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Towards affordable healthcare: Why effective innovation is key

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About SOS 2020

SOS 2020 was established by ILC-UK with the aim to raise awareness of the need to adapt our economy and society to the big strategic challenges posed by an ageing population, and will outline the specific policy measures needed to achieve this goal. It will illuminate the issues that face us and develop fully considered and costed solutions that will act as a “call to action” to policy-makers and politicians.

SOS began with two projects: Health Sustainability – which focusses on fostering innovation in health and social care systems and Financial Sustainability - which focusses on how we can deliver sustainable yet adequate retirement incomes.

This first report in SOS – Health sourced a bank of robust innovative global case studies, identified significant trends in the global health environment, and assessed the key influencing factors in the success and replicability of these health innovations.

By identifying sustainable innovations in health and care from across the world and then applying these in different country settings, we offered robust and verifiable models that improved performance (better health outcomes and reduced costs) at a time of growing pressure.

This second report in the SOS health series draws on the learning and some of the innovations from the last report. We explore the potential for innovation application and diffusion in health care within the UK and critically how the ‘right type’ of innovation could make health care better and cheaper, essentially doing ‘more with less’.

About the ILC-UK

The International Longevity Centre - UK (ILC-UK) is an independent, non-partisan think tank dedicated to addressing issues of longevity, ageing and population change. It develops ideas, undertakes research and creates a forum for debate.

The ILC-UK is a registered charity (no.1080496) incorporated with limited liability in England and Wales (company no. 3798902).

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Introduction

Historically the UK has been the driving force behind many significant health advances from the invention of the small pox vaccine to the discovery of the double helix structure of DNA. Today the UK is considered a world leader in life sciences (pharmaceuticals, medical biotechnology and medical technology) second only to the US, boasts a fully integrated health system and is an early adopter of transformational technologies in medicine principally in informatics and genomics. However, while the UK may rank highly for innovation per se, and does manage to foster some successful innovation, the NHS has a less positive record of adopting innovation at pace and scale. Indeed, only a tiny portion of the healthcare budget is spent on diffusing new ideas and performance and yet the potential is huge.

In this report, we look at one of the crucial pieces of the jigsaw – healthcare innovation. As one of the largest components of age-related public spending, healthcare is at the forefront of the challenge of ageing. While ensuring that we have a good healthcare system that requires continual improvements in the quality of services for users, it also requires improvements in the efficiency of the system to ensure its long run survival. In this regard, this report demonstrates why supporting long run productivity growth in healthcare is likely to be one, if not the, most important ingredient in ensuring a sustainable older society. And we will demonstrate how, in the face of the challenge of ageing, the health service will need to harness transformative innovation in order to put us on an affordable footing. The status quo will simply not do.

We will explore the potential for innovation application and diffusion in health care within the UK and critically how the ‘right type’ of innovation could make health care better and cheaper, essentially doing “more with less”. Alongside the seismic challenge facing the NHS by 2020, planned efficiency savings are not enough and therefore with such a foreboding outlook the importance of developing and disseminating innovative solutions has never been greater. In this report, we will measure the potential productivity gains to the NHS by theoretically applying at the national level some of the most promising healthcare innovations from the UK and Internationally. Now is the time to promote the roll out across the UK of some of the leading global and indeed home grown innovations, as Simon Stevens, the then incoming Chief Executive of NHS England, declared in 2014 to an audience of international health experts and business leaders: “*The future is already here, just unevenly distributed*”¹.

About this report

This report is the second in a major programme of work looking into how we can afford a sustainable older society.

In our first of the series - *Creating a Sustainable 21st Century Healthcare System* – we explored innovations around the world and the UK. From India to New Zealand, and the USA to Finland we identified 19 of the most original innovations covering a diverse array of age-related health challenges. This report builds on this earlier effort, exploring how specific innovations could be applied to the UK and what cost savings this could yield. In turn, such analysis leads to recommendations on how we can foster a public policy environment that is conducive to good innovation.

To meet these aims, this report consists of seven chapters:

Chapter 1 outlines the productivity challenge facing the NHS and the current public policy environment.

Chapter 2 uses economic data to explore the critical drivers of rising healthcare expenditure in the UK as well as other developed countries and discusses the role of health innovation and technology in this context.

Chapter 3 assesses where innovations could make the biggest impact – both in terms of supporting the quality of healthcare as well as the efficiency with which healthcare is delivered.

Chapter 4 first develops our innovation criteria before analysing the potential applicability of specific innovations to the UK health system including their potential cost savings.

¹ Lord Ara Darzi, (2014), The NHS does not use innovation effectively, The Guardian, accessed at: www.theguardian.com/healthcare-network/2014/mar/03/nhs-does-not-use-innovation-effectively

Chapter 5 develops a healthcare innovation and dissemination index against which to assess and benchmark the UK's current performance.

Chapter 6 outlines a number of different scenarios to illustrate how different NHS productivity paths could significantly impact on overall government finances. We conclude by offering a series of thoughts and recommendations for policymakers and industry.

Chapter 7 conclusions and recommendations.

The Challenge

The NHS is facing unprecedented uncertainty, trying to reconcile longer life expectancy, a number of significant health challenges in obesity, diabetes and dementia and rising consumer expectations and demands, the need to deliver improved productivity and efficiency has never been greater. Furthermore, the financial pressures have never been so acute, with the health system buckling under huge financial and operational pressures. At the end of the financial year 2015/2016 NHS Trusts (predominantly hospitals) were £2.45 billion in the red with 65% of providers in deficit, though some such as Chris Hopson, the Chief Executive of NHS Providers argued the underlying deficit was closer to £3 billion². On the back of the first quarter's (2015/16) financial figures, financial regulator Monitor felt compelled to label it as the “worst” financial position facing providers for a generation³. Inevitably as a result there is a struggle to meet existing services and standards of care, with regard to waiting times for example. The growing gap in finances does not just pertain to hospitals, with general practice, mental health and community services all facing huge pressures, amplified by cuts to social care and public health. Furthermore, how the NHS will develop new and better models of care and pay for new commitments such as the seven day NHS looks even more fragile.

Against this backdrop it is critical that the NHS maximises its productivity, while ensuring that the quality of services at the very least remains constant or improves. The NHS Five Year Forward View, published in October 2014, set out proposed changes to the provision of healthcare services to enable the NHS to respond to increasing patient demand and funding constraints. The Five Year Forward View estimated there will be a £30 billion gap between resources and patient needs by 2020–21. In November 2015, the Government committed to increasing funding for the NHS by £8.4 billion by 2020, with £3.8 billion of this given to the NHS in 2016–17. This extra funding leaves an estimated £22 billion gap between resources and patient needs by 2020–21⁴. Simon Stevens, the Chief Executive of NHS England, has committed the NHS to achieving £22bn efficiency savings through productivity gains of 2% or 3% a year between now and 2020, as outlined in the Five Year Forward View⁵. However, ILC-UK research has shown this is a hugely ambitious aim given overall improvements in NHS productivity have been modest over the past 30–40 years, as productivity in the health sector only rose by around 1% per annum on average between 1979 and 2010⁶.

Thus far the national strategy has focussed on a combination of policy levers that reduce cost and encourage ‘transformational change’ to address the funding gap. As highlighted in the King’s Fund Report ‘*The NHS Productivity Challenge*’ (2014)⁷, Sir David Nicholson in his evidence to the Public Accounts Committee in 2010 set out how the NHS planned to tackle the unprecedented productivity task. In broad terms, efforts to close the gap would focus on generating around 40% of savings at the local level through ‘traditional efficiency’ gains and the Payments by Results system, 40% from ‘central initiatives’ thereby cutting central budgets such as restricting NHS staff pay and a rather nebulous 20% which focussed on new ways of providing and delivering services, for example reducing length of hospital stays and centralising services where necessary. While it is beyond the scope of this paper to review the efficacy or impact of this approach, suffice to say such actions did go some way to meeting the productivity challenge, particularly with regard to reducing costs on staff (A reduction of the overall NHS pay bill in England was nearly £1.5 billion over the two years to 2012/13⁸) and reductions in nationally administered budgets.

² Bob Alexander, Elizabeth O’Mahony, (2016), *Performance of the NHS provider sector: year ended 31 March 2016*, NHS Improvement, Accessed at: https://improvement.nhs.uk/uploads/documents/BM1653_Q4_sector_performance_report.pdf

³ Nuffield Trust, (2016), *The state of NHS finances and the £22bn efficiency challenge*, Accessed at: <http://www.nuffieldtrust.org.uk/node/4388>

⁴ C&AG’s Report, *Sustainability and financial performance of acute hospital trusts*, Session 2015–16, HC 611, 16 December 2015

⁵ NHS England, (2014), *The five year forward view*, Accessed at: <https://www.england.nhs.uk/wp-content/uploads/2014/10/5yfv-web.pdf>

⁶ Office for Budget Responsibility, (2015), *Fiscal Sustainability Report*, Accessed at: http://budgetresponsibility.org.uk/docs/dlm_uploads/49753_OBR-Fiscal-Report-Web-Accessible.pdf

⁷ John Appleby, (2014), *The NHS Productivity Challenge – Experience from the Front Line*, The Kings Fund, Accessed at: http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/the-nhs-productivity-challenge-kingsfund-may14.pdf

⁸ John Appleby, (2014), *The NHS Productivity Challenge – Experience from the Front Line*, The Kings Fund, Accessed at: http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/the-nhs-productivity-challenge-kingsfund-may14.pdf

The Potential for Innovation to meet this challenge

The potential for improved application and diffusion of innovations to meet the NHS productivity gap has already been widely recognised. Research and innovation in the NHS are critical to addressing the complex and difficult decisions facing the NHS. While it has been argued the NHS has a strong track record of innovations that have changed the face of medicine and healthcare globally, the NHS has a less positive record of adopting and diffusing innovations and best practice at pace and scale⁹. The UK may have some of the leading clinical, research, academic and industry expertise, but there is potentially a schism between the ability to innovate within the UK and turn these innovations into improved health and social care outcomes for the populace and generate wealth from them.

The UK is arguably eager to claim its place among the healthcare innovation elites, for example Jeremy Hunt launched the London Centre of Innovation Excellence in 2013¹⁰ focusing on technologies in key areas such as dementia, cancer, immunology and biomarkers for disease. The UK also has a strong and productive £56 billion life science sector, supporting breakthroughs in science and economic growth and previous Governments have been keen to position the UK at the forefront of the global race for new business and hi-tech industry. Advances in medical technologies in particular offer the potential to improve the productivity and efficiency of our healthcare system and yet development does not always come quickly or cheaply. Indeed, not all investment in innovation is necessarily good for sustainability. Investment in new technologies, as we will discuss in the next chapter, has actually helped explain some of the excess growth in health expenditure experienced by many countries in recent decades. Smart innovation will therefore depend on being able to develop and diffuse innovations where there is strong evidence that implementation will improve the quality of healthcare without raising costs, or alternatively, by delivering the same health outcomes at a lower cost. This is not easy. As we have seen, successful new treatments can raise the demand for health services and therefore lead to increased costs of provision.

Furthermore, while we may rank highly for invention, our ability to apply and diffuse innovation does not always score so well. As Sir Bruce Keogh, the NHS Medical Director, himself acknowledged: “*We don’t always maximise the opportunity for exploitation (innovation) and not infrequently I see innovations that are taken up in other countries have been developed here*”¹¹.

⁹ NHS Confederation, (2015), *Cracking the innovation nut*, Briefing 285 June 2015, Accessed at: <http://imperialcollegehealthpartners.com/wp-content/uploads/2015/06/Cracking-the-innovation-nut-briefing-5-June-2015.pdf>

¹⁰ Department of Health and the RT Hon Jeremy Hunt MP, (2013), *London takes its place among healthcare innovation elite cities of the world*, Accessed at: <https://www.gov.uk/government/news/london-takes-its-place-among-healthcare-innovation-elite-cities-of-the-world>

¹¹ Becky Slack, (2015), *Why the UK needs increased investment in healthcare tech*, The New Statesmen, Accessed at: <http://www.newstatesman.com/politics/health/2015/12/why-uk-needs-increased-investment-healthcare-tech>

Understanding and containing healthcare costs: The economic evidence

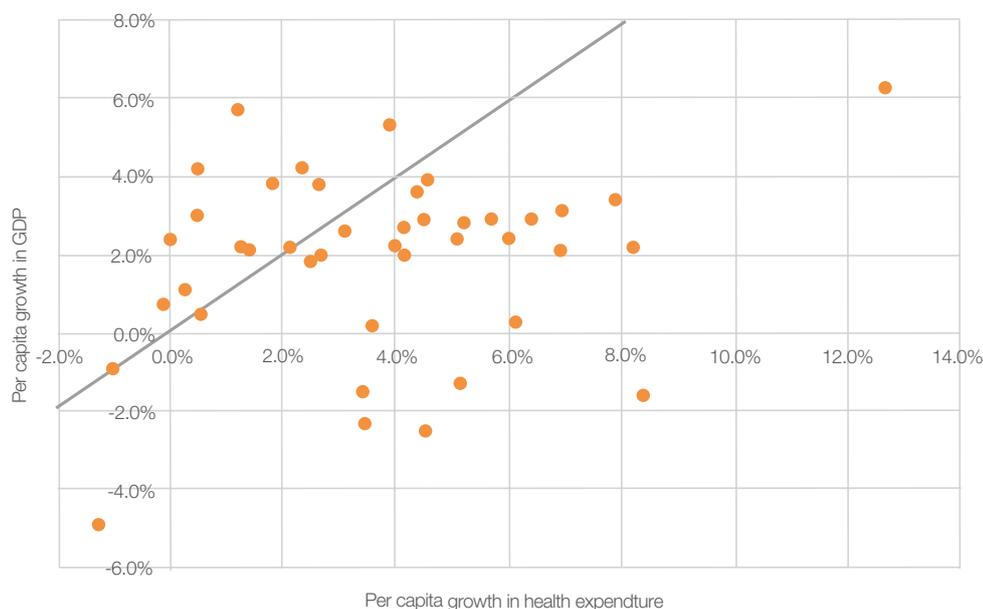
About this chapter

In this chapter, we trace UK healthcare expenditure and its determinants, drawing from an array of UK and international literature and data sources. In this context, the chapter examines the relative importance of demographic change, economic growth and other factors – such as technological change, relative prices and policies in institutions in driving up costs. Our key finding is that technological change has been an important factor in driving up healthcare costs in the UK as it has in many other developed countries. Therefore, in order to contain future rises in healthcare costs, we need to get better at identifying and supporting those innovations and technological changes that deliver better outcomes at the same or at a reduced cost. Otherwise healthcare costs will continue to rise faster than GDP, putting sustained pressure on public finances.

Historic health spending

Health expenditure is by far the largest component of UK Government spending accounting for 7.3% of GDP - £135bn - in 2014/15¹². Over the past 30 years or so, health spending in the UK (as well as in other countries) has risen much faster than economic output. Between 1971 to 2012, average health spending per person grew by around 3.7% which was significantly above growth in GDP per person over the same period (just under 2%). All the dots on the chart below represent different years, those dots below the diagonal line represent years when growth in health spending outstripped economic growth per person. Rather tellingly, there are far more dots below the line than above it.

Figure 1: Growth of real health spending and GDP per capita (1971-2012)

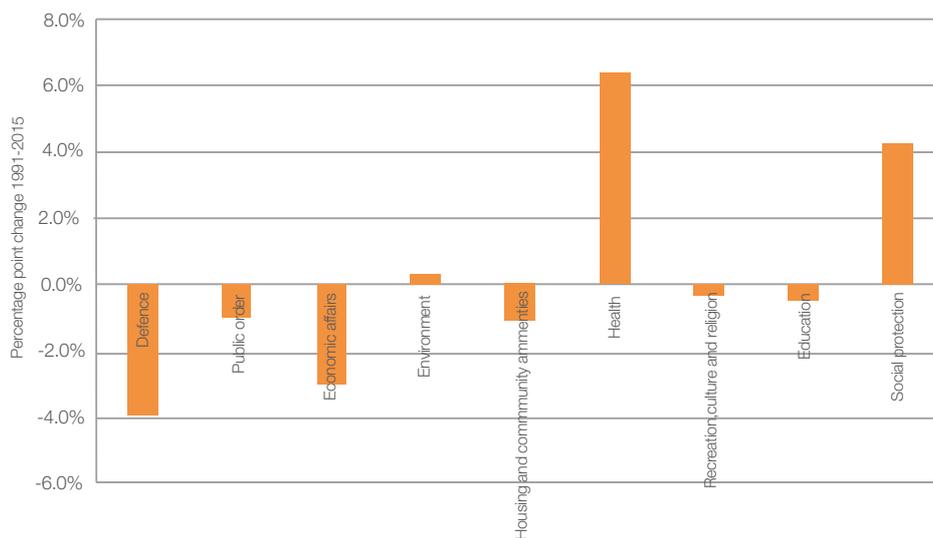


Source: ILC-UK calculations based on OECD data

Growth in health spending has not just outstripped economic growth, but also growth in other areas of public spending. As a result, over the last 25 years, health has accounted for an increasingly large proportion of overall government spending. The chart below shows that between 1991 and 2014-15 health increased its share of total public spending by over 6 percentage points.

¹²John Appleby, *How does NHS spending compare with health spending internationally?*, (2016), Accessed at: <http://www.kingsfund.org.uk/blog/2016/01/how-does-nhs-spending-compare-health-spending-internationally>

Figure 2: Change in share of total spending by function 1991-2015



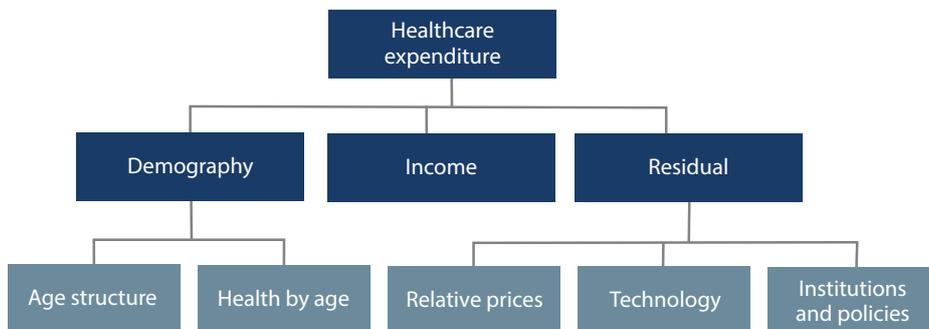
Source: ILC-UK calculations based on HM Treasury Public Expenditure Statistical Analyses 2015

Why has health spending risen so fast?

The economic literature on drivers of spending growth in health identifies three key forces; demographic change, income growth and a residual which includes investment in technology, relative prices and changes in policies and institutions. We discuss each in turn. Most of the evidence in this area is based on cross-country analysis of healthcare costs. Since reliable macroeconomic data on healthcare costs have only been available since the post-war period, most researchers include multiple countries in their analysis in order to boost their sample sizes and therefore the credibility of their findings. In this regard, and consistent with recent work from the Office for Budget Responsibility (OBR), the following discussion of the determinants of rising healthcare costs refers to international evidence and data.

