

Regional inequalities in health and social care

The power of digital technology to close the gap

A white paper by Microsoft

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Executive summary

Governments of all political leanings have, in recent years, sought to reduce health inequalities between regions. This short report suggests that digital technology can begin to address these inequalities — and that it may also be one of the best ways to tackle long-term economic imbalances between regions.

- The Covid-19 pandemic has demonstrated that despite people being able to access the same NHS services, there remain variations in health outcomes across the country. We already know that there would have been 40,000 fewer deaths in the UK if the national Covid mortality rate had been as low as the least deprived places.
- There are also large regional differences in cancer mortality outcomes and life expectancy. This undue variation in health outcomes has a direct link to variation in economic outcomes – for example in workforce productivity or work incapacity. In general, life expectancy is highest in those areas of the UK with the highest productivity – London, the South East, and the East of England – and lowest in those areas with the lowest productivity – Wales, the North East, and the North West.
- Policymakers are now seeking to rectify these disparities. This is a project occurring simultaneously across every nation and region of the UK, in both the NHS and social care.
- Despite exciting and dynamic advances, health technology is often framed as something that can reinforce health inequalities rather than help tackle them. Covid has accelerated the use of digital technology and demonstrated the benefits it can bring. In the Health Foundation’s survey of NHS staff conducted between October and November 2020, 82% of respondents said their organisation had increased its use of technology to some extent during the pandemic and 51% had been personally involved in that increased use of technology.
- However, whilst the pandemic has shown the positive benefits of the role of digital technologies in health and social care, it has also shown the difficulty of being able to reach particular groups and communities, particularly those often with poorer health relative to their local populations.
- Policymakers are increasingly interested in how far maximizing population health can be achieved by collecting better and more regular data on those populations. By ensuring data is collected on the most at-risk groups, or those with the most complex needs, the health and social care system should be better able to respond in times of individual need, in turn reducing variation in ill-health and mortality outcomes across the UK. This applies as much to social care as to health care.
- Outgoing NHS England Chief Executive Simon Stevens, as part of moves towards Integrated Care Systems (ICSs), has echoed this, setting out the need for the NHS to play a more proactive and prevention-focused role in public health in the years ahead.
- However, poor health outcomes do not have a single cause and just as important as integrating services within the NHS is forging partnerships with organisations working outside the health and social care system, such as employment support or housing associations. As such, technology has genuinely transformative power to help – by being the infrastructure around which disparate services and organisations can support each other’s long-term objectives.
- In short, by collating better data on patients, in turn enabling early detection and prevention, it is hoped that the stubborn link between longer term conditions and increased hospital admissions (disproportionately affecting people living in more economically disadvantaged areas) can be significantly disrupted.

Recommendations

There are several areas where government could make more or better use of technology specifically to reduce undue variation in health. We would identify five broad areas for priority attention, which together provide a strategic framework for improvement:

System intelligence – improved system intelligence and information would enable health and social care managers, and local government leaders, to better monitor population health in their communities and design better health interventions.

System and organisational partnerships – health and social care organisations both within and outside the NHS should be working together in partnership at a system level. This would help deliver much better preventative care.

Data sharing – we need more data sharing, more fluidly, across integrated NHS services and also with external partner organisations, including local government, schools etc, in order to better manage overall population health.

Organisational working – supporting staff in individual organisations involved in the provision of health and social care would improve the delivery of services for patients: supporting and connecting staff, and improving digital skills and confidence, should be a big priority.

Supporting outreach – technology should be playing a more central role in outreach and engagement with harder-to-reach groups who are more likely to have poorer health outcomes. This should be allied to a digital inclusion agenda.

We see these five areas as priorities for a technology-led strategy to reduce undue variation and raise outcomes. They provide a framework with which to design a strategy for driving specific interventions that could help close health inequalities.

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The Challenge of Regional Inequalities



Over recent years, governments of all political leanings have sought to reduce health inequalities between regions. Whereas policymakers have previously focused almost solely on economic outcomes – which forced a critical look at regional investment in areas like infrastructure and skills – now the same attention has turned to health. A primary aim of health policy is now to tackle undue regional variation in life expectancy or disease among different regional populations. This short report suggests that digital technology can begin to address this variation — while noting that doing so may be one of the best ways to tackle long-term economic imbalances between regions.



Regional health variation

The pandemic has demonstrated that despite people being able to access the same NHS services, there remain variations in health outcomes across the country.

