefits, rather than "selling them as the second best". There was a hope that the pandemic has helped to demonstrate the value of digital tools where they are used alongside face-to-face interactions in the most beneficial way for patients:

It became easier to implement virtual consultations in primary care, when the health care professionals also felt that there was a benefit for them, not having to have patients coming to the office, perhaps bringing in the virus or be subjected to the virus in the waiting room, etcetera. So what had previously been more of a benefit for the patient – 'I don't have to sit in the waiting room' – didn't really matter to the clinicians. But the pandemic made it so that there was also benefit for them – it made it a little bit easier to do things that would have taken months and months to implement.

One interviewee provided an example, where they felt that the Covid-19 pandemic had done a lot to reduce some of the historical barriers to digital transformation, by reducing resistance among three key groups:

We have the kind of Bermuda Triangle on these issues – doctors have resistance about using it, patients have resistance about using it, and payers in the NHS have resisted in paying for something that it could not see as a physical contact. I think that resistance of the three agents [has] actually decreased… doctors have seen that it is feasible, patients have seen it as a solution to avoid risks, and the NHS has seen that they need to pay for it otherwise people will not [get] care.

Countries have also used digital technology to respond to the pandemic itself. Test results, sick leave letters and public health information were made available via patient portals. Interviewees felt that having a robust infrastructure in place was a significant element of being able to manage the pandemic, because it provided a base for them to build things on top of. In Denmark, for example, Sundhed.dk built a coronavirus shortcut into its laboratory results section. In the same way as any other laboratory test result, people access their Covid-19 test results via Sundhed.dk and therefore get their results faster. This has resulted in a huge "acceleration" in the number of visits, which challenged the technical platform immensely. To stabilise the portal and respond to this increase, Sundhed.dk introduced a queuing system, as well as a notification system – this was to prevent people constantly checking the portal to see their results. It also stabilised its load balancer, enabling greater capacity on the web servers for both the website and app version. Sundhed.dk received additional funding to support with these improvements. Now, countries such as Denmark are using their digital health infrastructure as the basis for coronavirus passports, which have been viewed as key enablers to reopening society (BBC News, 2021).

The existence of Sundhed.dk and the wider digital health infrastructure in Denmark were considered an important part of Denmark's response to the pandemic, in part because it had this existing infrastructure to build on:

Without that [the infrastructure] we couldn't have [had a] very progressive and proactive strategy… So we are leaning on and standing on the shoulders of this long tradition for [the] utilisation and digitisation of health care in Denmark. And that's the point for the portal with or without Covid-19.

Estonia's long-term focus on creating a digital infrastructure was also considered to have been beneficial for responding to the pandemic. It was felt that Covid-19 had acted as a "wake-up call" in other nations on the importance of developing digital solutions, but that this needed to happen much faster because of the necessity demanded by the pandemic:
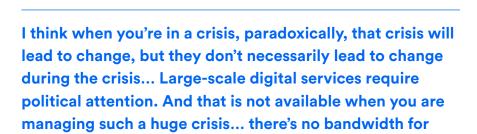
Because of corona[virus] we realised that all of this work that we had been doing for many years is actually paying off and showing that's the way to go because that's the only way to handle what's happening at the moment.

Although most interviewees felt that some of these barriers will be permanently reduced in the long term, what was less clear was how far these changes will continue once the threat of Covid-19 has subsided, or whether people will revert to more 'traditional' ways of interacting:

I think most of the reaction has been a reaction of fear because of Covid-19 so people are accepting things they would not accept in the previous context… I would see that over time, people would like to have a bit of physical contact again.

Given the rapid increase in the use of new technology, Covid-19 has also introduced new questions, particularly the legal and financial implications if these changes become more mainstream. Interviewees provided examples such as how to protect patient confidentiality and privacy during a video consultation, and how to design a fair reimbursement model for remote consultations. Although Covid-19 has resulted in rapid changes, interviewees did also recognise that it is an emergency and therefore "not a good guide because you just adapt what we have from the physical world". Some also felt that at a system level, providers are under so much pressure to care for patients that people become more risk-averse, and revert to more traditional ways of doing things. In terms of long-term change, it was felt that getting this to happen during a crisis was difficult:

I think when you're in a crisis, paradoxically, that crisis will lead to change, but they don't necessarily lead to change during the crisis… Large-scale digital services require political attention. And that is not available when you are managing such a huge crisis… there's no bandwidth for failure and if you can't fail you can't innovate.

The EU has led a number of cross-border programmes during the pandemic such as developing digital contact-tracing tools and smart vaccination certificates (European Commission, 2021a). Digital is also considered to be a key element of recovery from the pandemic too – the EU Recovery and Resilience Facility, which aims to mitigate the economic and social impact of the pandemic, has mandated that member states spend 20% of the funding on digital, including digital health solutions (European Commission, no date a). The funding available intends to make EU member states more sustainable, resilient and able to make the most of both green and digital transitions. Understanding what has worked effectively and designing a system that will support people to get the most benefit from digital health are therefore an important priority.

5 Concluding remarks

This report has highlighted the experiences of a sample of countries in Europe with regard to their progress on digital health. As many countries have digital health as a priority yet face similar challenges, looking internationally can provide valuable learning. Although not exhaustive, the report has demonstrated a number of key factors that have contributed to success. This includes the value of a clear strategy, robust governance and a dedicated legal framework for protecting patient data. Equally important are co-designing solutions, ensuring digital services are accessible and embedding digital health into education. At the centre of this is a recognition that advancing the use of digital within health care is closely linked to its use across all public services, which can provide the foundation for fostering trust and confidence among the public, as well as an infrastructure on which to build.

Across Europe, Covid-19 has led to an increase in the use of digital technology across many areas of life, including within health care. While some of this has undoubtedly been led by necessity, it is unlikely that things will return to how they were. Given that digital technology will be a fundamental feature of the post-Covid landscape, it is essential that it is used and embedded within health care in the most effective and beneficial way for both patients and health care professionals.

At such a pivotal moment for the use of digital technology and data in health care, this work also provides a number of insights for the NHS. In particular, it has highlighted the significance of a wider digital infrastructure in public services and, related to this, of cultivating patient and public confidence in the use of data and digital technology. There is already a clear strategic focus on digital technology in the NHS, but wider health care reform (such as the shift in responsibility to integrated care systems) is likely to have an effect on the success of digital transformation in the future and it will be important to monitor this. In the wake of the pandemic, it is imperative that there is a focus on how to embed digital technology and data into health care in the long term, ensuring that the benefits can be delivered most effectively for patients and health care professionals.

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