The determinants of public health expenditure

Figure 3: Determinants Public health care expenditure

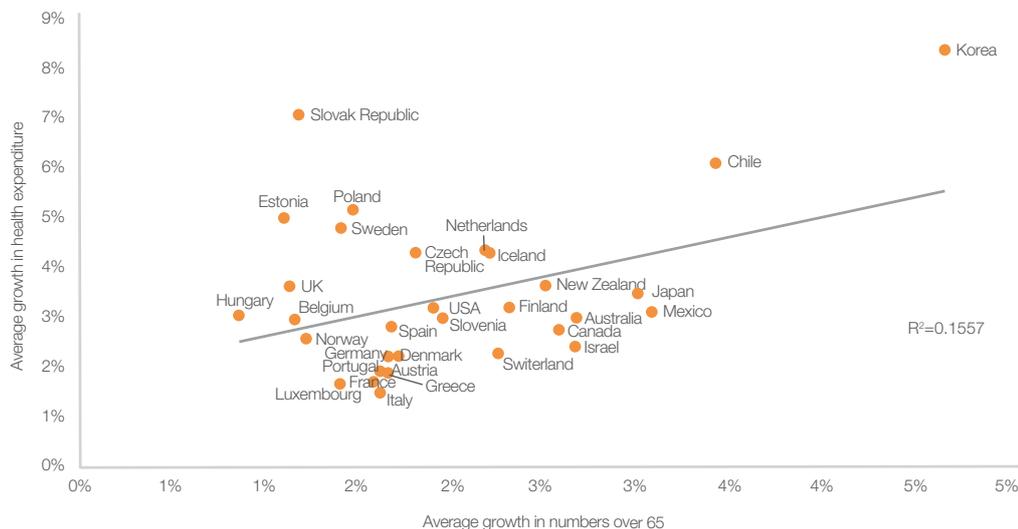


Source: OECD 2013

Demography

As people age, there is likely to be increased demand for healthcare so the greater the number of older people in a society, the greater the aggregate costs of providing a health service. The relationship between increased numbers of older people and spending on health services can be shown on a simple scatterplot of OECD countries. The relationship is relatively weak, but, on balance, countries with greater growth in numbers over the age of 65, spend more on health per person than countries who experience lower growth in the numbers of people over the age of 65.

Figure 4: Annual growth in numbers aged over 65 and health expenditure (average 2000-2012)



Source: ILC-UK calculations based on OECD data

Previous studies have noted that the effect of demography on health spending has been relatively weak. This may change over future decades as a result of population ageing and number of deaths. A report for the Kings Fund notes that “the exact impact of the ageing of populations is complicated, but tends to be less important than the health care costs associated with death”. According to their analysis, rising life expectancy simply “delays the time to increased demand and hence costs for both health and social care”¹³. Since the 1990s, the annual number of deaths in the UK has been in decline but we are at a tipping point. Driven by the ageing of the baby boomer generation, the number of deaths could increase by up to 20% over the next two decades if we hold mortality rates by age constant¹⁴. This suggests that demography could play a larger role in driving up healthcare costs in the future.

Income growth

A second key factor in explaining rising health expenditure is income growth. If we assume healthcare to be a “normal good” – i.e. a good people want more of as their incomes rise - then a 1% increase in income will lead to a 1% rise in demand for healthcare and therefore a 1% rise in expenditure to provide for the increased demand¹⁵. The below chart shows that countries that have experienced relatively high income growth over the last decade also seem to have experienced relatively high growth in health spending over the same period. Much of the literature confirms this, and, with a few notable exceptions, assumes a perfectly linear relationship between income growth and health spending growth.

Since income growth can explain around 2/3rds of the difference in health spending growth across OECD countries, and population ageing has had a somewhat weak to negligible effect on spending, what accounts for the additional 1/3rd¹⁶ of the difference in spending growth across countries? Within the literature this is what is known as the “residual” which literally means the quantity left over.

Explaining the residual

Technological change and relative prices

There are a number of explanations for the residual but many centre on the role of technology in driving up costs. Many studies argue that technological change accounts for the biggest part of expenditure growth¹⁷. In the health sector, advancements in treatment practices, the invention of new drugs and developments in equipment and surgical techniques have “not only expanded the range and scope of what is possible in health care, but have also led to higher spending”¹⁸. In part, this is because new

¹³ John Appleby, (2013), *Spending on health and social care over the next 50 years Why think long term?* The Kings Fund Accessed at: http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/Spending%20on%20health%20...%2050%20years%20low%20res%20for%20web.pdf

¹⁴ The International Longevity Centre UK, (2015), *The Funeral Time Bomb*, http://www.ilcuk.org.uk/images/uploads/publication-pdfs/Funeral_Timebomb_UPDATED_1.pdf

¹⁵ There are many goods and services which are not normal. Inferior good are ones where consumer demand falls as incomes rise. Whereas superior goods take up a larger proportion of consumption as incomes rise.

¹⁶ In a regression analysis, population change and income growth accounted for 74% of the variation in health spend across OECD countries between 2000-2012. This still leaves 26% unaccounted for.

¹⁷ Almost all studies have focussed on developed countries – typically OECD.

¹⁸ John Appleby, (2013), *Spending on health and social care over the next 50 years Why think long term?* http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/Spending%20on%20health%20...%2050%20years%20low%20res%20for%20web.pdf

treatments and technologies have often increased demand for health services without reducing the unit costs of their delivery¹⁹. This is not to say that new technologies will always have this impact, but that historically speaking new innovations have driven up the cost of healthcare.

Relative prices are also seen as an important factor in explaining the residual. Most famously Baumol's "cost disease" has been used to explain rising costs in healthcare expenditure. It is the idea that there can be a general rise in salaries and other costs without any increase in labour productivity because there are rising salaries in other jobs outside of the health sector. Therefore, in order to maintain and attract workers, salaries will need to rise in the health sector despite stagnant productivity growth. Other industries which play a peripheral role in the provision of healthcare have also risen, again leading to cost increases that must be borne by the health sector.

Policies and institutions

The impact of policies and institutions is also captured in the residual. There are many different types of policies or institutional arrangements that can help to reduce costs or that could lead to rising costs. For example, on the supply side, provider payment methods, budget caps and the degree of provider competition are three areas that could affect the costs of healthcare. On the demand side, the extent to which there is cost sharing between the individual and the health service, the degree of gatekeeping to prevent unnecessary hospital admissions and the definition of what health problems are covered by the State are all likely to have an impact on costs. There are also general public management, financing and coordination arrangements that may help raise, or lower costs. These might include the degree of centralisation of health system functions, controls on pharmaceutical prices and profits or measures for health technology assessments.

How big is the residual and its component parts?

In 2006, the OECD first attempted to estimate the contribution of demographic change, income growth and the residual in determining growth in health spending. They found that on average, across OECD countries, health spending had risen by an average of 3.6% per annum since the early 1980s, of which 2.3% was accounted for by income growth, 0.3% by demographic change and 1% by the residual. The UK was in line with the OECD average (see table over page for breakdown by country).

¹⁹ Office for Budget Responsibility, (2015), *Fiscal sustainability report*, <http://budgetresponsibility.org.uk/fsr/fiscal-sustainability-report-june-2015/>

Table 1: Decomposing growth in public health spending¹ 1981-2002²

Average annual percent change				
	Health spending	Age effect	Income effect ³	Residual
Australia (1981-2001)	3.6	0.4	1.8	1.4
Austria	2.2	0.1	2.1	0.0
Belgium (1995-2002)	2.9	0.4	1.7	0.6
Canada	2.6	0.4	1.7	0.6
Czech Republic (1993-2002)	2.7	0.4	2.8	-0.4
Denmark	1.3	0.1	1.7	-0.5
Finland	2.6	0.3	2.1	0.2
France	2.8	0.2	1.6	1.0
Germany	2.2	0.2	1.2	1.0
Greece (1987-2002)	3.4	0.4	1.3	0.8
Hungary (1991-2002)	1.5	0.3	2.8	-1.5
Iceland	3.5	0.1	1.5	1.9
Ireland	3.9	0.1	4.9	-1.0
Italy (1998-2002)	2.1	0.7	1.7	-0.1
Japan (1981-2001)	3.8	0.4	2.2	1.1
Korea (1982-2002)	10.1	1.4	6.1	2.4
Luxembourg	3.8	0.0	3.9	-0.1
Mexico (1990-2002)	4.5	0.7	0.5	2.4
Netherlands	2.6	0.3	1.9	0.3
New Zealand	2.7	0.2	1.5	1.0
Norway	4.0	0.1	2.5	1.5
Poland (1990-2002)	3.1	0.5	3.2	-0.6
Portugal	5.9	0.4	2.6	2.8
Slovak Republic (1997-2002)	2.1	0.5	4.2	-1.5
Spain	3.4	0.3	2.3	0.8
Sweden	1.5	0.1	1.7	-0.4
Switzerland (1985-2002)	3.8	0.2	0.8	2.9
Turkey (1984-2002)	11.0	0.3	2.3	8.3
United Kingdom	3.4	0.2	2.3	1.0
United States	4.7	0.1	2.0	2.6
Average	3.6	0.3	2.3	1.0

1. Total public health spending per capita.

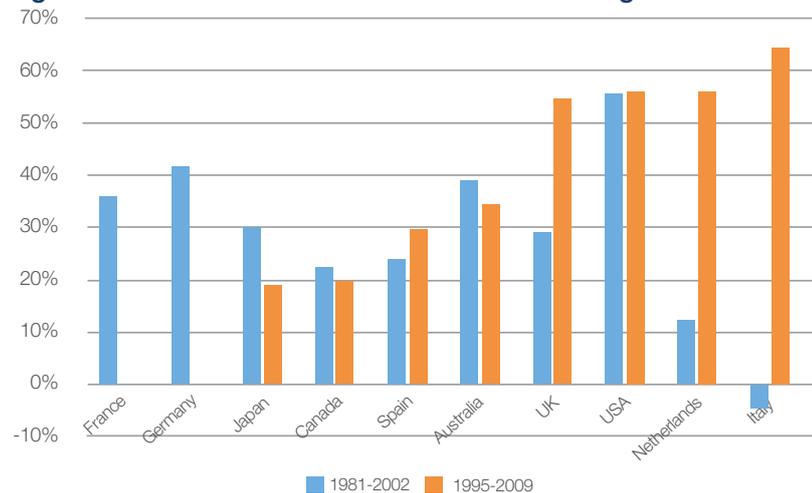
2. Or the longest overlapping period available.

3. Assuming an income elasticity of health expenditure equal to 1.

But the results are highly sensitive to the time period over which the analysis is undertaken. A subsequent study in 2013 repeated the analysis but over the period 1995-2009. During this period, the OECD average residual was much higher – 1.5% as opposed to 1% during 1981-2002. Indeed, during this later period, only 3 out of 41 OECD countries experienced growth in health spending that was simply the result of demographic change and income growth (and therefore no residual cost growth). The residual for the UK was also much higher – 2.5% as opposed to 1% during 1981-2002²⁰. In fact, during this period, rising residual costs in the UK accounted for over half of health spending growth. The UK was not alone in this regard, rising residual costs in the US, Netherlands and Italy also accounted for very large proportions of the overall rise in health expenditure during this period.

²⁰ OECD, (2013), *Public spending on health and long-term care: a new set of projections*, Accessed at: <https://www.oecd.org/eco/growth/Health%20FINAL.pdf>

Figure 5: Residual as % of total healthcare cost growth



Source: OECD (2006 and 2013) and author's calculations.

Notes: The chart reports the results where income elasticity equals 1 in both the 2006 and 2013 studies.

Discussion: how can we contain healthcare costs?

This chapter has shown that health expenditure, which is the largest component of government spending, has generally risen faster than the rate of economic growth. For the most part, this has been driven by growth in residual healthcare costs which are, in turn, linked to the development of new technologies, relative prices and changes to policies and institutions within different health systems. This picture appears to be particularly relevant for the UK, given that rising residual costs explain over 50% of the increase in health expenditure between 1995 and 2009. In this context, what if anything can UK policymakers do to ensure the future sustainability of the health system while continuing to drive up wellbeing?

To what extent is technology to blame for large residual costs?

A 2013 study found that technology and relative prices accounted for around 19% of health spending growth across OECD countries, while other factors including policies and institutions accounted for approximately 21%²¹. Another study from 2009, concluded that medical technology has accounted for between 27-48% of health spending growth across 23 countries since the 1960s²². As the authors of the study note:

“Changing medical technology is one of the few factors that can potentially explain persistently high growth in medical spending over time and across many countries. Indeed, the dominant role of technology as a driver of spending has become a truism in health economics.”

However, it must be stressed that in trying to isolate the impact of technological change, most studies do not actually include specific measures of health technology within their modelling. Rather they estimate the contribution of “known factors” to health spending growth (i.e. demography, economic growth and prices) and assume whatever is left over is largely attributable to technology. Or in the case of the study on OECD countries, the authors make “admittedly heroic” assumptions about the ability of the chosen measures to capture innovation and technology across countries. This difficulty in measurement helps explain the wide discrepancy of results when trying to account for the role of technology. Given the lack of good technology measures within previous statistical models, we have little empirical information about how technology drives up costs, or what aspects of technological change are particularly to blame.

Reforming policies and institutions can only go so far

By comparison to other developed health systems, the NHS already has in place many of the institutional arrangements that are likely to be linked to lower overall healthcare costs. In particular, it has strong demand side policies, including strong gatekeeping to prevent needless hospitalisation, a relatively restrictive definition of what citizens can access through the health service, and a relatively high degree of cost sharing²³. The UK also has relatively strong regulation of prices for hospital services and has

²¹ Authors calculations based on: Christine de la Maisonneuve and Joaquim Oliveira Martins, (2013), *A projection method for public health and long-term care expenditures economics department working papers No. 1048* [http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP\(2013\)40&docLanguage=En](http://www.oecd.org/officialdocuments/publicdisplaydocumentpdf/?cote=ECO/WKP(2013)40&docLanguage=En)

²² Sheila Smith, et al. (2009). *Income, insurance and technology: Why does health spending outpace economic growth?* Health Affairs, vol 5 (28). Accessed at: <http://content.healthaffairs.org/content/28/5/1276.long>

²³ OECD, (2013), *Public spending on health and long-term care: a new set of projections*. Accessed at: <https://www.oecd.org/eco/growth/Health%20FINAL.pdf>

taken measures to impose stringent budget caps. And most recently, the health service has undergone a significant number of cost cutting reforms including, and perhaps most importantly, measures to restrict NHS staff pay. While this has led to significant savings, it could be argued that the NHS is largely at its limit of what it can do in terms of institutional reform to keep costs in check.

A recent report from the Kings Fund underlined this point. It concluded that rather than cutting services further, the NHS and social care services need more money. In their view, more funding is required to “help unlock quality and cost improvements that increasingly require upfront investment and finance for double running, and, longer term, it is to realise the aspirations of the public for the sort of health service they would want to meet their health care needs”. Furthermore, it is not overly clear what sorts of broad based reforms work to reduce costs. Empirical evidence from cross country OECD work is useful but, barring a few notable exceptions, is largely inconclusive on the effects of different types of reform efforts on costs. Similarly, an IMF publication from 2010 implies that previous large scale reform efforts to the NHS may have helped to limit excess cost growth in the short term, but not in the long run²⁴. Nevertheless, it remains the case that innovations which support policies and institutional arrangements directly related to lower healthcare costs should be pursued.

The elephant in the room: supporting efficient innovation and harnessing technology

With the UK already having in place many of the institutional features associated with lower cost growth, our attention must turn to the other big element underpinning residual health costs – technology. While a number of studies identify technological change as driving up healthcare costs, the relationship between health innovations and cost is actually quite ambiguous. While many of the macroeconomic studies argue that the residual is driven by technological change, few have measured the direct impact of innovation on cost. And in contrast to these studies, there are a significant number of evaluations on the cost/benefit of specific innovations in the health sector that show net positive results – i.e. the economic benefits outweigh the costs. Consider for example, anticoagulant therapy which lowers health costs in the fairly short-term, because they are cheap relative to the costs of the conditions that they delay or prevent²⁵.

Clearly then, innovation does not always lead to rising costs. But equally, there are good innovations that are likely to raise costs too. Consider one of the best health innovations of them all – antibiotics. As others have argued, “the use of antibiotics to prevent deaths from infections can cause people to live longer and hence to die from heart disease and cancer, which typically entail even greater costs”²⁶. This view does not, of course, take into account the wider long run economic benefits of keeping people alive for longer. Indeed, as the OBR recently argued, if the uptake of new technologies leads to better health outcomes, higher initial spending may be recovered in lower spending further in the future. And to the extent that those better health outcomes lead to higher employment rates, “they would boost GDP and thereby reduce pressure on spending as a share of GDP”²⁷.

In this context, governments and policymakers cannot and should not prevent or deter innovations that could make significant improvements to wellbeing, even if they come with a heavy price tag. But, given the likely upward trajectory of healthcare expenditure, there is a growing need to systematically encourage, develop and disseminate innovations that are likely to support increased wellbeing while also keeping a lid on costs wherever possible. Only by supporting efficient innovation, will the NHS be able to deliver future productivity gains and build on the savings already made through recent policy and institutional reforms.

In summary, this chapter has identified how innovation can help support affordability of the healthcare system. In this context, desirable innovations might include new technologies and procedures which are able to supplement or replace existing ones at a lower cost, or those that help to support and grow policies and institutional arrangements that are more efficient in the long run. Finally, desirable innovations might be those which support the compression of morbidity, so that people can live longer but also healthier lives, reducing the need for additional treatments in the future. But those that increase the demand for healthcare will necessarily drive up costs and we must be honest about this reality. In essence, a holistic approach to efficient innovation is needed which factors in the various specific drivers of UK healthcare costs, so that cost effective solutions can be found.

²⁴ IMF, (2010). Macro-Fiscal implications of health care reform in advanced and emerging economies - case studies. Accessed at: <https://www.imf.org/external/np/pp/eng/2010/122810a.pdf>

²⁵ Kelly Anne-Maree, et al. (2001). *Prevention of stroke in chronic and recurrent atrial fibrillation: Role of the emergency department in identification of 'at risk' patients*. Australian Health Review, 24 (3). Accessed at: <http://vuir.vu.edu.au/21899/>

²⁶ J.D. Kleinke, (2001). *The price of progress: Prescription drugs in the health care market*. Health Affairs, 20 (5). Accessed at: <http://content.healthaffairs.org/content/20/5/43.full.html?cited-by=yes&legid=healthaff;20/5/43&related-urls=yes&legid=healthaff;20/5/43>

²⁷ Office for Budget Responsibility, (2016). *Fiscal sustainability analytical paper: Fiscal sustainability and public spending on health*. Accessed at: http://budgetresponsibility.org.uk/docs/dlm_uploads/Health-FSAP.pdf

Where innovations could make the greatest impact

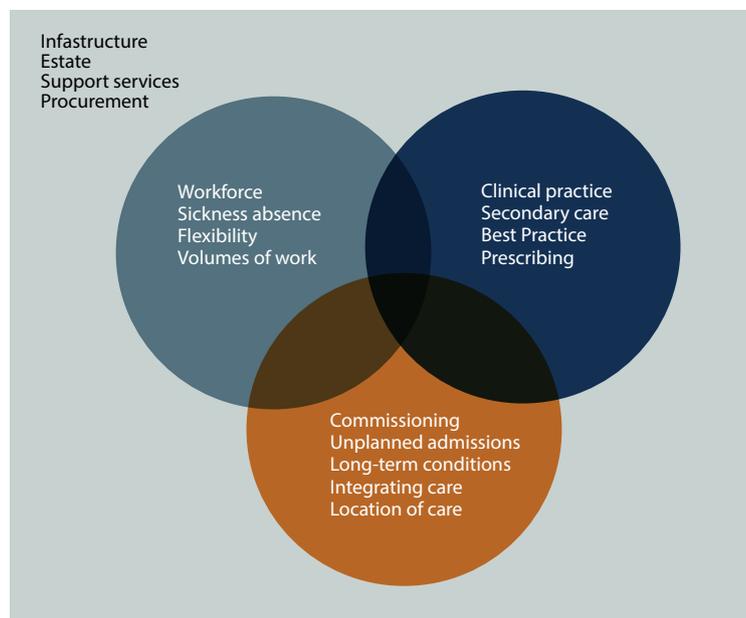
About this chapter

This chapter explores the potential for innovation application and diffusion in health care within the UK and critically how the ‘right type’ of innovation could make health care better and cheaper, essentially doing “more with less”. As outlined in the previous chapter unless we find ways of limiting excess growth in health spending, the overall fiscal position of the UK is likely to deteriorate over the coming decades. Alongside the seismic challenge facing the NHS, planned efficiency savings are not enough and therefore with such a foreboding outlook the potential for innovative solutions has never been greater²⁸. In this chapter we will examine how greater innovation application and diffusion could help address challenges in the NHS, both now and in the future and ultimately narrow the productivity gap. There is arguably an opportunity to roll out across the UK some of the leading global and indeed home grown innovations, as Simon Stevens, the then incoming Chief Executive of NHS England, declared in 2014 to an audience of international health experts and business leaders: “*The future is already here, just unevenly distributed*”²⁹.