A report from a cross-party group of MPs earlier this year found that:

- 90% of those who died with Covid had significant prior poor health.
- The most deprived places had much higher Covid mortality rates; Blackburn and Darwen had 345 per 100,000 die, five times more than South Cambridgeshire with 68 per 100,000.
- There would have been 40,000 fewer deaths in the UK if the national Covid mortality rate had been as low as the least deprived places.¹

There are also variations in outcomes for major healthcare conditions. For example in cancer the latest data shows that North East has the highest rate of cancer incidence at 646.1 patients diagnosed per 100,000 people, whilst London has the lowest rate at 567.6 patients diagnosed per 100,000 people. Other specific cancers whose regional incidence rates varied across England include: oesophageal, stomach, melanoma of the skin and cervical cancer.²

These can be mapped fairly well onto other health indicators such as the number of GPs per 1,000 patients, a general measure of health coverage in an area. While the East Midlands, Yorkshire, and the North East all have worse than the England average cancer mortality rates (with London having the best), they all have fewer GPs per 1,000 patients than the England average (with London having the highest).

Tackling these health inequalities has been a goal of policymakers of all political parties, and features as an explicit goal of the present Government's 'levelling up' agenda. A strategy to deliver this, however, as part of the response to the 2019 Prevention Green Paper, has been delayed due to the pandemic.

At a speech at Policy Exchange, in August 2020, the Secretary of State for Health and Social Care championed the importance of tackling health inequalities in relation to 'levelling up': *"Levelling up health inequalities and preventing ill-health is a vital and a broad agenda... It must be embedded right across government, across the NHS, in primary care, pharmacies, and in the work of every local authority."*

This applies as much to social care as to healthcare, indeed across every part of the system: *"pharmacies, primary care, community care, mental health, hospitals, and social care too."*³

This is reflected in the approaches taken by the governments of Scotland and Wales. Digitalisation is not just a project for NHS England. The SNP manifesto included new commitments to reduce health inequalities and shift the focus of healthcare to prevention.⁴ In Wales the Labour majority administration is in the process of continuing to enhance the implementation of the wellbeing framework, which seeks to ensure public bodies are acting in a way that improves and enhances public health.⁵

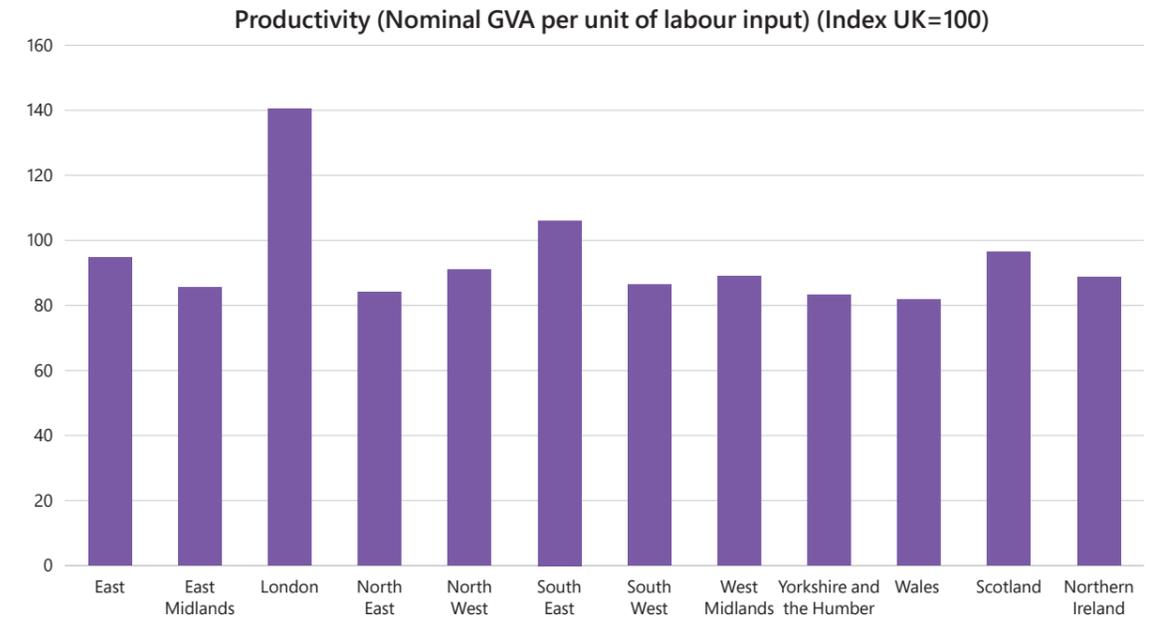
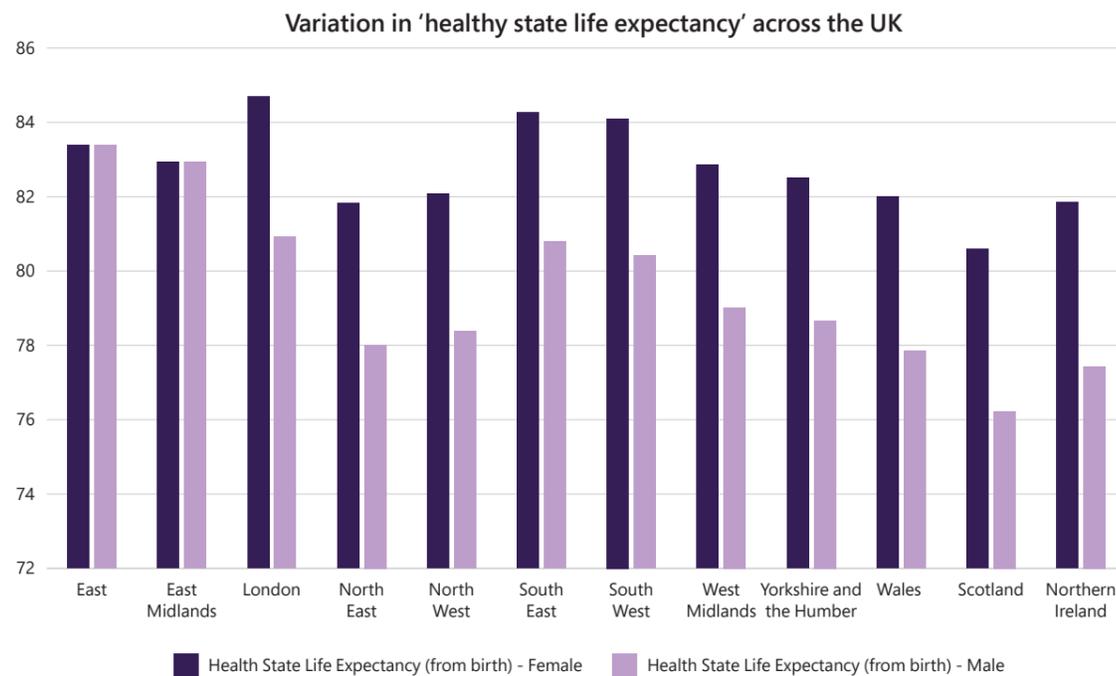
In many ways, the devolved nations and regions are actually leading the charge towards integrated health and social care. Digital Health and Care Wales has recently launched, for example, providing national technology and data services across the country and the Welsh Government has identified the development of digital services as key to delivering transformed health and social care (in many disadvantaged communities).

Among the combined authorities, Greater Manchester's Digital Platform – which joins up data from the NHS, local authorities, and other public bodies – is maximising the use of digital technology within the health and social care ecosystem. These efforts, often in areas of poor health outcomes, have been undertaken in order to improve indicators, reducing undue variation across the country.

The health-economy link

This undue variation in health outcomes has a direct link to variation in economic outcomes – for example in workforce productivity or work incapacity. Below is a chart showing the healthy state life expectancy in different regions of the UK.

In general, life expectancy is highest in those areas of the UK with the highest productivity – London, the South East, and the East of England – and lowest in those areas with the lowest productivity – Wales, the North East, and the North West.⁶



These statistics are mirrored in other health outcomes such as overall life expectancy and proportion of life spent in 'good health'. They are also reflected in the rate of children eligible for free school meals, where 26.3%, or over 1 in 4 pupils, are eligible in the North East and 23.3% in the West Midlands, compared to only 15.1% in the South East where both productivity and life expectancy are among the highest in the country.⁷ In Scotland, where productivity is relatively high, poor health outcomes map onto other economic measures such as low wages.⁸

- 30% of the productivity gap between the North and the rest of England is due to ill-health.
- Health inequalities between the North and the South cost £13 billion a year in lost productivity.
- 1.2m people aged 50-64 are not working for health reasons and health is the principal reason people in that age bracket aren't working.¹⁰

These correlations between health and economic outcomes are increasingly considered to be causal. Ill-health has a direct negative impact on economic outcome. Last year the Northern Health Science Alliance found that 30% of the £4 per person per hour gap in productivity between the North and the rest of England is due to ill-health. In fact, data even suggests that decreasing rates of ill-health by 1.2% and decreasing mortality rates by 0.7% would reduce productivity gap between the North and the rest of England by 10%.⁹