Improving Productivity

As noted above, improving productivity to close the funding gap will not be easy and what those changes should be and look like, remains hotly contested. In the 2010 King Fund’s Report ‘*Improving NHS productivity more with the same not more of the same*’ they identified three key productivity areas where they believed savings could be made not including infrastructure (which includes estate, support services, procurement), these were: workforce, clinical practice and commissioning. There is often no strict demarcation between these three areas with significant overlap therefore we will consider all areas in our report.

Figure 6: NHS productivity



Source: The Kings Fund, The NHS Productivity Challenge – Experience from the Front Line, May 2014

In July 2013, NHS England called for an “honest and realistic” debate among NHS Staff, public and politicians on the issue and as part of that debate, Monitor, identified four priority areas they believed presented an opportunity to make productivity gains³⁰, these were:

²⁸The chartered Institute of public finance and accountancy, (2016), *More medicine needed the health of health finances*

²⁹ Lord Ara Darzi, (2014), *The NHS does not use innovation effectively*, The Guardian, Accessed at: <https://www.theguardian.com/health-care-network/2014/mar/03/nhs-does-not-use-innovation-effectively>

³⁰ Monitor, *Closing the NHS Funding Gap: How to get better value health care for patients*, 2013

- 1. Improving productivity within existing services.** Monitor argued valuable opportunities to improve quality, safety and efficiency were available within existing configurations of primary, community, acute and mental health care, for example the Quality, Innovation, Productivity and Prevention (QIPP) and Cost Improvement Programmes (CIPs). Taking 2010/211 as a baseline, Monitor estimated these savings could yield gains of £6.5 billion to £12.1 billion by 2021.
- 2. Delivering the right care in the right setting.** Monitor argued patients could enjoy better outcomes at lower cost to the NHS if their care were delivered in more appropriate settings, for example increased care in the community could reduce emergency hospital admissions. Monitor suggested that reconfiguring services and integrating care more effectively, could yield productivity improvements in the region of £2.4 billion to £4 billion by 2021.
- 3. Developing new ways of delivering care.** Monitor argued that improvements in the above two categories would not be sufficient to close the financial gap and therefore posited that success will depend on developing new and more productive ways to organise and deliver care. They cite best practice from other health care systems, which could offer a rich source of ideas and conservatively estimate that by introducing applicable innovative models of care to services in primary and secondary care could deliver £1.7 billion to £1.9 billion in productivity gains by 2021. It is this potential for improved application and diffusion of efficient innovation to meet the productivity challenge, which we will address in the next section and chapter.
- 4. Allocating spending more rationally.** Monitor finally argued that NHS spending is determined more by history than solid assessment for example of disease burdens and populations at risk. They suggested the redirection of resources to prevention and early diagnosis would yield inevitable productivity gains, it was however beyond the scope of that particular report to quantify.

The potential of innovation

In 2014, a report from the Kings Fund identified providing “a more co-ordinated national focus to collate successful productivity approaches and innovations and diffuse them to NHS organisations” as a key pillar in keeping health service costs under control³¹. While the evidence on what innovations work best is somewhat sketchy, many have been evaluated and of these, some have been found to be particularly good at reducing costs and/or improving quality. In a summary of potential cost savings from various evaluated interventions published by the National Institute for Health and Care Excellence (NICE), it was estimated that the NHS could save upwards of £2.2bn as a result of implementing specific interventions in a number of key areas (see table below).

Table 2: NICE evidence-based QIPP publication list – summary of potential savings

Topic	Action	Value of potential saving/quality gain £m
The World Health Organisation Surgical Safety Checklist	Reduce harm by consistent use of the best practice	1,202.0
Safety Express	National pilot to deliver harm-free care	430.0
Fluid management during major surgery	Reducing post-operative complications and bed days	360.0
Cancer pathways	Redesigning services for those living with or beyond cancer	86.0
Type 1 diabetes	Dose adjustment for normal eating	48.0
Simple behavioural interventions	Reducing non-attendance	31.8
Histopathology management	7-day turnaround time	26.0
Low risk upper gastrointestinal bleeding	Avoiding patient admissions	13.6
Musculoskeletal physiotherapy	Patient self-referral	13.0
Heart failure	Use of BNP/NT -proBNP testing in primary care to facilitate early diagnosis	10.0
Others		46.6
Total		2,267.0

Source: Kings Fund 2014 summary of NICE QIPP: Full list of all published QIPP studies. London: National Institute for Health and Care Excellence. Available at:

³¹ Monitor, (2013). *Closing the NHS funding gap: How to get better value health care for patients*. Accessed at: <https://www.gov.uk/government/publications/closing-the-nhs-funding-gap-how-to-get-better-value-healthcare-for-patients>

Similarly Monitor in its 2013 paper '*Closing the NHS funding gap: how to get better value health care for patients*' as noted above, highlighted the potential productivity gains from innovation. The report reviewed organisational and technological innovations from a number of health care systems overseas to assess the feasibility of applying to the NHS and their potential. Of the innovations they assessed, they identified and quantified the potential impact of two, which they believed have the potential to transform NHS care, one from India in secondary care and Mexico in primary care. The report estimated that applying these two innovations in England could yield an estimated productivity gain of £1.7 billion to £1.9 billion.

1. Aravind Eye Care, India: potential gain of £1.1 billion

Aravind Eye Care in India has applied the principles of mass marketing and industrial engineering to create a model of eye care that combines high volumes and high quality of service with low cost. By streamlining the workflow of care to maximise the use of staff skills, Aravind is able to perform 60% of the number of NHS cataract surgeries but at one-sixth of the cost to the NHS and achieve better clinical outcomes.

Taking an "Aravind" approach to cases representing 50% of NHS spending on elective ophthalmology (around £430 million annually), the NHS might be able to generate a £179 million efficiency gain in this elective activity each year. Moreover, applying the Aravind principles to cases representing 50% of spending on other high volume and routine elective orthopaedic and cardiac surgeries could yield an additional productivity gain of £1.1 billion a year. While they state these calculations may be crude, the figures indicate the scale of what radical change in care models could achieve.

2. MediCall Home, Mexico: potential gain of £0.6 billion to £0.8 billion

MediCall Home in Mexico allows patients to consult a nurse by telephone. It serves 1 million households and deals with 90,000 calls a month. Of the patients who call in, two thirds resolve their queries over the phone and only the remaining third are referred to see a doctor in person, so reducing visits to general practice.

If the NHS were to introduce a similar service and it reduced 50% of first visits to general practice, where patients would otherwise have seen a doctor, Monitor estimates it could free up GP time worth in the region of £0.6 billion to £0.8 billion, taking into account the cost of nurses to run the phone service. The GPs could spend the freed time on care for more complex patients. MediCall is similar to NHS 111 except in two respects: first, all calls are handled by trained nurses and, second, a much higher proportion of callers' queries are resolved over the phone.

Source: Monitor: Closing the NHS funding gap, how to get better value health care for patients, 2013

In the next chapter, we will follow a similar approach to Monitor and measure the potential productivity gains to the NHS by theoretically applying at the national level some of the most promising healthcare innovations from the UK and Internationally. We have deliberately selected home grown innovations as well, as it appears that due to the extreme fragmentation of the NHS, scale to support the uptake of best practice even within the domestic context is more elusive than one may expect in a 'national' health service. As we will discuss in the next chapter, by improving the adoption and diffusion of innovation within the UK context, there is an opportunity to create better health for all and help narrow the productivity gap at the same time.

The potential application of high-impact innovations in the UK

About this chapter

As noted in the previous chapter, given the funding constraints facing the health service and the fact that the “easiest” spending cuts have already been made, the role of innovation in supporting further productivity gains in each of these areas is critical in order to secure short, medium and long-run sustainability. In this chapter, we have identified 7 high-impact innovations from within the UK or globally and akin to the approach taken by Monitor (see above) assessed their potential to transform NHS care and yield productivity gains. Some of the innovations selected derive from our first SOS Health report ‘*Creating a sustainable 21st century healthcare system*’, and others we have sourced from across borders, disciplines and sectors and through consultation with a broad range of experts.

As we will expand on below, the innovations were selected according to a predefined selection criterion and we then modelled the potential impact both in terms of productivity gains and improved health and wellbeing outcomes. We also assess the applicability, possible diffusion journey and scalability of the innovations. Quantifying potential productivity gains from innovation is obviously difficult given the many assumptions and uncertainties involved therefore, we have also developed a cost benefit analysis checklist to assess the strength and reliability of the economic costings presented.

Innovation criterion

As referenced in the previous chapter, based on the King’s Fund 2010 Report ‘*Improving NHS productivity more with the same not more of the same*’³² they identified three key productivity areas where they believed savings could be made not including infrastructure, these were: workforce, clinical practice and commissioning. There is often no strict demarcation between these three areas with significant overlap therefore we will consider all areas in our choice of innovations.

Therefore, the priority areas which we will seek to source our innovations from will include: 1) workforce to include sickness absence, flexibility, volumes of work, 2) clinical practice to include secondary care, best practice and prescribing and 3) commissioning which covers unplanned admissions, long term conditions, integration and location of care.

We will also base our selection of innovations on the following principles as recently highlighted by NHS England report³³ with regard to the areas with the most potential to transform services.

- 1. Giving patients greater control over their health:** this would include developing effective preventative approaches and support for self-management.
- 2. Harnessing transformational technologies:** this would help support improved self-management and control. Examples might include online access to medical records, online test results and appointment booking.
- 3. Exploiting the potential of transparent data:** To support active patients, the best quality data should be collected and made available.
- 4. Moving away from a “one-size fits all” model of care:** A relatively small minority of patients account for a high proportion of health spending. Personalisation including tailoring treatments and prevention to meet specific individual characteristics could make a significant impact in terms of efficiency.
- 5. Unlocking healthcare as a key source of future growth:** Understanding the NHS role in supporting economic output, through for example, helping people get back to work or by working with industry partners to make sure that the health and life sciences continue to be a growing part of the UK economy³⁴.

³² John Appleby, Chris Ham, Candace Imison, Mark Jennings, (2010) *Improving NHS productivity More with the same not more of the same*, The Kings Fund, Accessed at: http://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/improving-nhs-productivity-kings-fund-july-2010.pdf

³³ NHS England, (2013), *The NHS belongs to people: A call to action*, Accessed at: https://www.england.nhs.uk/wp-content/uploads/2013/07/nhs_belongs.pdf

³⁴ NHS England, (2013), *The NHS belongs to people: A call to action*, Accessed at: https://www.england.nhs.uk/wp-content/uploads/2013/07/nhs_belongs.pdf

Underpinning however the above principles are innovations that improve and deliver better outcomes for individuals and ultimately improve health and wellbeing. There is also a realism attached to our selection, we have chosen innovations that fit and work with everyday lives, where ideally individuals are co-designers and co-producers, as arguably the greatest untapped resource in most health systems is the people that use them

Measuring the impact

As noted in the Monitor report, measuring and evaluating the potential health, economic and wider value of innovations is both demanding and difficult. Our modelling process primarily focussed on quantifying the productivity gains the innovation could yield if applied at a national level. Unfortunately, it was beyond the scope of this paper to quantify the number of lives saved or cases of diseases averted for example, we have however managed to score their potential in this domain, based on evaluations of the original innovation. Indeed, innovations were chosen based on a strong evidence base which demonstrated improved patient outcomes alongside productivity savings. Therefore, we can make some broad assumptions and predictions on their potential if rolled out in the UK context.

With regard to assessing the productivity gains, our assessment was based on a series of assumptions to provide a partial analysis of the potential cost savings that these innovations could generate for the health service. Although the analysis applied to each innovation is tailored to that particular service, there are some general assumptions that have been made that applies in each scenario. We assume that the proportion of the population with a given health condition or demanding a particular service remains constant. To estimate this proportion, we use the ONS central population projection 2014. All cost savings featured are based on the assumption that we can achieve identical savings based on the savings of the original example. These assumptions however will mean we cannot give a definitive assertion that these cost savings are exact. Hidden and immeasurable costs and benefits may exist which cannot be analysed without further and more comprehensive studies. In order to provide more clarity, we include a chart to caveat the process, so that readers are fully aware of the certainty surrounding the cost saving figures.

Table 3: Innovation Checklist for Productivity Modelling

Level of Certainty	Data	Evidence	Modelling
High	Extensive data Accurate and verifiable costings	Large sample size Extensive evidence on the cost savings from the treatment and subsequence benefits	Straightforward modelling Previous work has been completed using a similar methodology Few sensitive assumptions
Medium	Incomplete data External sources used	Large sample size with adequate evidence Cost savings that can be derived from rational proxies	Some modelling challenges At least one sensitive assumption is made
Low	Incomplete data Makes heavy use of external sources Assumptions cannot be readily checked	Estimate of cost saving available Smaller or restricted sample size Little evidence on the wider costs and benefits of such an innovation	Significant modelling challenges Highly sensitive and unverifiable assumptions are made
Very Low	Little data Much of it very basic or poor in quality	Very little evidence from the study No quantifiable cost saving Little to no evidence of wider costs or benefits	Significant modelling challenges Many unverifiable assumptions are made Assumptions are extremely sensitive

Identifying enablers and barriers to application

After quantifying the productivity gains each innovation could yield, we undertook an analysis of the potential enablers and barriers for applying these innovations across the UK. This gives an indication of what challenges would need to be overcome before implementation, and conversely what features of either the innovation itself or the health and social care system of the UK would help this innovation be implemented. For this, we based our groups of 'enablers' and 'barriers' on a report from the Institute of Global Health Innovation Imperial College London, *From innovation to transformation: A framework for diffusion of healthcare innovation*³⁵. The report identifies three main levels of influence; 'systems characteristics (which we call 'macro-level influences'), 'enablers' (which we call 'policy and strategy dynamics) and 'cultural dynamics'. We explain these in more detail below:

- 1. Macro-level influences:** These are features of the wider economic and overall health and care systems in the UK. These can include cuts to Government budgets in recent years, or the separate funding mechanisms for health and social care in the UK.
- 2. Policy and strategy dynamics:** These are features of the current health and social care system in the UK which could either enable or prove a barrier to successful implementation of the innovation in question. These are usually legislation, policy developments or new funding which can promote change in a relatively short amount of time; an example of this would be a development such as the Better Care Fund in the NHS budget, or the introduction of a new IT system.
- 3. Cultural dynamics:** This category of barriers and enablers is the most nebulous, but nonetheless important to whether an innovation could diffuse successfully in a UK-wide context. The cultural dynamics are ways of working and thinking in the UK which can encourage innovation; behaviours of working and sharing information, or the willingness to take risks in developing new methods and systems of working. Examples of cultural dynamics include the enthusiasm of the UK to learn from other countries, or the recent increased interest from the public, the media and policy makers in dementia.

Using these three main areas, for each innovation we assessed what the most significant barriers and enablers would be both now and in the future for successful diffusion. Not every innovation had enablers and barriers for all three of the groups listed above. We also drew on the ideas formed in the third chapter of the first 'SOS 2020 Health' report from the ILC-UK, entitled *What makes a health innovation successful?* which assess the wider factors of why a health innovation could succeed or fail. Finally, for our assessment of each innovation we assessed each innovation out of three for potential cost saving, improved patient outcomes, strength of the evidence, likelihood of application and level of disruption required (for this rating, three ticks indicate high levels of disruption and one tick indicates low levels).

³⁵Institute of Global Health Innovation (2013). *From innovation to transformation: A framework for diffusion of healthcare innovation*. https://workspace.imperial.ac.uk/global-health-innovation/Public/From_Innovation_to_Transformation.pdf

Innovation: The Memory First Project



Country of Origin: UK

Productivity Area: Commissioning
Clinical Practice

Innovation Theme: Giving Patients greater control over their health

Harnessing transformational technologies

Description of Innovation

Memory First is an integrated dementia service run by a consortium of 162 GPs across 41 practices in Staffordshire and has been instrumental in reducing dementia diagnosis times in Staffordshire, from three years to just four weeks.

It provides fully integrated care by bringing consultant led clinics into the community and drawing together social care services, charity and end of life support. The patient remains in the community under the responsibility of their GP with support from secondary care expertise as and when required. Patient centric care plans are held, monitored and performance managed by the patient and their family using innovative new smartphone apps. At the heart of the service is the new role of the Eldercare Facilitator. Recruited from the local communities, these include many retired healthcare professionals who act as intelligent companions and advocates for patients and coordinate access to services.

Evidence of Success

Potential Cost Saving	✓
Improved Patient Outcomes	✓ ✓ ✓
Strength of the evidence	✓ ✓ ✓

Cost Saving

- Reduced costs of clinical time, over £120,000 per year.
- Cost savings of nearly £500,000 per year for a catchment area of 280,000 patients, which approximately equals a saving of £1.78 per patient.

Improved Patient Outcomes

- Diagnosis time reduced from three years to four weeks.
- Detection rates increased from 30% to 100% of predicted cases.
- Patient Satisfaction rates of 100% were achieved.

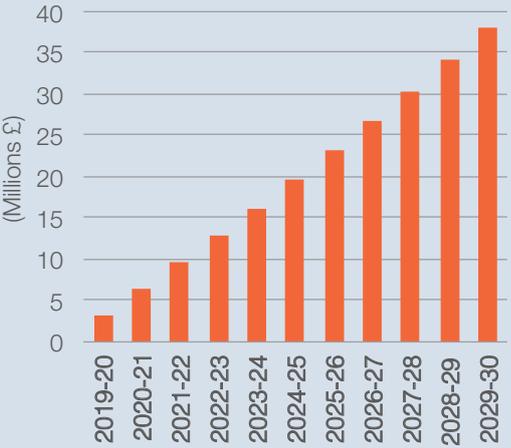
Applicability to the UK - Context

The numbers: 850,000 people have dementia as of 2015. By 2025, it is estimated that the number of people with dementia will be above £1 million.

The cost:

Total Cost:	£26.3 billion
Health Cost:	£4.3 billion
Social Care:	£10.3 billion
Unpaid Care:	£11.6 billion

Individual and Societal Impact: High – Dementia has a profound effect on the individual, their family and carers, particularly in relation to the level of unpaid care required.