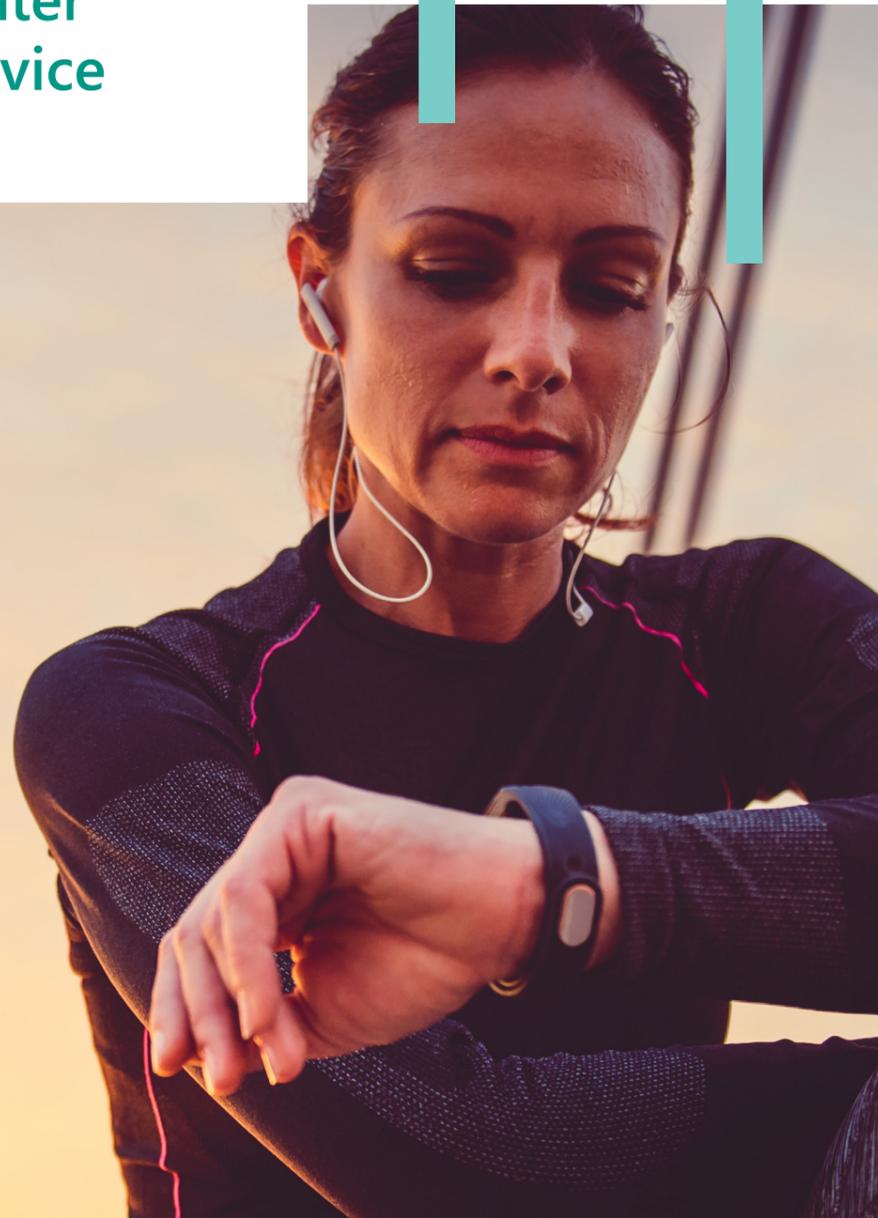
As more data arrives showing a very clear link between poor health outcomes and weaker productivity, policymakers are increasingly looking to tackle regional economic inequalities through the prism of health. The benefits to the national economy are potentially huge: if productivity in the North increased to match the UK average, it would equate to a potential £44 billion real terms gain to UK GDP.¹¹

A report from the All-Party Parliamentary Group for Longevity earlier this year found that:

The time has come to reframe healthcare spending as an enabler of both transformed health and improved economic outcomes in all regions of the UK. The challenge is identifying the strategies and tools that will deliver this.

Can Advances in Health Tech Help Close the Gap?

Despite exciting and dynamic advances, health technology is often framed as something that can reinforce health inequalities rather than help tackle them. This is particularly the case with smartphone technology which enables those with them to access greater healthcare information and advice through their devices.



This is broadly because wider access to health technology is unequal. National Voices, the coalition of 170 patient charities has highlighted this issue consistently:

“ System leaders (must) confront digital exclusion head-on. A significant proportion of the population is digitally excluded. Income, language, literacy, confidence – all play a role. But digital exclusion isn’t equally distributed - those on low incomes, older people, people with disabilities, and specific communities, many of whom are already at particular risk of poor health, are all much more likely to face digital exclusion. They also face the double digital health inequality of not being able to access other essentials online - food, employment, education, social support¹². ”

These patient and public representative groups are not anti-technology in health and social care (both have praised the way technology has enabled people to continue to access care in different ways through Covid); but they want to know that the system caters fairly for all users. There is thus a strong sector view that the NHS and local authorities should be doing more to ensure that digital exclusion does not affect health and social care access and outcomes.

Covid-19 and the use of technology in healthcare

Covid has accelerated the use of digital technology and demonstrated the benefits it can bring. In the Health Foundation’s survey of NHS staff conducted between October and November 2020, 82% of respondents said their organisation had increased its use of technology to some extent during the pandemic and 51% had been personally involved in that increased use of technology. Examples in recent months have included the use of telemedicine to support virtual patient consultations, integrating data to monitor population-level responses to disease, including hotspots of infection, and the use of online platforms such as Microsoft Teams to support and connect health and social care staff.

However, whilst the pandemic has shown the positive benefits of the role of digital technologies in health and social care, it has also shown the difficulty of being able to reach particular groups and communities, particularly those often with poorer health relative to their local populations. The vaccine rollout, while a major success, is demonstrative of this. Public Health England Covid surveillance data demonstrates the difficulties, for example, of Black / African / Caribbean / Black British citizens in taking up the vaccine (see chart below).¹³

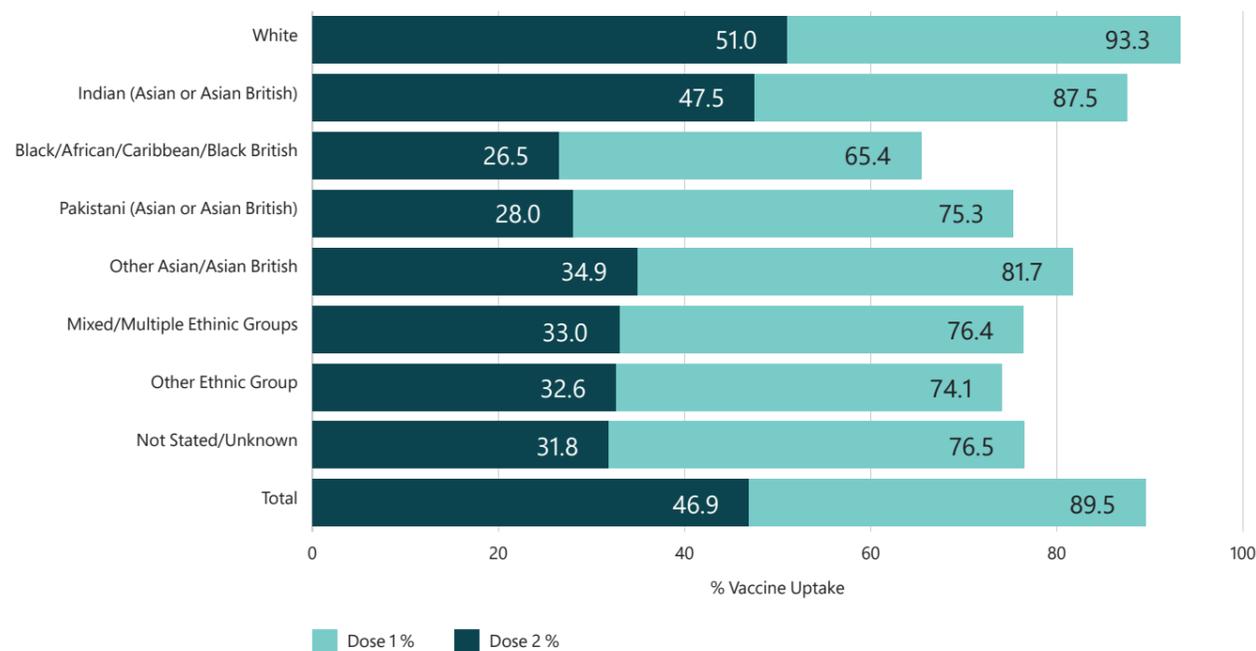
A recent article in the British Medical Journal by Osama et al also noted the difficulties of properly tackling health inequalities through traditional health policy development and that Covid 19 had demonstrated this:

“

One of the core aims of health policy is maximising overall population health while achieving equitable health distributions. Tensions between efficiency and equity often lead to positive and negative impacts of health policies and interventions being distributed unequally within populations, as observed during the Covid-19 response. For public health interventions to be considered effective, and not only efficient, those at highest risk must be targeted, protected, and supported, thereby ensuring that health outcomes are improved.¹⁴

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Cumulative weekly COVID-19 vaccine uptake by ethnicity in England in those aged 50 and over



The better use of healthcare data

Policymakers are increasingly interested in how far maximizing population health can be achieved by collecting better and more regular data on those populations. By ensuring data is collected on the most at-risk groups, or those with the most complex needs, the health and social care system should be better able to respond in times of individual need, in turn reducing variation in ill-health and mortality outcomes across the UK.