Potential Cost Savings	Cost Saving: Methodology Level of Certainty: Medium																								
 <table border="1"> <caption>Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Cost Saving (Millions £)</th> </tr> </thead> <tbody> <tr><td>2019-20</td><td>3</td></tr> <tr><td>2020-21</td><td>6</td></tr> <tr><td>2021-22</td><td>10</td></tr> <tr><td>2022-23</td><td>13</td></tr> <tr><td>2023-24</td><td>16</td></tr> <tr><td>2024-25</td><td>20</td></tr> <tr><td>2025-26</td><td>24</td></tr> <tr><td>2026-27</td><td>27</td></tr> <tr><td>2027-28</td><td>31</td></tr> <tr><td>2028-29</td><td>34</td></tr> <tr><td>2029-30</td><td>38</td></tr> </tbody> </table>	Year	Cost Saving (Millions £)	2019-20	3	2020-21	6	2021-22	10	2022-23	13	2023-24	16	2024-25	20	2025-26	24	2026-27	27	2027-28	31	2028-29	34	2029-30	38	<p>Using the potential cost saving of £1.78 per person and population projections for over 60 year olds we estimated how much this could reduce costs on a yearly basis. Assuming the proportion of people with dementia remained the same, we took the year on year difference to estimate the number of new cases and applied the cost saving to each one. The cumulative impact of implementing the Memory First Project across the UK, could result in a cost saving of up to £38 million between 2019 and 2030, providing we could replicate the individual cost saving across the country.</p> <p>The improved patient satisfaction and independence that this project promotes could also have many, immeasurable economic benefits. The cost of the treatments and care associated with early onset dementia could be reduced by allowing more effective management and keeping people in a healthier state for longer and encourages them to contribute to the economy for longer, be it through working or consumption. We do not take into account the cost of implementing the project across the country, which will incur some fixed costs, as well as requiring funding for the necessary structural and organizational changes. Nor have we taken into account the cost saving from reduced clinical time integrated care would result in.</p>
Year	Cost Saving (Millions £)																								
2019-20	3																								
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Potential Patient Outcome <p>Reduced diagnosis time allows patients and their families to respond and plan more effectively, in terms of accessing care, treatment and support.</p>																									
Enablers for Applicability <p>Macro-level influences</p> <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ ICT capabilities ✓ Strong evidence base that this innovation improves outcomes and reduces costs. <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✓ Dementia in recent year has been afforded greater policy priority and seen an increase in investment 	Barriers for Applicability <p>Macro-level influences</p> <ul style="list-style-type: none"> ✗ Historically research into dementia diagnosis and prevention has been underfunded compared to other conditions ✗ A lack of a joined up approach between health and social care in the UK means that dementia care is often fractured. <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✗ This innovation requires strong levels of local leadership and direction. <p>Cultural dynamics</p>																								
Summary: What needs to happen for successful diffusion?																									
<p>Likelihood of application: ✓ ✓ ✓</p> <p>Level of disruption Required: ✓</p> <p>Strength of evidence: ✓ ✓</p>	<ul style="list-style-type: none"> • The potential for systematic roll out of this innovation is high. • This innovation won several awards when conceived in 2013 and Brunel University and LSE are working on a national model for the UK. • If rolled out nationwide, we predict between 2019-30, it could save £38 million and deliver improved patient outcomes. • Key to roll out would be leadership from CCGs and successful partnership working. 																								

Innovation: Canterbury Integrated Care



Country of Origin: New Zealand
Productivity Area: Commissioning
Innovation Theme: Moving away from a “one size fits all” model of care.
 Unlocking healthcare as a key source of future growth

Description of Innovation

Integration of health and social care became a focus for Canterbury when concern grew that unless action was taken to stem growing demand for hospital care, increased hospital capacity would be required resulting in higher costs. The leaders of the District Health Board (DHB) responded by developing a future vision based on the notion of ‘one system, one budget’, and that all those involved in the system needed to work together to improve care. This resulted in a commitment to build on the strengths of primary care in Canterbury and particularly to invest in services that would help avoid hospital admissions and facilitate early discharge where possible. These and many other initiatives enabled the DHB to stem the increase in hospital use. The system also helped to alleviate the adverse effects of 2011, when an earthquake destroyed some of the hospital capacity in Christchurch.

Sustained investment has provided staff and organizations with the necessary skills to improve care. Training was provided for more than 1,000 staff in quality improvement methods. Visits to other organizations which have applied these methods, such as Air New Zealand were also made. The training and visits helped build momentum and staff commitment to make the changes needed. Experts in process engineering were also engaged to help design more efficient care pathways.

Evidence of Success

Potential Cost Saving ✓ ✓

Improved Patient Outcomes ✓ ✓

Strength of the evidence ✓ ✓

Cost Saving

- No formal cost evaluation, although the reductions achieved by the program suggest significant cost saving opportunities.

Improved Patient Outcomes

- 20% reduction in nursing home admissions and 25% reduction in duration of nursing home stays.
- Proportion of elective work in Canterbury has risen from less than 23% of its activity in 2006/7 to 27% in 2011/12.
- Reduced emergency department admissions, hospital admissions, length of hospitalisation and readmission rates.

Applicability to the UK - Context

The numbers: Between 2005/6 and 2012/13, the number of older people in residential care homes rose 21% from 135,000 to 164,000. The number of older people living in nursing care homes rose by 22% from 65,000 to 79,000. It is estimated that nearly 800,000 older people with care related needs receive no support.

The cost: The cost to service users has increased, with individuals paying on average £588 per year more in real terms in 2012 than they were paying in 2009. Expenditure on social care cost £7 billion including the NHS transfer in 2013. According to Age UK, to maintain the standards of social care seen in 2010/11, by 2020 expenditure must be around 11.49 billion.

Individual and Societal Impact: Reducing nursing home admissions can help improve independence and quality of life for older people. It can also free up resources so there will be more nursing places available for those in need.

Potential Impact if Diffused in the UK																					
<h3>Potential Cost Savings</h3>	<h3>Cost Saving: Methodology</h3>																				
<table border="1"> <caption>Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Cost Savings (Millions £)</th> </tr> </thead> <tbody> <tr><td>2014</td><td>100</td></tr> <tr><td>2016</td><td>200</td></tr> <tr><td>2018</td><td>400</td></tr> <tr><td>2020</td><td>800</td></tr> <tr><td>2022</td><td>1500</td></tr> <tr><td>2024</td><td>2200</td></tr> <tr><td>2026</td><td>3000</td></tr> <tr><td>2028</td><td>4000</td></tr> <tr><td>2030</td><td>4500</td></tr> </tbody> </table>	Year	Cost Savings (Millions £)	2014	100	2016	200	2018	400	2020	800	2022	1500	2024	2200	2026	3000	2028	4000	2030	4500	<h3>Level of Certainty: Low</h3> <p>To estimate the savings, we took the 20% reduction in nursing home admissions that this approach has been responsible for. Then using evidence on the number of people living in nursing and residential homes in the UK, and holding this proportion constant, we estimated the future numbers expected to live in these types of accommodation. Using the current level of social expenditure, we calculate a unit cost to generate future cost savings. Then taking the difference between the annual populations of nursing home residents we estimate the number of admissions. Following this, we calculate the number if we were to reduce admissions by 20%.</p> <p>This could result in a cost saving of up to £4.5 billion between 2014 and 2030.</p> <p>However, the levels of integration of health and social care required would be a whole scale systems change which would be costly. It should be noted that there are a number of fixed costs involved in nursing home provision, and so decreasing the number of admissions may reduce total costs, but increase the per unit costs, which would reduce total savings. This model does though have wider benefits including reduced hospital admissions, which would generate cost savings for the wider health care budget.</p>
Year	Cost Savings (Millions £)																				
2014	100																				
2016	200																				
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2024	2200																				
2026	3000																				
2028	4000																				
2030	4500																				
<h3>Potential Patient Outcome</h3> <ul style="list-style-type: none"> Reduced nursing home admissions and improved general health. 																					
<h3>Enablers for Applicability</h3> <p>Macro-level influences</p> <ul style="list-style-type: none"> ✓ The Manchester devolution project could encourage projects such as Canterbury Integrated Care to be replicated in the UK ✓ Current Government direction is towards decentralizing the health systems, which could encourage regions in the UK to introduce innovations similar to Canterbury. <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ In recent years' certain budgets to promote integration, notably the Better Care Fund, have been introduced, which could facilitate innovations such as this. <p>Cultural dynamics</p>	<h3>Barriers for Applicability</h3> <p>Macro-level influences</p> <ul style="list-style-type: none"> ✗ The macroeconomic environment in the UK means that significant and bold investment required to replicate the whole-scale change in Canterbury is relatively unlikely to happen. ✗ Despite integration of health and social care being frequently discussed in the UK, the pace of change is low, indicating that there are many barriers to overcome. <p>Policy and strategy dynamics</p> <p>Cultural dynamics</p>																				
<h3>Summary: What needs to happen for successful diffusion?</h3>																					
<p>Likelihood of application: ✓✓</p> <p>Level of disruption Required: ✓✓</p> <p>Strength of evidence: ✓✓</p>	<ul style="list-style-type: none"> Canterbury Integrated Care requires a significant and whole-scale systems change in the UK, but has potential to provide a reactive response to an ageing population. Strategies of decentralization and integration in healthcare need to continue, but with concrete political and economic will behind it. Health leaders should learn from international systems and from other industries who have undergone significant systems changes. 																				

Innovation: Stay on Your Feet Programme



Country of Origin: Australia

Productivity Area: Commissioning

Innovation Theme: Giving patients greater control over their health.

Moving away from a “one size fits all model of care”

Description of Innovation

The Stay on Your Feet Programme was a multi-strategy, population based intervention programme aimed at preventing falls among the older population living in the large and rural coastal region of New South Wales, Australia.

The four-year intervention targeted knowledge, attitudes, behaviours, medication use, footwear, home hazard reduction and other risk factors in non-institutionalised people over the age of 60. The subjects were randomly selected and enrolled via telephone interviews into the programme.

The programme was instigated by the NSW Health Department and the National Health and Medical Research Council, with funding of AUD \$600,000 provided by the NSW Health Department. The programme was delivered via a mix of community education methods, such as utilising brochures, posters, television and radio advertisements; policy development and through the engagement of local clinicians and other health professionals.

Evidence of Success

Potential Cost Saving



Improved Patient Outcomes



Strength of the evidence



Cost Saving

- No formal cost benefit analysis.
- However, the lower incidence of self-reported falls and reduction in falls related hospitalisation in the intervention area compared to the control area suggests there is the potential for significant cost savings.

Improved Patient Outcomes

- 22% lower incidence of self-reported falls in the intervention area compared to the control community.
- 20% decrease in fall-related hospitalisations in the intervention area compared to the control community.
- 77% of the targeted population had been in contact with at least one aspect of the intervention.

Applicability to the UK - Context

The numbers: One in three individuals over 65 and over half of those over-80 fall at least once a year. Falls are the most common cause of injury related deaths for over-75s in the UK.

The Cost: It is estimated that falls cost the NHS over £2 billion every year, however with the population of older people rising it is likely that this will increase. There are also additional costs in the form of care costs and lost productivity as a result of the injury, as carers and healthcare workers will be forced into providing support for those who have experienced a fall.

Individual and Societal Impact: High – Falls can be incredibly detrimental to the livelihood of older people, reducing their independence, causing injury and increasing the risk of death as a result of injury. Subsequent care for preventable falls comes at the expense of delivering care elsewhere.

Potential Impact if Diffused in the UK																																			
Potential Cost Savings	Cost Saving: Methodology																																		
	Level of Certainty: Medium																																		
<table border="1"> <caption>Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Cost Saving (Millions £)</th> </tr> </thead> <tbody> <tr><td>2015</td><td>500</td></tr> <tr><td>2016</td><td>1000</td></tr> <tr><td>2017</td><td>1500</td></tr> <tr><td>2018</td><td>2000</td></tr> <tr><td>2019</td><td>2500</td></tr> <tr><td>2020</td><td>3000</td></tr> <tr><td>2021</td><td>3500</td></tr> <tr><td>2022</td><td>4000</td></tr> <tr><td>2023</td><td>4500</td></tr> <tr><td>2024</td><td>5000</td></tr> <tr><td>2025</td><td>5500</td></tr> <tr><td>2026</td><td>6000</td></tr> <tr><td>2027</td><td>6500</td></tr> <tr><td>2028</td><td>7000</td></tr> <tr><td>2029</td><td>7500</td></tr> <tr><td>2030</td><td>8000</td></tr> </tbody> </table>	Year	Cost Saving (Millions £)	2015	500	2016	1000	2017	1500	2018	2000	2019	2500	2020	3000	2021	3500	2022	4000	2023	4500	2024	5000	2025	5500	2026	6000	2027	6500	2028	7000	2029	7500	2030	8000	<p>To estimate the cost savings for the UK, we have used the estimated figure of £2 billion, which falls cost the NHS each year and the most recent figures from the Hospital Episode Statistics for the specific number of patients over-65 that are hospitalized as a result of a fall. From this we derive the estimated cost per patient. If the UK could achieve the same 20% reduction in fall-related hospitalization, in a best case scenario this could result in a cost saving of up to £9 billion between 2015 and 2030.</p> <p>However, there are some associated benefits which could be overlooked. Reduced falls will allow older people to stay independent and healthier for longer. Preventing falls could help to reduce nursing home admissions, encourage independence and allow older people to stay in their home for longer. The provision of care that was previously reserved for older people who experienced falls will now be free to provide support elsewhere in the health service. The complications that may have resulted in the event of a fall will also be reduced and by extension resulting in cost savings.</p>
Year	Cost Saving (Millions £)																																		
2015	500																																		
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2028	7000																																		
2029	7500																																		
2030	8000																																		
Potential Patient Outcome																																			
<ul style="list-style-type: none"> A lower incidence of falls will allow older people to live more independently, potentially delaying admission to nursing or residential care and reduce emergency hospital admissions. 																																			
Enablers for Applicability	Barriers for Applicability																																		
<p>Macro-level influences</p> <ul style="list-style-type: none"> ✓ Falls have been quantified as being both a significant cause of death and costly to the NHS; any innovation which can reduce incidents of falls should be well received by health policy makers. ✓ Reducing falls and therefore allowing older people to remain in their own homes fits in with wider policy strategies. <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ There is clear evidence that the programme reduced incidents of falls in the area it was implemented in. <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✓ Harnessing the efforts of patients and the public as co-producers of wellbeing. 	<p>Macro-level influences</p> <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✗ Requires a long-term vision and strategy ✗ Requires communication channels across healthcare as well as across the wider public, including the media. ✗ This innovation has only been tested in highly rural areas and therefore may not translate across all settings. <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✗ The awareness programme in New South Wales utilized local media channels, which are not as widely watched, read or listened to in the UK than in Australia. 																																		
Summary: What needs to happen for successful diffusion?																																			
<p>Likelihood of application: ✓ ✓</p> <p>Level of disruption Required: ✓</p> <p>Strength of evidence: ✓ ✓</p>	<ul style="list-style-type: none"> This innovation requires relatively little disruptions to health systems, which increases the likelihood of implementation. It is however untested in non-rural areas. Communication channels across healthcare, the media and wider public needs to be improved, and strategies to reach the target audience through these channels need to be further considered. In the UK health literacy and trust particularly for the over 65's is low for these types of communication. 																																		

Innovation: Urban E-Health Pilot



Country of Origin: Brazil
Productivity Area: Commissioning
Innovation Theme: Harnessing transformational technologies
 Exploiting the potential of transparent data

Description of Innovation

The New Cities Foundation set up a Task Force on E-Health in collaboration with the municipality of Rio de Janeiro that uses technology to improve access to primary healthcare in an urban community.

The Task Force equipped a primary care health clinic in a Rio community, consisting of a backpack that contained various tools to measure health indicators. The clinic staff made visits to 100 older people who had chronic diseases and mobility issues with the goal of producing a comprehensive diagnosis using the e-health backpack.

Evidence of Success

Potential Cost Saving	✓
Improved Patient Outcomes	✓ ✓
Strength of the evidence	✓

According to the study, regular monitoring helped improve the quality and timing of diagnosing chronic conditions in older people. This resulted in reduced hospitalizations across a wide range of illnesses, from strokes to heart failure. The subsequent reduction in demand for emergency hospital admissions as a result of chronic conditions has led to significant cost savings among the control group.

Cost Saving

Through medical emergencies being avoided the following savings were made per 100 patients and converted to dollars from Brazilian reais:

- Strokes - \$32,521
- Heart failures - \$4,002
- Kidney dysfunction - \$200,541

Improved Patient Outcomes

- Reduced hospital admissions for individuals with chronic diseases.
- Prevalence (%) of stroke in hypertension patients fell from 14.8% to 0.82%, after e-health pilot implemented.
- Heart failure in patients with type II diabetes and hypertension fell from 17.1% to 6.36%.
- Percentage of type II diabetes patients undergoing hemodialysis fell from 28% to 2.71%.
- In addition, there has been a sharp rise in patient satisfaction since adopting the e-health pack.

Applicability to the UK - Context

The numbers: 1 in 4 adults in the UK live with hypertension, but over 5 million people are unaware of their condition. Over 3.2 million adults are living with Type II Diabetes, with the number rising sharply.

The Cost: It is estimated that hypertension costs the NHS £2 billion every year, as it can have a variety of negative health impacts, leading to strokes, heart disease and chronic kidney disease. Treating type 2 diabetes and its complications cost the NHS £8.8 billion in its annual budget.

Individual and Societal Impact: Many people in the UK living with chronic diseases will go on to have complications which will increase the likelihood of a severe medical emergency.

Potential Impact if Diffused in the UK																																			
Potential Cost Savings	Cost Saving: Methodology																																		
	Level of Certainty: Low																																		
<table border="1"> <caption>Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Cost Savings (Millions £)</th> </tr> </thead> <tbody> <tr><td>2014</td><td>20</td></tr> <tr><td>2015</td><td>40</td></tr> <tr><td>2016</td><td>60</td></tr> <tr><td>2017</td><td>80</td></tr> <tr><td>2018</td><td>100</td></tr> <tr><td>2019</td><td>120</td></tr> <tr><td>2020</td><td>140</td></tr> <tr><td>2021</td><td>160</td></tr> <tr><td>2022</td><td>180</td></tr> <tr><td>2023</td><td>200</td></tr> <tr><td>2024</td><td>220</td></tr> <tr><td>2025</td><td>240</td></tr> <tr><td>2026</td><td>260</td></tr> <tr><td>2027</td><td>280</td></tr> <tr><td>2028</td><td>300</td></tr> <tr><td>2029</td><td>320</td></tr> </tbody> </table>	Year	Cost Savings (Millions £)	2014	20	2015	40	2016	60	2017	80	2018	100	2019	120	2020	140	2021	160	2022	180	2023	200	2024	220	2025	240	2026	260	2027	280	2028	300	2029	320	<p>The E-Health Project has many cost saving benefits, but for the purpose of this research we have focused on the savings from reducing stroke-related hospitalization, although there is evidence that there are cost savings through the reduction of hospitalization of kidney, heart and cardiovascular diseases. To calculate the savings, we took the cost savings of stroke hospitalization reduction (\$32,531) and converted this to pounds. We then took the proportion of people over the age of 65 who suffer from strokes each year, and made a projection over the long run holding the proportion constant. We then calculate the cost savings per 100 people. This could result in a cost saving of £538.1 million between 2014 and 2030.</p> <p>However, as this is not the UK currency, there can be expected volatility in this number. Furthermore, the cost of health in Brazil will be different due to prices reflecting the size of the economy. The cost of treatment will also depend on the manner in which it is delivered, which may differ from nation to nation. This is only the case if we could replicate the exact saving that E-Health has achieved in Rio. This also neglects the savings for other diseases which E-Health has helped to prevent hospitalizations for, and which may be more or less prevalent in the UK.</p>
Year	Cost Savings (Millions £)																																		
2014	20																																		
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Potential Patient Outcome																																			
<ul style="list-style-type: none"> Reduced hospitalisations as a result of a wide range of chronic conditions, including diabetes and hypertension. The reduced hospitalisations imply improved general health, leading to a better quality of life and reduced risk of medical emergencies as a result of poorly managed conditions. 																																			
Enablers for Applicability	Barriers for Applicability																																		
<p>Macro-level influences</p> <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ This innovation fits with the move in the UK to deliver healthcare in the community. <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✓ Delivers healthcare in an accessible way, and takes a proactive approach to diagnosing and treating people with long term conditions. 	<p>Macro-level influences</p> <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✗ This innovation would work in high density population areas, but it may prove to be inefficient in lower density areas. <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✗ Brazil faces different challenges than the UK. Many of the people targeted in this innovation in Rio are not accessing health services at all. 																																		
Summary: What needs to happen for successful diffusion?																																			
<p>Likelihood of application: ✓</p> <p>Level of disruption Required: ✓ ✓</p> <p>Strength of evidence: ✓</p>	<ul style="list-style-type: none"> This innovation is promising and makes use of technology to take a proactive approach to treating people with long term conditions. Just considering the potential to reduce hospitalisations from stroke, this innovation could potentially save more than £570 million by 2031. For this innovation to be implemented in the UK, there needs to be further evaluation as to whether this approach of delivering this type of healthcare in a community setting is cost effective. 																																		



Country of Origin: Belgium

Productivity Area: Commissioning

Innovation Theme: Moving away from a “one size fits all” model of care

Description of Innovation

Protocol 3 (P3) offers a wide range of care services to older people in great need of care 24/7, with co-ordination by a case manager. The patient must achieve relevant scores on the Katz and Edmonton scale measure, and/or have early stage dementia. Family carers are also targeted where there is a need for professional support to continue to avoid admission to a residential setting for the person for whom they provide care. Services available include nursing assistants, professional alert responses, emergency relief, individually scheduled day care, occupational therapist advice, cleaning services and volunteer befriending. Care coaches act as both a client advocate and a service coordinator. The Care Coach provides a single point of contact for service providers, clients, volunteers and family members and constantly adapts the service to the clients needs.

Project progress is monitored by a steering committee consisting of representatives of various partners. A project report must be submitted to the National Health Insurance Institute every six months. The project currently reaches 110 people per year in Ghent, an urban region with a general area population of 280,000.

Evidence of Success

Potential Cost Saving	✓ ✓
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Improved Patient Outcomes	✓ ✓
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Strength of the evidence	✓ ✓
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Cost Saving

- No formal cost benefit analysis, but the reduced admission rates to nursing homes and reduced lengths of stay, facilitated by a P3 Unit may directly translate into cost savings.

Improved Patient Outcomes

- Results to date show the P3 project delays nursing home admission by an average of eight months, exceeding the original objective of six months.
- Other benefits identified, include improved social and wellbeing benefits for clients and carers and improvement in Katz scores for clients. Monitoring and evaluation of the project is conducted by a scientific consortium from a number of universities using pre-defined measures of assessment.
- P3 came third in the Social Innovation in Ageing European Awards.

Applicability to the UK - Context

The numbers: In 2014, Age UK published figures revealing that 900,000 older people between 65 and 89 have unmet care needs. Needs ranged from every day activities such as preparing meals to taking medication. Between 2005 and 2013 the number of people over 65 in receipt of social care fell by a quarter.

The Cost: Expenditure on social care cost £7 billion including the NHS transfer in 2013. According to Age UK, to maintain the standards of social care seen in 2010/11, by 2020 expenditure must be around 11.49 billion.

Individual and Societal Impact: Lack of social care can greatly harm the quality of life of older people, depriving them of independence and leaving them in vulnerable positions. Without social care, older people may find themselves facing injury or worse, and end up leaving them reliant on an even greater level of care in the future.

Potential Impact if Diffused in the UK																					
<h3>Potential Cost Savings</h3>	<h3>Cost Saving: Methodology</h3> <h4>Level of Certainty: Low</h4>																				
<table border="1"> <caption>Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Cost Savings (Millions £)</th> </tr> </thead> <tbody> <tr><td>2014</td><td>100</td></tr> <tr><td>2016</td><td>250</td></tr> <tr><td>2018</td><td>450</td></tr> <tr><td>2020</td><td>650</td></tr> <tr><td>2022</td><td>850</td></tr> <tr><td>2024</td><td>1050</td></tr> <tr><td>2026</td><td>1250</td></tr> <tr><td>2028</td><td>1450</td></tr> <tr><td>2030</td><td>1800</td></tr> </tbody> </table>	Year	Cost Savings (Millions £)	2014	100	2016	250	2018	450	2020	650	2022	850	2024	1050	2026	1250	2028	1450	2030	1800	<p>Collecting data on the number of older people living in adult social accommodation in England and Wales, the cost to the Government and then dividing through we are able to estimate the monthly cost, per person. We then use population projections to estimate, holding the proportion of people living in adult social care constant and the annual increase in individuals living in care.</p> <p>Using the evidence which suggests nursing home admissions can be delayed for 8 months, for each individual, we then work out a cost saving based on this for each individual. This could result in a cost saving of up to £1.8 billion between 2014 and 2030.</p> <p>This assumes the 8-month delay can be matched across all new patients and that the proportion of older people in nursing homes remains constant. It also assumes that new entrants will equal the year on year difference according to our data, when in reality the number could be larger if more people were to leave nursing home care in the same year. We must also remember due to economies of scale the unit cost of each individual will be lower with a higher rate of admissions, however we cannot take this into account as we have no model for the increase in unit cost as a result of delaying admissions. There are other economic benefits however, as delaying admissions frees up the time and resources of older individuals, and the delayed admissions implies that their health is better managed, which reduces healthcare costs elsewhere.</p>
Year	Cost Savings (Millions £)																				
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<h3>Potential Patient Outcome</h3> <ul style="list-style-type: none"> • Delayed admission to nursing homes and improved general health allows for more independence and a greater standard of living. 																					
<h3>Enablers for Applicability</h3> <p>Macro-level influences</p> <ul style="list-style-type: none"> ✓ The Better Care Fund could be used to fund a similar innovation in the UK <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ Delaying admission to nursing homes is a clear incentive, in terms of costs and improving quality of life. <p>Cultural dynamics</p>	<h3>Barriers for Applicability</h3> <p>Macro-level influences</p> <ul style="list-style-type: none"> ✗ Due to the division in funding between health and social care in the UK, investment in this sort of social care prevention is difficult to secure <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✗ The adult social care sector currently significantly lags behind the NHS in terms of ICT capabilities. <p>Cultural dynamics</p>																				
<h3>Summary: What needs to happen for successful diffusion?</h3>																					
<p>Likelihood of application: ✓ ✓</p> <p>Level of disruption Required: ✓ ✓</p> <p>Strength of evidence: ✓ ✓</p>	<ul style="list-style-type: none"> • Delaying nursing home admissions can save money for both the individual and an adult social care sector which is under resourced and under staffed. • Coordinated care, as used in this innovation, can encourage a person centered approach to care. • For successful diffusion, there needs to be an improvement in the ICT capabilities of the adult social care sector, in order to integrate and coordinate care for the individual between various services. 																				

Innovation: Home Dialysis



Country of Origin: UK - Manchester

Productivity Area: Commissioning
Clinical

Innovation Theme: Giving Patients greater control over their health

Harnessing transformational technologies

Description of Innovation

The Manchester Royal Infirmary has implemented an innovative solution to improve care for dialysis patients, by providing the training and equipment to perform home dialysis. This has generated a number of cost savings and benefits for patients. Home dialysis brings in financial savings through being 40% less expensive than offering the same treatment in a clinical environment.

Launched five years ago, 70 patients have been trained to perform their own dialysis at home, generating cost savings of up to £1 million a year, according to the Central Manchester University hospitals foundation trust. Patients enjoy more independence and freedom, foregoing regular hospital visits for convenient home treatment. In addition to this, better outcomes are reported for patients by the trust. The flexible nature of this innovation has resulted in anecdotal evidence from patients receiving home dialysis to claim a noticeable increase in energy levels and improvements in general wellbeing.

Evidence of Success

Potential Cost Saving



Improved Patient Outcomes



Strength of the evidence



Cost Saving

- No formal cost benefit analysis, but for the 70 patient trial, the hospital reported savings of £1 million.

Improved Patient Outcomes

- Improved patient outcomes reported, as patients are able to treat themselves around their own timetables, leading to improved patient experience and superior clinical outcomes.
- Many patients undergo the treatment regularly while asleep which is less restrictive, more convenient and safer.

Applicability to the UK - Context

The numbers: At the start of 2014, 57,000 adults in the UK were receiving treatment for kidney failure. 23,683 of which were receiving hemodialysis. Over half of new patients receiving hemodialysis are over 65. Of the 4,900 new patients receiving hemodialysis in 2013, approximately 2,500 were over 65.

The Cost: It costs up to £46,000 annually for a single patient to use a hospital dialysis machines, while the equivalent cost for home dialysis is £26,000.

Individual and Societal Impact: Hemodialysis involves regular trips to the hospital which can have a disruptive effect on the livelihoods of patients in need of treatment.

Potential Impact if Diffused in the UK																					
<h3>Potential Cost Savings</h3>	<h3>Cost Saving: Methodology</h3> <h3>Level of Certainty: Medium</h3>																				
<table border="1"> <caption>Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Cost Savings (Millions £)</th> </tr> </thead> <tbody> <tr><td>2014</td><td>200</td></tr> <tr><td>2016</td><td>400</td></tr> <tr><td>2018</td><td>600</td></tr> <tr><td>2020</td><td>800</td></tr> <tr><td>2022</td><td>1000</td></tr> <tr><td>2024</td><td>1200</td></tr> <tr><td>2026</td><td>1400</td></tr> <tr><td>2028</td><td>1600</td></tr> <tr><td>2030</td><td>1800</td></tr> </tbody> </table>	Year	Cost Savings (Millions £)	2014	200	2016	400	2018	600	2020	800	2022	1000	2024	1200	2026	1400	2028	1600	2030	1800	<p>According to reports by the Central Manchester University hospitals foundation trust, the innovation has saved approximately £1 million for 70 patients. There are 50,000 people in the UK receiving treatment for incurable kidney failure, with 44% treated with hemodialysis. In order to work out the potential cost savings, we have assumed the proportion of people in the UK with kidney failure and in need of dialysis is held constant. From this we then assume that the same saving can be made for every 70 patients. This could result in a cost saving of up to £5.6 billion between 2014 and 2030. This does not take into account the fixed costs of implementing home dialysis and the fact that additional complications may exist, which will require some hospital visitation. However, the increased flexibility and freedom for those who suffer from kidney conditions will result in more economic activity which can have wider benefits. While this analysis is dependent on matching cost savings, it is likely from reducing costly hospitalizations that such savings are not beyond the realms of possibility.</p>
Year	Cost Savings (Millions £)																				
2014	200																				
2016	400																				
2018	600																				
2020	800																				
2022	1000																				
2024	1200																				
2026	1400																				
2028	1600																				
2030	1800																				
<h3>Potential Patient Outcome</h3> <ul style="list-style-type: none"> Results suggest improved health and longevity for the patient, as well as greater empowerment as patients. 																					
<h3>Enablers for Applicability</h3>	<h3>Barriers for Applicability</h3>																				
<p>Macro-level influences</p> <ul style="list-style-type: none"> ✓ With a strong focus on care in the community and a drive to reduce costs the case for home dialysis is strong. <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ The technology and equipment is available to enable this innovation to spread across the UK. <p>Cultural dynamics</p>	<p>Macro-level influences</p> <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✗ A national minimum target and greater incentives are needed for example a review of the tariff structures. A report from the All Party Parliamentary Group Kidney Group blamed ‘Cultural and Clinical Inertia’ for the low levels of home dialysis across the UK. <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✗ Further research is needed and Comparative audits of home dialysis rates by renal unit should be introduced. Patients and their families need greater support and information with regard to dialysis in a home or hospital setting. 																				
<h3>Summary: What needs to happen for successful diffusion?</h3>																					
<p>Likelihood of application: ✓ ✓</p> <p>Level of disruption Required: ✓ ✓</p> <p>Strength of evidence: ✓</p>	<ul style="list-style-type: none"> This is a promising innovation which can give patients greater control of their health and treatment, whilst saving the NHS money at the same time A challenge is whether other regions and NHS Trusts have the same desire as Manchester to disrupt traditional ways of working. There needs to be a cost benefit analysis, with results widely disseminated. 																				



Country of Origin: International
Productivity Area: Commissioning
Innovation Theme: Giving Patients greater control over their health
 Harnessing transformational technologies

Description of Innovation

A global collaborative project, EASYCare is aimed at the population of over 75s. Through intervention, the project aims to extend healthy active life in old age. Disease prevention activities are taken up at a local level through the introduction of practical and holistic assessments to identify threats to health, independence and well-being.

Once targeted the older person will gain access to a variety of services and sources of advice focused on the specific areas that are a concern to them. The tailored nature of this early intervention service means that person-centered care can be offered, closer to homes and in a way which creates many financially viable benefits to the oldest people in society.

Evidence of Success

Potential Cost Saving	✓ ✓
Improved Patient Outcomes	✓ ✓
Strength of the evidence	✓ ✓

As an international project, the application of EASYCare has been different across nations. In the Netherlands, randomized and controlled trials have shown a decrease in hospital admissions due to increased independence. In UK trials, evidence suggests reduced hospital admissions and long term care needs. As well as general improvements in independence and wellbeing.

Cost Saving

- A trial in Bridlington, where practices were established show a projected reduction in long-term care costs.
- In the total population of over 75s in the study, there was a 0.1% reduction in long term care costs, amounting to a saving of an estimated £30,000 per individual.

Improved Patient Outcomes

- Reduced hospital admissions.
- Reduced long term care needs.
- Compression of morbidity.
- Contribution to care planning.
- Population needs data for service development.
- Increased health independence and wellbeing.

Applicability to the UK - Context

The numbers: 70% of people turning age 65 can expect to use some form of long-term care during their lives. Older people account for 40% of emergency admissions.

The Cost: The average cost of long term care in the UK is £30,000 a year. Emergency admissions as a result of admissions of over 75s to hospitals was estimated in 2012/13 to cost the NHS approximately £563 million.

Individual and Societal Impact: The high costs and opportunity cost of healthcare workers is relatively high for a single individual. Older people find their independence, health and wellbeing diminished as a result of a long term care need.

Potential Impact if Diffused in the UK																					
Potential Cost Savings	Cost Saving: Methodology																				
	Level of Certainty: Medium																				
<table border="1"> <caption>Projected Potential Cost Savings (Millions £)</caption> <thead> <tr> <th>Year</th> <th>Projected Savings (Millions £)</th> </tr> </thead> <tbody> <tr><td>2014</td><td>150</td></tr> <tr><td>2016</td><td>300</td></tr> <tr><td>2018</td><td>600</td></tr> <tr><td>2020</td><td>1000</td></tr> <tr><td>2022</td><td>1400</td></tr> <tr><td>2024</td><td>1900</td></tr> <tr><td>2026</td><td>2400</td></tr> <tr><td>2028</td><td>2900</td></tr> <tr><td>2030</td><td>3300</td></tr> </tbody> </table>	Year	Projected Savings (Millions £)	2014	150	2016	300	2018	600	2020	1000	2022	1400	2024	1900	2026	2400	2028	2900	2030	3300	<p>A trial in Bridlington across a series of practices set up to implement EASYCare, there was a 0.1% reduction in the cost of long term care. The projected savings provided estimate that a delay or an avoidance for a single individual results in a cost saving of £30,000. To estimate the cost saving from this aspect of the project, we take the projected population of over 75s and estimate 0.1% of the population. We then apply the individual saving of £30,000 to estimate the total cost savings if we were to reduce long term care by 0.1% for this sub-group of the population.</p> <p>This could result in a cost saving of up to £3.3 billion between 2014 and 2030.</p>
Year	Projected Savings (Millions £)																				
2014	150																				
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2030	3300																				
Potential Patient Outcome	<p>This neglects the cost of implementing the EASYCare project, which will require a certain level of fixed costs in order to make the necessary structural changes. There will be additional cost benefits that will accrue as well. Reduced admissions to hospitals and improved general health will generate savings for the NHS and free up resources so that they can be put to use elsewhere in the health service.</p>																				
<ul style="list-style-type: none"> Improved general health, and implications of greater independence and reduced suffering from potential long-term, but preventable health issues, which could have a severely detrimental impact on quality of life. 																					
Enablers for Applicability	Barriers for Applicability																				
<p>Macro-level influences</p> <ul style="list-style-type: none"> ✓ The growing issue of underfunding in long term care means that both now and in the future, the UK will need to try different ways of working to reduce demand. <p>Policy and strategy dynamics</p> <ul style="list-style-type: none"> ✓ The innovation focusses on promoting independence and reducing hospital admissions, both of which are currently a significant focus of the NHS. <p>Cultural dynamics</p>	<p>Macro-level influences</p> <p>Policy and strategy dynamics</p> <p>Cultural dynamics</p> <ul style="list-style-type: none"> ✗ Whilst the NHS can be good at treating disease-specific symptoms, the alleviation of suffering and promoting overall wellbeing are both holistic goals which the NHS often struggles with. ✗ Despite a move towards a person-centered approach to health and care in recent years, the sheer scale of the NHS means that a truly tailored service such as this would require a significant change in thinking from health and care providers. 																				
Summary: What needs to happen for successful diffusion?																					
<p>Likelihood of application: ✓ ✓</p> <p>Level of disruption Required: ✓</p> <p>Strength of evidence: ✓ ✓ ✓</p>	<ul style="list-style-type: none"> This innovation has a strong evidence base, and indicates some promising results in both cost savings and improved patient outcomes. One significant strength of this innovation is that EASYCare is international in scope and operating in many different countries. This indicates the potential for international diffusion is strong. For increased UK diffusion, there needs to be a stronger move within the NHS towards care which is both personalised and holistic. 																				

Encouraging new innovators in UK healthcare

Our modelling in this report shows the potential to reduce costs and improve patient outcomes if innovation is fostered in the UK, and encouraged to diffuse. The previous innovations were selected because there has been sufficient evidence collected or evaluations carried out to allow for projections to be made on their potential financial impact in the UK if applied. This process naturally means that this report has not been able to undertake modelling on more recent, promising innovations which often have a small evidence base particularly in the health technology sector. To conclude this chapter therefore, we highlight some innovations which show promise, but are not yet at the stage where they are ready to be evaluated.

Tutella (UK based)

Tutella was founded to enable companies to help employees who are caring for a family member.

The economic case for this service is strong, with British business losing £1.3 billion a year in lost productivity from carers being forced to give up work.

The web-based service creates a “secure social network of friends and family” so that those closest to the person in need of care can coordinate and share the workload of caring for the individual. The service can also connect users to a ‘navigator service’, with specialist advisers which can offer advice and information on care options, and how to navigate the often complex world of getting and paying for care services.

<http://tutella.co/>

Quealth

Quealth is an app which covers the five most common NCDS (cancer, cardiovascular disease, dementia and COPD) and provides information on the most vital health risks and in depth information and advice. The user can input “health objectives”, which the app then provides advice and targets on how to achieve them. The app also has a health coaching function which provides targeted information and coaching (on quitting smoking for example).

<http://www.quealth.co/>

Myrecovery.ai

Myrecovery.ai is an app which gives patients customised in-depth information on the operation they are having, with detailed information on each step of the process. It can provide customised exercise and rehabilitation plans to improve recovery outcomes, with patients being able to track their process. The app is an NHS Choices Partner, and gives providers data insights into patient outcomes.

<https://www.myrecovery.ai/>

How to create the ‘perfect climate’ for healthcare innovation in the UK

About this chapter

In many respects and as some of the case studies in the previous chapter illustrate, the UK can be extremely effective in creating new, efficient innovations. However, while the UK may rank highly for innovation per se, and does manage to foster some successful innovation, the NHS has a less positive record of adopting innovation at pace and scale. Indeed, only a tiny portion of the healthcare budget is spent on diffusing new ideas and performance and yet the potential is huge. In this chapter, we will briefly explore the prevailing theoretical perspectives in healthcare diffusion before developing a healthcare innovation index to the UK in order to examine and highlight the respective strengths and weakness of the UK to apply and diffuse innovations. We also include in this chapter details of two innovations in UK healthcare which were successfully implemented and diffused.