This applies as much to social care as to health care. A new report published by Digital Social Care and Skills for Care in June 2021 “shows that there has been a steady increase in the use of all types of digital tools over an 18 month period with a seismic shift in the use of video conferencing software (+65%).” That has raised the confidence and ability of organisations to lead with a digital approach, “20% care organisations now consider themselves to be digitally ‘expert’ as opposed to only 12% in 2019.”¹⁵

Indeed, many of the lessons of wider digital technology use in Covid-19 are now being taken into other areas of health and social care to integrate and improve services. One major area in particular is how to use hyperscale cloud providers, such as Microsoft Azure, to better link together healthcare data to deliver improved population health.

This comes alongside reforms set out in the NHS White Paper *Integration and Innovation: working together to improve health and social care for all* for delivering more integrated care across different regions of England. Outgoing NHS England Chief Executive Simon Stevens, as part of moves towards Integrated Care Systems (ICSs), has set out the need for the NHS to play a more proactive and prevention-focused role in public health in the years ahead.¹⁶ The NHS Long Term Plan, published in January 2019 included commitments to improve the measurement and focus of the health system onto health inequalities¹⁷. In May 2020 the NHS Confederation and NHS England launched a new NHS Race and Health Observatory which is identifying and tackling the specific health challenges facing people from BAME backgrounds.¹⁸

Similarly NHS Scotland’s Covid recovery plan included commitments to ensure that a future policy framework was rooted in improving prevention and public health:

“

This pandemic has highlighted the value of rooting our approach in the National Planning Framework, the importance of preventative practices and public cooperation. We will increase our work on prevention, improving life expectancy and promoting physical and mental health. Focus on putting in place services, environments and wider approaches that support people to live healthy lives.¹⁹

”

The Welsh Covid recovery plans include similar messages and commitments.²⁰ The focus for health services in Northern Ireland is more secondary care and acute focused given the pressures on the hospital system in the country.

The challenge as the NHS emerges from Covid therefore is how to ensure technology is seen as part of tackling health inequality and variation and making the actions of healthcare systems more inclusive rather than exclusive.

04

Case Studies

Improving Health Outcomes with Digital Technology



Recent work from across the digital technology sector is ensuring that the emerging health data ecosystem is primed to tackle some of the most persistent health inequalities across the UK. In order to better understand the necessity of this work, in this next section we look at three case studies based on work Microsoft has undertaken in healthcare.

There are three ways to reduce health inequalities with digital technology: optimising care team performance, enabling personalised care, and using future technologies.

Case study 1

Optimising care team performance in Dorset

A major way to reduce health inequalities is to optimise the performance of care teams. Digital technology can be a driver of this, using data to build cross-system collaboration across ICSs.

Health service collaboration across regions has historically been difficult, with different health and social care organisations working alongside each other in a relatively complex set up. That complexity has created silos in which integration of working between public bodies has not happened.

Fortunately, many areas have begun to shift towards a more integrated model and ICSs have been developing better and more convenient services, invested in keeping people healthy and out of hospital, as well as setting shared priorities for the future.

This integrated approach has a significant digital aspect, which hugely benefitted some areas during the Covid-19 pandemic.

The 'Our Dorset' ICS had been building a mature approach to data into its digital strategy since 2016. By early 2020 it had built a data warehouse on Azure, Microsoft's cloud computing service, to surface insights using Power BI, Microsoft's data visualisation platform — and this was being widely used by care teams.

The benefits were obvious. Multiple datasets from across the county were brought together onto one platform, allowing them to be analysed by in-house teams. Not only did the process save money previously spent on external consultancies but it also allowed Our Dorset ICS to respond quickly during the Covid-19 crisis.

"We got the call a couple of weeks before COVID really started hitting asking whether we could use our linked-in datasets and our linked-in people to build a COVID system report," reports Heather Case, the Intelligent Working Programme Manager at Dorset Intelligence & Insight Service (DiIS). Within two weeks its team had built drillable dashboards that offered insights into risk and

response planning, as well as operating as a case-finding tool for partner clinical organisations. But the data was far more than just a Covid-19 database: "As we collectively started to know more about Coronavirus, we could be a bit more practical about what we were likely to want to know, the groups that would be most impacted, and which of our services and our workforce would be most impacted. We started building something that was far wider than just trying to track the disease." That meant real time updates from across the patient population with no in-built latency while staff compiled spreadsheets and amalgamated disparate datasets.

The crucial fact is that this system is now being turned to post-pandemic population health management. Dorset ISC can now analyse comprehensive patient care records dating back to when they are first created in the county. This represents a huge wealth of data about people's histories, how they've been treated and how they've responded.

Over time, this data could help to close the health outcome gap between the most vulnerable, complex patients and the rest. The integration aspect continues as well, with data being shared with the police and fire service, all supplemented by local authority information and detail on mental health. All of this is helping to optimise care team performance across Dorset.

Case study 2

Enabling personalised care in Greater Glasgow and Clyde

Using the example above, it is easy to see how changes in the use of data can benefit care teams. More data, more accessibly collated, with the benefit of real time updates has the potential to make the health service far more responsive and efficient.

But the purpose of benefitting care teams is, ultimately, to benefit patients. Reducing health inequalities is about making real changes to treatments on the basis of more information.

NHS Greater Glasgow and Clyde is now using cutting-edge technology to remotely monitor and treat people with a life-threatening lung condition in their own home.

Of all UK deaths from lung diseases, Chronic Obstructive Pulmonary Disease (COPD) makes up over a quarter. It can be a debilitating condition, usually worsening over time without treatment, and is the second most common cause of emergency hospital admissions.

In 2019, two NHS consultants in Glasgow tried to improve these figures. Glasgow has some of the worst health outcomes in all of the UK — initiatives which benefit patients in the city have the potential to reduce health inequalities all over the country.

By using wearable devices and Microsoft's Azure cloud platform to remotely monitor COPD patients' breathing machines in their homes and vary their treatment accordingly, NHS Greater Glasgow and Clyde hoped to avoid hospital admissions by catching warning signs early. That not only saves on the £6,000 cost of a hospital admission but it improves the wellbeing of patients more generally, managing the condition before it progresses so far that an emergency admission is required.



The medical team partnered with Storm ID, a Microsoft partner that specialises in developing new digitally enabled care models. Alongside them, the care team was able to see real time physiology data produced by a patient's wearable device and to communicate with them through a cloud-based platform.

There is an empowerment aspect to this too, which ties in with poor health outcomes across the country. By giving patients the tools to start to self-manage their own care, the NHS hoped to give back a sense of agency to patients for whom an urgent hospital admission was a constant and unpredictable possibility.

The trial, originally conducted with 400 patients, was a success. Hospital admissions were reduced significantly over the course of the year. That success means similar programmes will now be rolled out for other illnesses and conditions, including frailty and diabetes. By tracking patients using wearable tech and feeding this data back into the healthcare system in real time, some of the areas with the worst health outcomes are now beginning to close the gaps; empowering the most at-risk groups to manage their care effectively before hospital admission is even required.

Case study 3

The future of healthcare

Technology can be used during times of increased strain, such as the recent pandemic, to ensure vital and routine health procedures are still provided to the public. Advanced technology, such as Microsoft's HoloLens can help in facilitating remote evaluations and treatment while health care professionals keep a safe distance.

Protecting staff and patients from transmissible diseases, whilst also continuing normal healthcare procedures has been a difficult balance, especially when there has been a variation in which areas are most high-risk, in turn impacting their ability to treat patients as quickly and effectively as possible.

At the height of the pandemic, Dr. James Kinross, a surgeon at Imperial College, noticed 29 people were working close together during a trauma call. He realised that the hospital needed to change its way of working to manage the increased pressure on hospitals and high transmission rates in wards.

Imperial College Healthcare began using Microsoft's HoloLens to protect healthcare professionals providing critical care to patients. The HoloLens with Dynamics 365 remote assist, a mixed-reality remote support tool, uses Microsoft Teams to send a live video-feed to a nearby computer screen, allowing healthcare teams to interact with patients virtually.

Unlike virtual reality, which is completely computer generated, HoloLens allows users to place 3D digital models in the room alongside them and interact with them using gestures, gaze and voice. Using Dynamics 365, doctors wearing HoloLens are able to:

- Hold Teams video calls with colleagues and experts anywhere in the world, enabling virtual consultations
- Receive advice whilst also interacting with the patient at the same time
- Superimpose 3D views of MRI images and CT scans
- View medical notes and X-rays through the HoloLens glasses during patient consultations

“Imperial College Healthcare began using Microsoft's HoloLens to protect healthcare professionals providing critical care to patients.”