Theoretical perspectives in healthcare

It would be remiss of any report on healthcare innovation particularly when considering how the UK can best apply and foster healthcare innovation not to consider Roger’s seminal work *‘Diffusion of Innovation’* from 1962. Within this approach Roger identifies the various stages and adopters of innovation and identifies the key characteristics of innovation that influence their adoption and diffusion³⁶. Roger argues healthcare innovations are adopted and diffused more easily when certain conditions are favourable. Furthermore, innovations are more likely to be diffused when they have the support and buy in of key opinion leaders and when homogenous groups of people sharing common values are involved³⁷. Invariably others have built on this theory, including adopting a more systemic approach to the theory of disruptive innovation thereby highlighting that radical change may be needed to lead and sustain innovation in the healthcare system³⁸. Indeed how countries foster the ‘perfect climate’ to create the optimal conditions for innovation application and diffusion is by no means clear, evidently a range of interlocking actors and influencers engage to provide a fertile bed for innovations to nest in, yet there is invariably no guarantee of future innovation off spring.

Building a healthcare innovation index for the UK – to assess the weaknesses and strengths of the UK for innovation diffusion

As noted above, while there is a growing body of research on healthcare innovation and its application and diffusion, to our knowledge the research has stopped short of developing a healthcare innovation index to measure and assess a country’s ability to spread diffusion. This is arguably, as highlighted in the Institute of Global Health Innovation report, 2013 *‘From Innovation to transformation: A framework for diffusion of healthcare innovation’* due to an absence of literature on some of the drivers of system transformation, which they explore under the category of ‘cultural dynamics’. Based in part on their framework and the findings of our previous report of the SOS health series *‘Creating a Sustainable 21st Century Healthcare System’*, we will develop a healthcare innovation index specifically focussed on the potential to apply and diffuse innovation within the UK context. Arguably as highlighted above, there is no set formula for assessing how and why some innovations are applied and diffused more than others, however through the development of this index, we hope to provide some insight into some of the key barriers and obstacles within the UK which may need to be overcome.

In this section, we qualitatively assess the forces influencing the application and diffusion of healthcare innovation in the UK. We look at four broad themes: system characteristics, actors, policy and strategy dynamics and cultural dynamics. Below is a written summary of the main strengths and weaknesses of the UK in terms of nurturing and adopting innovation in health and social care. The full index, which can be found in Appendix, offers a more detailed breakdown of the specific characteristics of these four themes.

³⁶ Institute of Global Health Innovation (2013). *From innovation to transformation: A framework for diffusion of healthcare innovation*. https://workspace.imperial.ac.uk/global-health-innovation/Public/From_Innovation_to_Transformation.pdf

³⁷ Barnett et al (2011) *Understanding innovators’ experiences of barriers and facilitators in implementation and diffusion of healthcare service innovation*, BMC Health Services Research

³⁸ Barnett et al (2011) *Understanding innovators’ experiences of barriers and facilitators in implementation and diffusion of healthcare service innovation*, BMC Health Services Research

The system characteristics of the UK healthcare environment

Influencing forces:

The economy and employment	The political environment
The legal environment	The regulatory environment
The legislative environment	Health system productivity
Health system funding	Health system workforce
Health system skills	Health system commissioning
Health system national leadership	Social care
Innovation environment	Investment environment
Infrastructure for ICT	Research environment

Strengths of the UK

The UK economy is relatively stable and competitive. On top of this, health spending in the UK is protected and current Government plans are for a slight increase in annual health budgets until 2020. There is also strong leadership within the NHS, and a wide recognition that innovation must be encouraged in the NHS if it is to continue to provide high quality healthcare free at the point of use. Multiple programmes, grants and awards have been set up to recognise and diffuse innovation across the health system. Leaders who want to see a climate in the UK which successfully diffuses the best in innovation have multiple tools at their disposal. For example, unlike in a privatised system, Government has access to direct workforce policy levers such as education, migration and pay which can improve workforce productivity. More broadly, the UK has a relatively advanced IT infrastructure, strong research institutions including some of the world's best universities, a relatively high-skilled domestic workforce and the ability, due to cultural, economic and linguistic reasons, to attract some of the best healthcare professionals from the wider world. In a post-Brexit economy, the UK is likely to have greater freedom to establish an industrial strategy that can build on the existing strengths of the UK health innovation sector. By encouraging home-grown innovation whilst having a truly global outlook in terms of emerging technologies, health innovation in the UK has the potential to flourish.

Weaknesses of the UK

In terms of the broader picture, the economic uncertainty post-referendum cannot be ignored, with many economic forecasts predicting slower growth and weaker public finances. In terms of the characteristics of the UK healthcare system, there are weaknesses. Productivity growth in the health system remains stagnant, and the system remains fractured. As well as the division between health and social care, the NHS is fragmented, limiting the benefits that can come with operating at scale. Many leaders have warned that planned increases in health spending is insufficient in the face of rising demand and increased output costs.

Influencing forces:

Secretary of State for Health	The Department of Health
NHS England	CCGs including GPs, nurses and clinicians
Health and Wellbeing Boards	Regulatory boards
Private sector: Startups	Private sector: SMEs
Private sector: Large companies	

Strengths of the UK

NHS England, in the Five Year Forward View, places innovation as a central point of their vision for the future of the NHS. From this, the Forward View has inspired a number of new and innovative care models such as the vanguard sites. The CCG model can though hinder innovation, which we discuss below. However, if utilised correctly, the model can ensure that innovation can be tailored to respond to specific local demand. In another strength, the creation of NHS Improvement through the merger of Monitor and the NHS Trust Development Authority is positive, in that it now has the dual role of accelerating innovation and ensuring financial responsibility amongst providers.

Weaknesses of the UK

There are a number of weaknesses in terms of the UK's ability to apply and diffuse healthcare innovation when looking at the actors involved. Whilst the CCG model can ensure solutions are tailored to local regions, it also ensures that the NHS is fragmented, and therefore can make it difficult for successful innovation and good practice to diffuse. Within central Government, the leadership structure of the Department of Health can mean that there is not one individual who is overall responsible for healthcare. Whilst there are positives to this structure, this has the potential to hinder the strong leadership and direction often needed to successfully implement innovation across an organisation. In terms of actors outside of the NHS and in the private sector, procurement practices within the NHS often lack transparency and can make it difficult for new companies to win contracts.

The policy and strategy dynamics of the UK healthcare environment

Influencing forces:

Vision and strategy	Incentives and rewards
Transparency of data	Communication channels between key players
Communication channels between key players	Technology
Accountability and performance management	
Specific policy/strategy to promote healthcare innovations	

Strengths of the UK

The system of incentives and rewards have, over the years, been changed within the NHS to encourage innovation. In the longer term, the implementation of targets (for example the target to treat cancer patients within a certain amount of days) has been shown to have been effective in many instances. An innovation and technology tariff has also recently been launched, which incentivises the uptake of innovation. In terms of data transparency, recent initiatives have made use of open data in both health and social care. For example, open data sets on GP prescribing patterns have allowed NESTA to identify GPs who are early adopters of innovation.

Weaknesses of the UK

There remains a problem within the NHS of financial structures that incentivise and reward output, rather than outcome. This can disincentivise adoption of innovation, as innovation which produces better patient outcomes by reducing medical activity can be under-recognised. Another system that can discourage innovation is the financial rules placed on CCGs to balance their budgets year on year. This can restrict innovation in the sense that many innovations require significant upfront costs, with the financial benefits seen more than a year later. In terms of data and its transparency, the picture is mixed in the UK. There remains a lack of readily available data to audit in primary care, and there is still too much data not being made publicly available, hindering bottom-up innovation.

Cultural dynamics

Influencing forces:

The patient	Adopting innovations to suit local context
Identifying and supporting innovation champions	

Strengths of the UK

There has been a recent drive to promote innovation champions within the NHS; this could be certain clinicians to promote specific technologies or practices, or programmes such as the Innovation Scouts, in which a network of leaders source and promote innovation within the NHS. In terms of the patient, an optimistic look at technology and society would argue that a new generation of tech-literate health consumers can take more control and ultimately responsibility for engaging in healthy lifestyle.

Weaknesses of the UK

However, whilst new technology can offer the tools for behaviour change in patients and the wider population, health literacy levels remain low in the country, especially when health information requires numeracy skills. There are also barriers in terms of a lack of collaborative working between different networks and individuals who act as innovation champions.

Successful health innovation in the UK – what can we learn?

It is of value to look at innovations which have been successfully adopted and diffused, to identify what factors enabled them to successfully spread. In this section we look at two successful innovations in recent years; independent treatment centres and the centralisation of stroke centres.

Independent treatment centres

These are private-sector owned centres which are contracted with NHS England. They are usually found inside NHS hospitals, and provide common non-emergency surgery and procedures. They often perform more simple, ‘bulk’ surgery such as cataract operations, as opposed to more complex procedures.

These treatment centres were established to provide a specific solution to a specific problem; unacceptably long waiting lists for elective (non-emergency) surgery. Hospitals found that they had long waiting lists for relatively straightforward operations, as these operations were regularly delayed due to prioritisation of emergency surgeries, and a lack of resources³⁹. By commissioning out these services on bulk, rather than more expensive spot purchases, it was predicted that this would lower costs whilst quickly and dramatically reducing waiting times for these operations.

Independent treatment centres were adopted in many parts of the country, and their successful diffusion appears to come from two factors. Firstly, like many successful innovations, independent treatment centres were an answer to a specific challenge facing the health service (long waiting times for non-emergency procedures). Once a specific problem has been identified, an innovation which claims to offer the solution quickly gains traction. Secondly, what is clear from this innovation is that it was implemented top down, with strong determined leadership from the top of Government. The new Labour Government had been elected with a specific pledge to reduce operation waiting times, therefore there was a strong political will which moved down the health service and hastened their implementation. An innovation which is a specific policy of central Government will have a greater chance of succeeding (although it must be questioned whether there will be a greater reluctance to adapt or withdraw the innovation if it turns out to be not as effective as the Government had hoped it would be).

The centralisation of stroke centres

In 2010, both London and Manchester remodelled their stroke services to provide more specialist services in fewer hospitals. Instead of 30 London hospitals providing care for stroke patients, eight hospitals were set up as “hyperacute units” which allowed for highly specialised and concentrated stroke care; in Manchester, three specialist centres were set up, with patients who had symptoms of stroke being transferred there within four hours⁴⁰. Hospitals were invited to submit bids to become a specialised stroke unit in London, and an expert panel, all based outside of London, evaluated each site and selected eight, and included geography and performance of each site in their criteria⁴¹.

Whilst independent treatment centres were successfully implemented due to a top down prioritisation from Government of reducing waiting times, hyperacute stroke units was a product of building a solid evidence base on what worked. The Department of Health published a 10-year National Stroke Strategy in 2007, which argued that concentrating treatment for strokes can dramatically improve patient outcomes⁴². Evidence was collected, which strengthen the argument for this innovation; a UCL evaluation found that the innovation directly saved lives and reduced days spent in hospitals by patients⁴³. The Kings Fund also argue that as well as the compilation of a robust evidence base,

³⁹The King's Fund, (2009), *Briefing: Independent sector treatment centres*. Accessed at: <https://www.kingsfund.org.uk/sites/files/kf/Briefing-Independent-sector-treatment-centres-ISTC-Chris-Naylor-Sarah-Gregory-Kings-Fund-October-2009.pdf>

⁴⁰Nursing Times, (2014), Centralising stroke care in specialist units has saved lives. Accessed at: <https://www.nursingtimes.net/clinical-archive/cardiology/centralising-stroke-care-in-specialist-units-has-saved-lives/5073634.article>

⁴¹The Kings Fund, (2014), Reforming the NHS from within: Beyond hierarchy, inspection and markets. Accessed at: https://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/reforming-the-nhs-from-within-kingsfund-jun14.pdf

⁴²Stephen Morris, (2014), Impact of centralising acute stroke services in English metropolitan areas on mortality and length of hospital stay: difference-in-differences analysis, Accessed at: <http://www.bmj.com/content/349/bmj.g4757>

⁴³Stephen Morris, (2014), Impact of centralising acute stroke services in English metropolitan areas on mortality and length of hospital stay:

the diffusion of this innovation was due to “effective person-to-person communication rather than technological solutions”⁴⁴. It is effective leadership, and allowing these leaders to communicate their innovations, that can bring about change in health systems⁴⁵.

What are the indicators of successful health innovation adoption and diffusion in the UK today?

This chapter has assessed where the UK is placed today in terms of the ability to successfully adopt innovation, and encourage its spread. In this last section, we take stock of this and look at what the UK is doing right and just as importantly, what it is doing wrong. We utilise learnings from both our analysis of the implementation journeys of two successful innovations in the UK, as well as our full healthcare innovation index which is summarised earlier in this chapter and can be found in appendix.

Lessons learned from innovation case studies

Earlier in this concluding chapter we looked at two innovations in the UK shown to have some degrees of success in better patient outcomes and efficiency, the centralisation of stroke centres and independent treatment centres. How they were successfully implemented can serve as lessons for diffusing other innovations in healthcare across the country. It showed that a strong evidence base, demonstrating effectiveness, is crucial to gain traction. An innovation that is a specific solution for a specific challenge (for example, unacceptably long operation waiting times) has more of a chance of succeeding.

We also see that strong pressure or will from central Government leads to a greater chance of success in adoption of innovation. If it is a Government priority to tackle a certain issue within healthcare, there will be more resources available to any innovation. There is, of course, the danger that too much top down pressure from central Government can lead to innovation being pushed through too hastily. A strong evidence base must be amassed for any large scale diffusion of innovation. On a more local level, it is apparent that strong leadership within the organisation in question, whether it is NHS England, a local CCG or a Foundation Trust, is important in having vision and drive through innovative change successfully.

Encouraging innovation: Main strengths of the UK today

Our innovation index highlights a number of strengths of the UK in terms of how it is placed to encourage innovation to improve health outcomes and reduce cost. The UK has a strong history of innovation in this field, and is supported by world-leading higher education and research institutions. Some of the most cutting-edge health tech start-ups are emerging from the UK. There is also a real movement within the NHS to prioritise innovation, and there is a wide acceptance amongst leaders that action needs to be taken now to ensure the financial sustainability of the NHS in the face of demographic change and increasing healthcare costs. The Five Year Forward View places innovation at the heart of its central message, and this has been strengthened by a number of new campaigns, grants and projects to foster and promote innovation. And whilst some of the structures of the NHS can hinder innovation, unlike in other countries with a private or semi-private healthcare system, central Government has access to strong workforce levers such as education, pay levels, training and migration, which can push through innovative practices and get the most out of the NHS workforce.

Encouraging innovation: Main weaknesses of the UK today

The UK is at a crossroads. The foundations are there, as outlined above, to successfully foster innovation and ensure the NHS is sustainable in future years, but it is important that this is at the forefront of policy makers’ minds, as it will only continue to grow in importance as our population ages. On a systems level, there are other weaknesses. Social care has for too long played second fiddle to the NHS, and seriously lacks the funding and strong leadership which is hindering progress. A financially unsustainable model of adult social care has a knock-on effect in terms of NHS sustainability. And within the NHS, too many funding mechanisms still do not reward or encourage innovation, with payments too often based on output and not outcome, and CCG funding regulations discouraging the bold moves needed to create long term cost savings whilst still maintaining high levels of quality.

difference-in-differences analysis, Accessed at: <http://www.bmj.com/content/349/bmj.g4757>

⁴⁴ The Kings Fund, (2014), Reforming the NHS from within: Beyond hierarchy, inspection and markets. Accessed at: https://www.kingsfund.org.uk/sites/files/kt/field/field_publication_file/reforming-the-nhs-from-within-kingsfund-jun14.pdf

⁴⁵ Ibid.

Future paths for health productivity and the affordability of Government finances

About this chapter

In an earlier chapter, we demonstrated how health expenditure has been driven by changing population structures, economic growth and a residual which captures technological change, relative prices and policies and institutions. We noted that technological change has been an important driver in healthcare costs and that to contain future cost growth, we must get better at identifying and disseminating those efficient innovations and technological changes that manage to deliver improved health outcomes at the same, or at lower cost. To underline the importance of this point, this chapter develops three plausible scenarios for future productivity growth in the health sector and models how these scenarios could impact on health expenditure and the overall state of Government finances. The results are stark – maintaining the current trend rate of productivity growth in the health sector would result in a significant rise in health spending and the deficit as a proportion of GDP.

Scenario planning is a useful means of identifying ‘early warning’ indicators that signal a shift towards a certain kind of future – whether good or bad. Given the difficulty in trying to predict what the world will look like at some distant point in time, scenario planning is a useful tool of analysis – challenging our basic assumptions of what the future might entail and correspondingly prompting us to develop possible policy responses.

Previous scenarios on health expenditure

There have been a number of attempts to project health expenditure in the UK and elsewhere along similar lines. Perhaps the most extensive efforts have been undertaken by the OECD which in 2013 outlined two scenarios for health spending with different assumptions regarding growth in residual health expenditure. In a “cost pressures scenario” – which implicitly assumes no policy change - residual health expenditure is projected to grow by 1.7% per year. By contrast, in a “cost-containment scenario” it is assumed the residual will converge to zero by 2060 – which assumes that policies are more effective in the future in controlling growth in expenditure. The OECD make two additional important assumptions. First, they assume an income elasticity of 0.8 – in other words if incomes rise by 1%, healthcare spend will rise by 0.8%. And they assume longevity gains are translated into equivalent additional years in good health. They also rerun their projections accounting for the compression and expansion of morbidity.

In a separate report, the OBR assumes a baseline scenario where there is no residual growth in healthcare costs. Costs therefore only rise in line with income growth and demographic change. By contrast, in a low health productivity scenario, the OBR envisages a residual of 1.1% which it argues best reflects recent history in the UK. The OBR assumes an income elasticity of 1 – in other words if incomes rise by 1%, healthcare spend will also rise by 1%. The OBR also implicitly assumes that healthy life expectancy rises proportionately with total life expectancy. They do not assess the sensitivity of their projections to the compression/expansion of morbidity. But, critically, they do assess the impact of the different health productivity scenarios on overall Government spending.

The scenarios

We construct three simple scenarios based on projections for: demographic change, the rate of productivity growth in the economy and a residual. Given the importance of the residual in explaining past rises in healthcare expenditure, each scenario models the residual differently, while the future of the economy and population structure remain the same for each. We take the following approach to modelling the residual:

- 1. Transformative change:** The health service makes significant productivity gains and ensures that residual health care costs are zero over the projected period.
- 2. No policy change:** There is no meaningful policy change, productivity in the health service continues to disappoint and residual health costs rise in line with the historic OECD average (1.7%).
- 3. Gradual convergence:** In light of continuing cost pressures, it is perhaps hard to imagine public policymakers and individual NHS Trusts will not make adjustments over time to improve efficiency. But transformation will take time and is unlikely to happen overnight. For this reason, productivity

gradually improves over time so that residual health costs converge to zero by the end of the projected period (from 1.7% in 2019-20 to 0% by 2064-5).

Putting numbers to the scenarios: Underlying assumptions

To make forward projections for health spending we used the following methods.

1. *Estimating future demographic change*

We use the ONS' 2014 Principle Population Projections by single year of age as the basis for the UK's future age structure. These are the latest official projections for the UK's population.