The recent pandemic has shown high-tech innovation is not just optional, but essential during health crises. Imperial College Healthcare NHS Trust, which includes Charing Cross Hospital, Hammersmith Hospital and St Mary's Hospital, advocated for the tool, stating that it led to an 83% cut in the amount of time staff spent in high-risk areas. It is also significantly reduced the amount of personal protective equipment (PPE) being used, as only the doctor wearing the headset must dress in PPE. Early figures show using HoloLens is saving up to 700 items of PPE per ward, per week.

Covid-19 has changed how we approach healthcare forever, meaning tools such as HoloLens will be useful and necessary for decades to come. Dr. Kinross remarked, “We're now looking into other areas where we can use HoloLens because it is improving healthcare without removing the human; you still have a doctor next to your bed, treating you. Patients like it, too. They are interested in this new piece of technology that's helping them.”

Due to the technology's multiuse capabilities, healthcare professionals can utilise its functions for various health services and procedures. HoloLens can be used in departments such as intensive care, trauma and in surgery to overlay CT scans onto patients during operations, improving surgical accuracy and reducing radiation exposure. HoloLens can also be used for educational purposes, teaching medical student's surgical procedures virtually, and creating immersive patient experiences for students to use. It's clear that Microsoft's technology can be used in areas where hospitals are the most understaffed, and with patients who are incredibly vulnerable or elderly. Lessons learnt from the recent pandemic alongside the versatility of the technology used, is helping medical professionals reimagine the future of healthcare.

Implications for policymakers

Integration and Partnership

Poor health outcomes do not have a single cause and just as important as integrating services within the NHS is forging partnerships with organisations working outside the health and social care system, such as employment support or housing associations. By working in partnership with these bodies, health and social care systems are increasingly building up pictures of how to help patients with complex needs.

As such, technology has genuinely transformative power to help – by being the infrastructure around which disparate services and organisations can support each other’s long-term objectives. Indeed, this potential is already being recognised. The NHS Long Term Plan, for example, lists a number of benefits to introducing digital health technology and investing further in digital inclusion, including “improved self-management of long-term conditions” and “costs saved through accessing services digitally.” What it also allows for, however, is the “more appropriate use of services, including primary and urgent care.”²¹ By collating better data on patients, in turn enabling early detection and prevention, it is hoped that the stubborn link between longer term conditions and increased hospital admissions (disproportionately affecting people living in more economically disadvantaged areas) can be significantly disrupted.

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Recommendations

There are several areas where government could make more or better use of technology specifically to reduce undue variation in health. We would identify five broad areas for priority attention, which together provide a strategic framework for improvement:

System intelligence – improved system intelligence and information would enable health and social care managers, and local government leaders, to better monitor population health in their communities and design better health interventions.

System and organisational partnerships – health and social care organisations both within and outside the NHS should be working together in partnership at a system level. This would help deliver much better preventative care.

Data sharing – we need more data sharing, more fluidly, across integrated NHS services and also with external partner organisations, including local government, schools etc, in order to better manage overall population health.

Organisational working – supporting staff in individual organisations involved in the provision of health and social care would improve the delivery of services for patients: supporting and connecting staff, and improving digital skills and confidence, should be a big priority.

Supporting outreach – technology should be playing a more central role in outreach and engagement with harder-to-reach groups who are more likely to have poorer health outcomes. This should be allied to a digital inclusion agenda.

We see these five areas as priorities for a technology-led strategy to reduce undue variation and raise outcomes. They provide a framework with which to design a strategy for driving specific interventions that could help close health inequalities.

Conclusion and areas for further study

Patterns of poor health and life expectancy across the regions map very closely to indices of regional economic deprivation. We know the two fields both cause and exacerbate one another, but there is always a need for more research on specific causes – and crucially, which specific areas are most amenable to technological interventions.

There is also a need to quantify the impacts in order to better justify additional resource being put to specific forms of health technology. For example, in the outreach priority above, we need to understand how far language can be a barrier to accessing NHS services; and how health and medical-related language apps or devices could help more patients come forward, while helping staff understand the issues. There is a huge range of potential examples.

The other key aspect is to assess costs and benefits associated with this. Making even modest improvements in undue variation in health outcomes would not only improve millions of lives, the additional economic prize is likely to be worth billions each year added to the UK's economy.

The key in all of this is to identify specifically how far technology can be used as a vehicle for closing variation. This should be the focus of substantial new work by government, in partnership with industry and patient groups.

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