2. *Income growth*

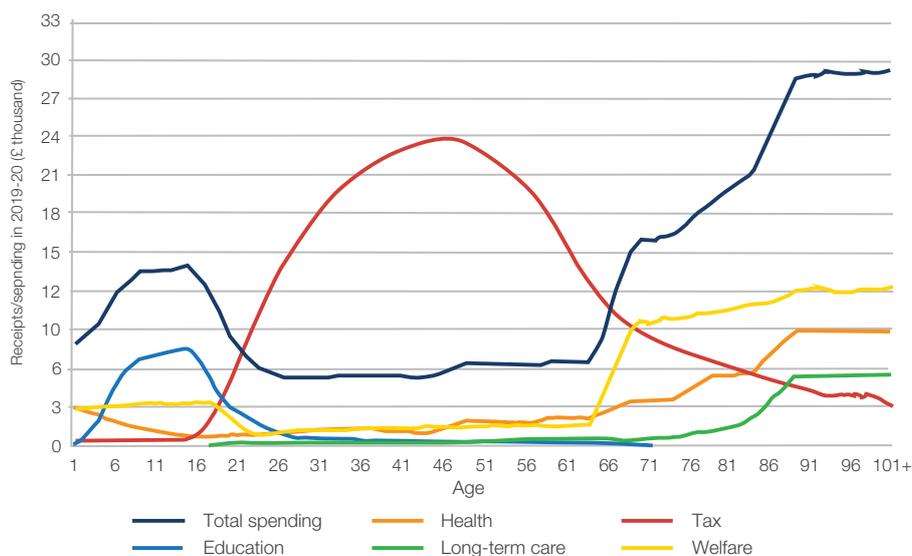
We use the OBR's core assumption of 2.2% earnings growth over the entire period as the basis for future income growth. We assume healthcare is a normal good – if incomes rise by 2.2% then health spending will also rise by 2.2%.

3. *Developing age related spending profiles*

We use the OBR's health spending profile by single year of age as the baseline for our projections. By combining the age-specific spending profiles with population projections and our future assumptions around income growth, we are able to create projections for health spend per head over the next 50 years. From this we derive total annual public spending on health. For simplicity we do not assume healthy ageing or that morbidity compresses or expands over time.

The chart below, taken from the OBR's 2015 Fiscal Sustainability Report, provides a representative profile of public spending and taxation per head based on single year of age. With regard to spending on health, there is a clear rise after the age of 60 before peaking in later life.

Figure 7: Representative spending/taxation profiles by single year of age



Source: OBR

4. *Factoring in residual health costs*

In order to factor in the residual costs we simply add this to the 2.2% earnings growth assumption. So for instance, for the no policy change scenario we assume that healthcare costs per person rise by 3.9% per annum (2.2 + 1.7) instead of 2.2%. For the gradual convergence scenario we take a slightly difference approach. We start by assuming that residual costs rise by 1.7% (so total costs rise by 3.9%) before incrementally falling to zero over the period (so total costs rise by just 2.2% in 2064-65).

5. *Projecting the impact on the public finances*

Steps 1 to 4 allow us to derive future values for spending on health in line with the different scenarios. But we want to go a stage further and assess their potential impact on the public finances. For this, we utilise the OBR's assumptions for future economic growth and non-interest public spending - excluding health spending - as a proportion of GDP. We then plug in the numbers from our health spending scenarios in order to derive new public spending figures. This allows us to project future health spending as a proportion of GDP and to calculate the impact of the different scenarios on the underlying primary balance (or budget surplus/deficit) over the next 50 years.

The primary balance is a critical measure of sustainability since it tells us whether governments are consistently spending more than they take in tax revenue. Arguably, a government cannot continue to run ever increasing deficits over time unless GDP also rises by the same amount. Therefore the key thing to note is whether the deficit is rising or falling as a proportion of overall GDP.

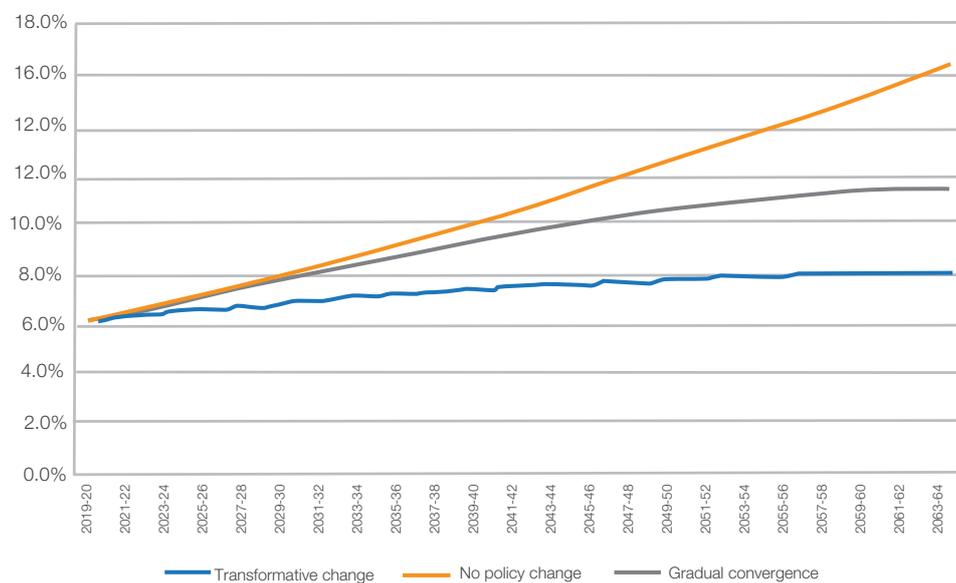
Results

The results show that changes to underlying productivity in the health sector will have a dramatic effect on the public finances. We look at health spending and the primary balance in turn.

Health spending as a proportion of GDP

- In the **transformative change** scenario, health spending rises from around 6% of GDP in 2019-20 to 8% by 2064-65.
- In the **no policy change** scenario, health spending rises from around 6% of GDP in 2019-20 to 16.4% by 2064-65.
- In the **gradual convergence** scenario, health spending rises from around 6% of GDP in 2019-20 to 11.4% by 2064-65.

Figure 8: Health expenditure as a proportion of GDP (various scenarios)

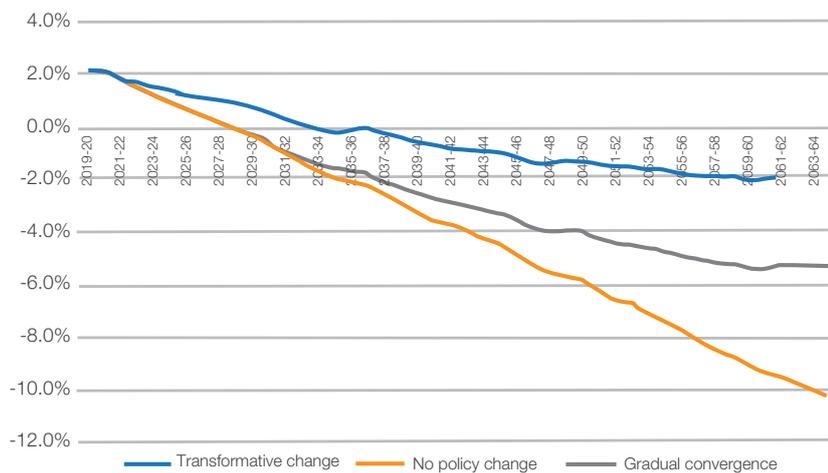


Source: OBR FSR 2015 and author's calculations

The primary balance – the difference between non interest receipts and expenditure

- In the **transformative change** scenario, the primary balance falls from a surplus of around 2% of GDP to a deficit of 1.9%.
- In the **no policy change** scenario, the primary balance falls from a surplus of around 2% of GDP to a deficit of 10.3%.
- In the **gradual convergence** scenario, the primary balance falls from a surplus of around 2% of GDP to a deficit of 5.3%.

Figure 9: Primary balance as a percent of GDP (various scenarios)



Source: OBR FSR 2015 and author's calculations

Our three scenarios lead to dramatic differences in health spending over the period, and significant differences in the deficit as a proportion of GDP. To put these numbers in perspective – The UK’s deficit in the aftermath of the financial crisis was 9.3% of GDP, Ireland was 12.4% and Greece was 10.1%. Our no policy change scenario would therefore take us back to our crisis level of deficit. Even in a transformative change scenario, we still end up with a deficit in the Government finances but nowhere near as large and therefore far more sustainable.

In summary, the future trajectory of productivity in the health sector is highly uncertain but it will make a massive difference to overall levels of fiscal sustainability in the UK. It is important to note that our worst case scenario is purely based on current trends across developed countries rather than envisaging something dramatically different to the norm. This graphically demonstrates why maintaining the status quo is not an option and why supporting efficient innovation must be now be a priority for the UK health sector if we are to contain future cost growth.

Conclusions and Recommendations

Conclusion

Modelling seven health innovations from the UK and globally that show we can do ‘more with less’ and deliver improved patient outcomes, this report shows that we could save the NHS up to £18.5 billion between 2015 and 2030, and help meet the predicted £22 billion black hole in the NHS budget by 2020. Below, we summarise the main themes and findings of this report.

The challenges ahead mean that we cannot go on in the same way:

The costs of providing healthcare is increasing in the UK. The research in this report demonstrates that similar to other countries, health spending in the UK has increased disproportionately faster than economic output; average health spending per person increased by 3.7% between 1971 and 2012, whilst GDP per person increased by just under 2% over the same time period. Health expenditure is also increasing in terms of the total proportion of public spending, increasing its share of overall Government expenditure by over 6 percentage points. With the population growing older, limiting this increasing expenditure will remain even harder but even more important.

We need to concentrate on the residual:

This report also analyses the factors behind the disproportionate growth in health expenditure. Examining the existing literature, it is shown that the effect of demography on health spending is relatively weak (although population bulges mean that as the baby boomer generation reaches older age, the effect will possibly increase). Increasing income growth in the UK accounts for two-thirds of the difference in health spending growth.

The remaining difference is known as the “residual”, comprised of ‘policies and institutions’, ‘relative prices’ and ‘technological change’. OECD data shows that the increase in health spending which is due to the residual in the UK between 1995-2009 was 2.5%. In another way of looking at it, over 50% of the total healthcare cost growth was down to the residual. Since it is impossible to control the rate of growth in the economy, or the rate of population ageing, we argue that it is this residual that policy makers need to concentrate on if we are to ensure a financially sustainable, yet high performing, health system.

The focus therefore must be on reducing costs through technological change and policies and institutions. Whilst in some instances technological advances can increase health expenditure, technological innovations can also reduce costs, especially in the longer term. For example, we show in this report that adopting the Urban E-Health Pilot in the UK has the potential to save £538 million between now and 2030. The evidence shows that the UK already has many measures in place that will limit increases in spending due to ‘policies and institutions’, such as strong gatekeeping through GPs to reduce emergency admissions, recent restrictions on staff pay and relatively strong price regulation for hospital services. However, there is still potential for improvement in this area. We therefore argue that we must focus mostly on these residual health costs if we are to meet the challenges of unsustainable increases in health expenditure relative to increases in GDP.

Innovation can meet this challenge:

As noted above, given the funding constraints facing the health service and indeed considering some of the ‘easiest’ spending cuts have already been made, the role of innovation to support productivity gains is essential for future sustainability. However the innovations sourced for this report, are chosen not simply for their ability to save money, critically they needed to demonstrate improved health and well-being outcomes. Our innovations are all exemplars of giving patients greater control over their health and moving towards a co-production model of care, harnessing transformational technologies and moving away from a “one size fits all” model to effective risk reduction and tailoring treatments and prevention to meet specific individual characteristics.

This report showcases seven outstanding global and home grown innovations with a strong evidence base of demonstrable success according to our predefined criteria. We measure the potential productivity gains to the NHS by theoretically applying at the national level some of the most promising health care innovations. We show that if our seven innovations were successfully rolled out across the UK and retain the cost savings demonstrated in the innovation’s country or region of origin, we could

save the NHS up to £18.5 billion between 2015 and 2030. These innovations could also save up to £6.3 billion of the social care budget, meaning that altogether these innovations could generate up to £24.8 billion in cost savings of the UK's health and care expenditure between 2015 and 2030. This equals a total annual saving of £1.6 billion a year for the Government.

Our innovations respond to some of the prescient challenges facing us today, the growth of non-communicable diseases, multiple chronic diseases and the growing shortage of healthcare workers alongside responding to new opportunities in the space of advances in health technology, a more empowered health consumer and an increasing drive towards integration. They range from innovative technologies to take people out of hospitals and give them greater control of their own health in the Urban Home Dialysis, to the P3 model of adult social care which moves away from a "one size fits all" approach to care and population based intervention programmes to prevent falls among older people in Australia through the 'Stay on Your Feet Programme'. Critically for each innovation we explore the potential for it to be rolled out across the UK, assessing the enablers and barriers for applicability and consider what needs to happen within a UK context for successful diffusion.

But it needs to be diffused in the right way:

The challenge for the UK often is adopting innovation and the diffusion of it. This report assesses how innovation can be successfully implemented. We show this through reviewing previous health innovations that have been adopted in the UK, as well as developing a healthcare innovation index which assesses the strengths and weaknesses of the UK in terms of innovation diffusion.

From our case studies, which were Independent Treatment Centres and the centralisation of stroke services, a number of determining factors stand out. Strong leadership is widely acknowledged as important in having the vision and the drive to push through the often disruptive change required. An innovation also has a greater chance of success if it is an area of priority for central Government, with more resources available.

Our UK innovation index shows the UK performing strongly in some areas, but in others less so. We have the benefit of world-leading research institutions and higher education which can support innovation in healthcare. There is strong leadership within the NHS that prioritises the need for innovation and has a recognition that the NHS must continuously strive to do 'more with less' if it is to be sustainable. The structures of the NHS mean that central Government has the levers at their disposal to foster innovation, which gives the UK an advantage over other countries with privatised or hybrid health provision models.

However, there are weaknesses, and the UK is often not doing enough with the tools at its disposal. The model of social care is underfunded and fragmented, which has consequences also for NHS costs. Also, funding mechanisms within the health system can often discourage innovation. There continues to be a slow uptake in the UK of new drugs and treatments, with adoption speed varying across the country.

A lack of action will have severe ramifications:

After demonstrating how increasing expenditure on health has been driven by population change, economic growth and the 'residual', we conclude this report by showing, through scenarios, that a continuation of the normal will have severe knock-on effects for the UK's deficit as a proportion of GDP. We created three scenarios. In the 'transformative change' scenario, which predicts that the health service makes significant gains in productivity and ensures residual health care costs are zero during the projection, health spending increases from 6% of GDP in 2019-2020 to 8% by 2064-65. In the 'gradual convergence' scenario, productivity gradually improves and the residual slowly reduces, health spending still increases from 6% of GDP to 11.4% in the same time period.

Ominously, in the 'no policy change' scenario modelled, which predicts a continuation of low productivity gains in the NHS and an increase in residual health costs in line with historic trends, health spending increases from 6% to 16.4% of GDP between 2019-20 to 2064-65. Moreover, in this scenario, we have modelled that the primary balance of the UK falls from a surplus of 2% of GDP to a deficit of 10.3%.

This scenario of no change should serve as a stark warning to Government. If we continue to operate our health service as we currently do, the UK will have a budget deficit even greater than the deficit immediately after the financial crisis. These scenarios highlight how serious the financial health of the UK could be if there is a lack of action in identifying and disseminating the most efficient health innovations across the country.

Final thoughts:

This report clearly demonstrates that we need to act now to ensure future sustainability of our health systems. We have shown that doing nothing will be insufficient. Innovation in healthcare exists; in this report we have highlighted examples from both in the UK and globally, and demonstrated that there is the potential to see significant cost savings if we harness the best innovation and adopt them successfully. The UK, as our innovation index and this chapter shows, has the foundations to be world leaders in innovative healthcare solutions in the light of demographic change. There are, however, significant challenges in this journey. We hope that policy makers and leaders in health and social care find this report a constructive and useful tool to start to overcome these challenges.

Appendix

Forces influencing applications and diffusion of Healthcare Innovation	Strengths	Weaknesses	Rating for innovation Diffusion (1-5, 1 LOW -5 High)
A. System Characteristics			
1. The economy and employment	<p>The UK economy is relatively stable and competitive. According to estimates, UK GDP continued to grow in Q1 of 2017, although growth was slower than expected⁴⁶.</p> <p>UK unemployment has recently fallen to its lowest level since 2005, with employment rates at a record high⁴⁷.</p> <p>A successful Brexit, which maximises UK opportunities, would see greater trade and investment in health innovation and disruptive technologies, strengthening the NHS and increasing international trade.</p>	<p>The EU referendum result has created high levels of uncertainty, and could have long-term negative consequences on the UK economy.</p>	3
2. The political environment	<p>Overall stable Government at present.</p> <p>Strong discourse on protecting the NHS.</p> <p>With the correct approach, Government can utilise the UK's numerous strengths in healthcare innovation to meet domestic challenges whilst also becoming health innovation leaders in a post-Brexit world.</p>	<p>Possible political instability within political parties could lead to short policy cycles.</p> <p>Continuing uncertainty over the nature of Britain's withdrawal from the EU, with wide ranging impacts including further devolution.</p>	3
3. The regulatory environment	<p>The Clinical Trials Directive has been criticized by industry leaders as leading to "increased bureaucracy and costs for running clinical trials"⁴⁸. Leaving the EU will mean the UK would not have to sign up to this Directive. Exiting the EU will give the UK greater control in setting an industrial strategy which can support and encourage innovation in the UK health sector.</p>	<p>Conversely, representatives of the pharmaceutical industry stated that in the face of Brexit, a separate trial application process would "result in additional cost... and damage to the UK's clinical trials market"⁴⁹.</p>	3

⁴⁶ONS (2017), Second estimate of GDP: Jan to Mar 2017. Accessed at: <https://www.ons.gov.uk/economy/grossdomesticproductgdp/bulletins/secondestimateofgdp/quarter1jantomar2017>

⁴⁷ONS, (2017). UK labour market: May 2017. Accessed at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/may2017>

⁴⁸Applied Clinical Trials, (2016). Oncologists Oppose Brexit, but Criticize EU Directive. Accessed at: <https://www.ons.gov.uk/employmentandlabourmarket/peopleinwork/employmentandemployeetypes/bulletins/uklabourmarket/may2017>

⁴⁹Janice Morton, (2016). EU in or out? What a pro-Brexit vote could mean for UK medical device companies. Accessed at: <https://medtechengine.com/article/brexit-uk-medical-device-companies/>

4. The legislative environment	The UK has many tax incentives for pharmaceutical and other large firms involved in the process of producing health care innovations, as well as tax reductions for individual researchers and small and medium sized enterprises.	Whilst the situation is currently uncertain, the UK may have to withdraw from the European Medicines Agency, which harmonises medicine regulation across the EU and makes it more efficient to import new innovative drugs ⁵⁰ .	4
5. Health system - productivity	Heavy emphasis on innovation in the health service in England, with 1.76% of GDP being spent on research and development. In global competitiveness rankings England ranks 10th out of 148 countries and in a global innovation index, the UK ranks 3rd out of 142 countries ⁵¹ . In a Commonwealth Fund report highlights that among 11 developed nations, the UK is the most efficient ⁵² .	Productivity growth in the health system remains stagnant. Although great improvements have been made to the quality of outputs in the health sector, this has been matched by increasing costs of inputs. This leaves the growth of productivity much lower than that of the economy as a whole.	3
6. Health system – funding	Unlike many other areas of Government spending, health spending in the UK is protected, and planned to increase slightly until 2020 ⁵³ .	Commissioners within the NHS must balance budgets year on year. These budget cycles can make it difficult for the NHS to make initial high investments often needed to see longer-term cost savings through innovation ⁵⁴ . The net deficit in 2015-16 was reported to be £2.4 billion across NHS providers. However, independent analysis has shown the true deficit to be nearly £3.7 billion ⁵⁵ . Whilst the NHS budget is protected, funding has slowed in recent years. From 2015/16 to 2020/21 budgets are only set to grow 1.1% a year, which is insufficient to meet rising demand ⁵⁶ .	2

⁵⁰The King's Fund, (2016), *Five big issues for health and social care after the Brexit vote*. Accessed at: <https://www.kingsfund.org.uk/publications/articles/brexit-and-nhs>

⁵¹Institute of Global Health Innovation, (2013). *Global diffusion of healthcare innovation*. Accessed at: <https://assets.ipsos-mori.com/gdhi/>

⁵²The Commonwealth Fund, (2014). *Mirror, mirror on the wall: How the performance of the U.S. health care system compares internationally*. Accessed at: http://www.commonwealthfund.org/~media/files/publications/fund-report/2014/jun/1755_davis_mirror_mirror_2014.pdf

⁵³The King's Fund, (2017). *The NHS budget and how it has changed*. Accessed at: <https://www.kingsfund.org.uk/projects/nhs-in-a-nutshell/nhs-budget>

⁵⁴NHS Confederation, (2015). *Cracking the innovation nut: Diffusing healthcare innovation at pace and scale*. Accessed at: <http://www.nhsconfed.org/resources/2015/06/cracking-the-innovation-nut-diffusing-healthcare-innovation-at-pace-and-scale>

⁵⁵Nuffield Trust, (2016). *Behind the numbers: NHS finances*. Accessed at: <https://www.nuffieldtrust.org.uk/resource/behind-the-numbers-nhs-finances>

⁵⁶The King's Fund, (2016). *How hospital activity in the NHS in England has changed over time*. Accessed at: <https://www.kingsfund.org.uk/publications/hospital-activity-funding-changes>

<p>7. Health system - workforce</p>	<p>The UK is currently well placed to attract highly skilled migrant workers to the health service, partly due to a demand for health professionals and the international prevalence of the English language.</p> <p>The fact that the Department of Health is responsible for the NHS means that they have access to workforce policy levers within Government such as education, migration, working conditions and pay which can make positive impacts on workforce supply and productivity⁵⁷.</p>	<p>The Chief Executive of Health Education England has warned that there will be an ongoing nursing shortage for the next 4 years, with over 23,443 vacant nursing posts in the NHS in England, Wales and Northern Ireland⁵⁸.</p> <p>The junior doctors strike has damaged trust within the NHS workforce, and between the NHS and the Department of Health.</p> <p>Pressures on politicians to reduce net migration, particularly after the EU referendum, could impact negatively on the workforce of the health system.</p> <p>The benefits of the workforce policy levers available have often not been utilized, with limited collaborative working across Government departments⁵⁹.</p>	<p>2</p>
<p>8. Health system - skills</p>	<p>The percentage of high skilled workers in the NHS rose between 2002 and 2012 by 1.6%⁶⁰.</p> <p>Innovative pilots have been successful in advancing the skills and knowledge of NHS staff, and developing clear career pathways which can improve the retention of high-skilled staff⁶¹.</p> <p>The 'support workforce' within the NHS is recognised as flexible, large and highly skilled, whilst also being relatively quick to train⁶².</p> <p>In 2013 the coalition government committed itself to have 100,000 members of staff to have foundation level dementia training and to train a multi-disciplinary workforce to be able to work in both hospitals and the community⁶³.</p>	<p>Demographic change means that in the future, the health and social care workforce will have to adapt their skills. Patients will be older, and have more chronic long term conditions.</p> <p>Skills of leaders in the NHS need to also change; from "command and control" of their respective area, to ones of collaboration and integration⁶⁴.</p>	<p>3</p>

⁵⁷The King's Fund, (2009). *NHS workforce planning: Limitations and possibilities*. Accessed at: <https://www.kingsfund.org.uk/sites/files/kf/NHS-Workforce-Planning-Candace-Imison-James-Buchan-Su-Xavier-Kings-Fund-November-2009.pdf>

⁵⁸ONS, (2017). *Vacancies by industry*. Accessed at: <https://www.ons.gov.uk/employmentandlabourmarket/peoplenotinwork/unemployment/datasets/vacanciesbyindustryvacs02>

⁵⁹The King's Fund, (2009). *NHS workforce planning: Limitations and possibilities*. Accessed at: <https://www.kingsfund.org.uk/sites/files/kf/NHS-Workforce-Planning-Candace-Imison-James-Buchan-Su-Xavier-Kings-Fund-November-2009.pdf>

⁶⁰ONS, (2013). *Changing skills in the NHS, 2002-2012*. Accessed at: http://webarchive.nationalarchives.gov.uk/20160105160709/http://www.ons.gov.uk/ons/dcp171776_329101.pdf

⁶¹NHS Improvement, (2016). Retaining our skilled workforce - introducing a careers clinic and transfer process to advance knowledge and skills, and develop a career pathway. Accessed at: https://improvement.nhs.uk/uploads/documents/Case_study_-_UCLH_PD_.pdf

⁶²Nuffield Trust, (2016). Expanding skills of existing staff best way way to develop NHS workforce for 21st century. Accessed at: <http://www.nuffieldtrust.org.uk/media-centre/press-releases/expanding-skills-existing-staff-best-way-develop-nhs-workforce-21st-cent>

⁶³Department of Health, (2013). *New era of education training for NHS staff*. Accessed at: <https://www.gov.uk/government/news/new-era-of-education-and-training-for-nhs-staff>

⁶⁴Health Service Journal, (2015). *Ending the crisis in NHS leadership: A plan for renewal*. Accessed at: <https://www.hsj.co.uk/Journals/2015/06/12/y/m/e/HSJ-Future-of-NHS-Leadership-inquiry-report-June-2015.pdf>

9. Health system - commissioning	<p>Continuing moves towards integration means more joint commissioning between health and social care.</p> <p>Interventions in the form of the Sustainability and Transformation Partnerships will further cement joint commissioning and person centered planning.</p>	<p>NHS remains extremely fragmented, due to the nature of CCG's unable to operate at scale.</p> <p>Most innovation requires up-front investment and productivity yield may not go back to CCG.</p> <p>Autonomous purchasing decisions leads to different procurement processes.</p>	2
10. Health system – national leadership	<p>Simon Stevens, Chief Executive of NHS England, is vocal in defending NHS budgets and highlighting the need to continue to do 'more with less' through innovation.</p>	<p>Cultural issues have been identified by the NHS Confederation that suggest there are top down pressures in the management and running of the NHS which acts as a deterrent to medical leaders considering taking on chief executive leadership and stifles leadership skills⁶⁵.</p>	4
11. Social Care	<p>Recent budgetary developments such as the Better Care Fund and the council tax adult social care precept could go some way to address underfunding in the sector.</p>	<p>Health and Social Care remains in large parts distinct.</p> <p>Local Authorities continue to have budget cuts with more expected, with knock on effects for health.</p> <p>Ongoing political inertia and lack of consensus on how to solve the social care crisis, highlighted by the recent Conservative manifesto U-turn.</p>	2

⁶⁵NHS Confederation, (2008). *The challenges of Leadership in the NHS*. Accessed at: <http://www.nhsconfed.org/resources/2008/12/the-challenges-of-leadership-in-the-nhs>

<p>12. Innovation environment</p>	<p>There has been a clear direction with the NHS and Government to try to foster a climate that encourages innovation. Developments include:</p> <ul style="list-style-type: none"> • A new innovation prize for innovation that improves mental health outcomes⁶⁶. • The Test Beds programme, which trials innovations from around the world within the NHS, with successful innovations available for other regions of the UK to adopt⁶⁷. • An addition to the national tariff system specifically for innovations in medical technology, with the NHS negotiating large scale discounts on behalf of local organisations⁶⁸. • Introduction of the Accelerated Access Review, which involves patient groups, charities and research organisations in the development process of new innovation⁶⁹. • Establishment of Academic Health Science Networks, which have a specific focus on translating health research into practice⁷⁰. 	<p>Evidence suggests that the UK is not as good at embracing and implementing new and innovative technologies⁷¹. A Government report found that when it came to the uptake of best practice drugs, the UK was ranked 8th out of 13 other countries. The UK ranked even lower when it came to seven of 16 clinical-need type drugs, which included drugs for treating cancer, dementia and many other severe illnesses.</p> <p>There is variation across innovation uptake across the UK, as shown by an innovation scorecard from the National Institute for Health and Care Excellence, which emphasizes the variation across 76 medicines and 6 medical technologies used across the country.</p> <p>The poor uptake of innovation has led to the UK health service lagging behind other areas of the economy when it comes to implementing other technologies which would improve the delivery of health services, such as digital innovation.</p>	<p>2</p>
<p>13. Investment environment</p>	<p>Analysis from the Department for Business Innovation and Skills found that there has been an increase in innovation in business in the UK, with 53% of business investing in innovation⁷².</p> <p>Globally, healthcare remains an attractive option for private equity investment⁷³.</p> <p>There has been an introduction of some fiscal incentives to support investment from R & D tax credits, Patent Box and a £300 million UK Research Partnership Investment Fund⁷⁴.</p>	<p>The vote to leave the EU has created economic uncertainty. According to the Lloyds Bank investor sentiment index, confidence of investors in the UK is at its lowest recorded levels⁷⁵.</p>	<p>4</p>

⁶⁶Department of Health, (2015). *Challenging the NHS to innovate*. Accessed at: <https://www.gov.uk/government/speeches/challenging-the-nhs-to-innovate>

⁶⁷NHS England, (2016). *Our work: Test beds*. Accessed at: <https://www.england.nhs.uk/ourwork/innovation/test-beds/>

⁶⁸NHS England, (2016). *Simon Stevens speech to NHS Confederation Conference 2016*. Accessed at: <https://www.england.nhs.uk/2016/06/simon-stevens-confed-speech/>

⁶⁹NHS England. *The Accelerated Access Review*. Accessed at: <https://www.gov.uk/government/organisations/accelerated-access-review/about>

⁷⁰NHS England. *Academic Health Science Networks*. Accessed at: <https://www.england.nhs.uk/ourwork/part-rel/ahsn/>

⁷¹IPPR, (2015). *Improved circulation: Unleashing innovation across the NHS*. Accessed at: http://www.ippr.org/files/publications/pdf/improved-circulation-NHS_June2015.pdf?noredirect=1

⁷²Department for Business Innovation and Skills. (2016). *Headline findings from the UK innovation survey 2015*.

⁷³Bain & Co, (2015). *Global healthcare private equity report 2015*. Accessed at: <http://www.bain.com/publications/articles/global-healthcare-private-equity-report-2015.aspx>

⁷⁴UK Trade & Investment, (2014). *Unlock your global business potential: Supporting life sciences in the UK*. Accessed at: <http://www.hra.nhs.uk/documents/2014/04/mark-treherne.pdf>

⁷⁵Lloyds Bank, (2016). *Lloyds bank investor sentiment index*. Accessed at: <http://www.lloydsbankinggroup.com/globalassets/documents/media/press-releases/lloyds-bank/2016/160323-lloyds-bank-investor-sentiment-index-march-final.pdf>

14. Infrastructure for ICT	<p>Comparatively, the UK has an advanced IT infrastructure, with high levels of internet connectivity, much of which is superfast broadband. Despite some high-profile failures, the N3 network has been successful in enabling higher degrees of communication between health professionals, although the NHS is now transitioning to the new HSCN network.⁷⁶.</p>	<p>There have been a series of failures in implementing an NHS-wide IT system, with previous projects going significantly over-budget before being scrapped.</p> <p>Poor or non-existent integration of health and social care records.</p> <p>Lack of electronic health records in the adult social care sector.</p>	<p>2</p>
15. Research environment	<p>NHS is considered to have a strong research infrastructure, though argued bias towards the new rather than existing.</p> <p>World leading in life sciences, strong pharmaceutical industry, biotech sector and medical technology sub sector.</p>	<p>Limited reward and incentives within NHS for adoption of what others have developed.</p> <p>High tax and regulation can be deterrent for some pharmaceutical companies, with a shift in R & D centers out of UK.</p> <p>Gap in early stage funding from Universities to the Clinical.</p>	<p>3</p>
B. Actors			
1. Secretary of State for Health	<p>Jeremy Hunt MP has been bold in his vision for the NHS, notably one which performs highly 7 days a week and is digital and paper-free.</p>	<p>The junior doctor's strike lead to strained relationships between NHS staff and the Department of Health.</p>	<p>3</p>
2. The Department of Health	<p>Overall leadership within the Department is largely seen as effective, and one that encourages innovation.</p>	<p>Leadership structures can be problematic, as there is not one person who is overall responsible for healthcare.</p> <p>Large scale staff cuts at the department could impact on quality and outcomes.</p> <p>For 2015-16, the department was only able to avoid a significant overspend by taking for the capital budget, which is a short-term fix⁷⁷.</p>	<p>2</p>
3. NHS England	<p>The NHS Five Year Forward View places innovation as a central point of their forward vision. The Forward View has inspired new care models, including vanguard sites.</p>	<p>There is often an inherent conflict within NHS England between the need for experimentation and innovation, and a standardised, national service which provides health services of equal quality to all⁷⁸.</p>	<p>4</p>

⁷⁶Digital Health, (2017). *Hunt approves HSCN: N3 replacement*. Accessed at: <https://www.digitalhealth.net/2015/11/hunt-approves-hscn-n3-replacement/>

⁷⁷The Health Foundation Foundation, (2016). *Response to the Department of Health's annual end of year accounts*. Accessed at: <http://www.health.org.uk/news/health-foundation-responds-department-health%E2%80%99s-annual-end-year-accounts>

⁷⁸The King's Fund, (2014). *Reforming the NHS from within: Beyond hierarchy, inspection and markets*. Accessed at: https://www.kingsfund.org.uk/sites/files/kf/field/field_publication_file/reforming-the-nhs-from-within-kingsfund-jun14.pdf

<p>4. Clinical Commissioning Groups including GPs, nurses and clinicians.</p> <p>Services include planned hospital care, rehabilitative care, urgent and emergency care, community health services and mental health services</p>	<p>CCG's can ensure that innovation can be tailored to respond to specific local demand.</p>	<p>The CCG system means that rather than enjoying the benefits of scale, the NHS is fragmented which can make innovation diffusion more difficult. This can lead to difference in healthcare delivery across England, even when there are established solutions from other parts of the country⁷⁹.</p>	<p>2</p>
<p>5. Health and Wellbeing Boards</p>	<p>When run successfully, these can play an effective role in bringing together different stakeholders and creating an integrated approach to health and social care, especially around commissioning⁸⁰.</p>	<p>If they are to be effective in encouraging innovative approaches to integrated commissioning, there is a need to create more formal powers for the boards⁸¹.</p>	<p>2</p>
<p>6. Regulatory boards, including NHS Improvement, GMC, NMC</p>	<p>The creation of NHS Improvement, through merging Monitor and the NHS Trust Development Authority, is a positive development, in that it has the role of both pushing through transformational change within the NHS and accelerating innovation, whilst at the same time regulating providers to improve financial performance.</p>	<p>NHS improvements will increasingly have to balance the competing demands of giving power and freedom to local foundation trusts, which can promote innovation, and the trend towards more centralised control of healthcare in the face of poor financial and performance issues⁸².</p> <p>The move towards integration which often comes with innovation creates a challenge for regulators, as responsibility and accountability can become less defined.</p>	<p>4</p>
<p>7. Private Sector: Startups</p>	<p>A number of grants and funding programmes are available to UK health tech startups, including the "Quantified Self Innovation Contest".</p> <p>NHS England, Public Health England and other bodies such as Innovate UK see startups as priority areas to encourage innovation.</p>	<p>Procurement processes within the NHS can sometimes lack transparency, and favour renewing contracts with established suppliers; there is a culture which discourages risk, making it harder for new startups to establish themselves even if they provide more efficient services at a lower cost⁸³.</p> <p>This can discourage investment in the UK health startup industry, and can persuade innovators in new technology to look at other industries rather than health.</p>	<p>4</p>

⁷⁹NHS Confederation, (2015). *Cracking the innovation nut: Diffusing healthcare innovation at pace and scale*.

⁸⁰Humphries. R and Galea. A, (2013). *Health and wellbeing boards; one year on*. The King's Fund.

⁸¹The King's Fund, (2016). *Health and wellbeing boards (HWBs) explained*.

⁸²Murray. R, (2016). *Challenges ahead for the newly established NHS improvement*. The King's Fund.

⁸³Hames. P, (2016). *The time is now: The NHS as world-leader in digital health*. The Huffington Post, United Kingdom

8. Private Sector: SMEs	Innovate UK this year is providing £15 million in funding for projects that support SMEs to develop innovation in health sciences.	The UK leaving the European Union would most likely restrict access to EU finances for SMEs developing research and innovation in healthcare ⁸⁴ .	4
9. Private sector: Large companies	<p>Multinationals and large companies can provide the link between ‘innovation hubs’ (such as Silicone Roundabout in the UK) and the wider world of health and business.</p> <p>They can also provide financial investment to promising health startups, and are able to take more financial risks than the publicly funded bodies.</p>	<p>It is difficult for even the largest companies to obtain data on the needs of the NHS in terms of purchasing and product needs; this provides challenges in identifying market size and rates of adoption of new products⁸⁵.</p> <p>Healthcare innovation still remains relatively difficult to get right; therefore it remains an area of investment that comes with not insignificant risks⁸⁶.</p>	3

C. Policy and Strategy Dynamics

1. Vision and Strategy	<p>The introduction and implementation of targets has prompted NHS providers to find innovative solutions to improve services⁸⁷.</p> <p>The Five Year Forward View offers a clear strategic vision of a future NHS that is both high in quality and more efficient.</p>	The NHS currently has no strategic framework in place to develop leaders in the health service, essential for innovation. However, there is currently a consortium of organisations developing a framework to rectify this ⁹⁰ .	3
2. Incentives and Rewards	<p>The NHS has recently either reduced or stopped many of the fines imposed if hospitals miss waiting time targets. This was seen by many as financially harming the hospitals which needed the most help⁸⁸.</p> <p>Simon Stevens recently launched the new innovation and technology tariff, which incentivises the uptake of tested innovations by removing the process of multiple cost negotiations, with a guaranteed set reimbursement for CCGs⁸⁹.</p>	<p>There remain too many financial structures within the NHS which incentivises outputs rather than outcomes; innovation which reduces health activity therefore are disincentivised⁹¹.</p> <p>The interim report of the Accelerate Access Review found that there was “insufficient financial support and lack of financial incentive to adopt [innovation]”⁹².</p> <p>The financial rules on CCG balancing their budgets disincentivise up-front spending which can bring long-term cost savings.</p>	2

⁸⁴European Commission, (2016). *Research and Innovation, health, policies*, SME support.

⁸⁵Grajewski, B. (2015). *10 barriers to healthcare innovation*. The Guardian

⁸⁶Herzlinger. R. E, (2006). *Why innovation in health care is so hard*. Harvard Business Review

⁸⁷The King’s Fund, (2010). *Have targets improved NHS performance?* Accessed at: <https://www.kingsfund.org.uk/projects/general-election-2010/key-election-questions/performance-targets>

⁸⁸Triggle. N, (2016). *Hospitals given green light to miss waiting time targets*. BBC News

⁸⁹NHS England, (2016). *NHS Chief launches new fast track funding so NHS patients get treatment innovations faster*.

⁹⁰Lake. C, (2016). *The six barriers to making leadership development in health a priority*. NHS Leadership Academy.

⁹¹Quilter-Pinner. H, and Muir. R, (2015). *Improved circulation: unleashing innovation across the NHS*, Institute for Public Policy Research

⁹²Freeman. G (2015). *Accelerated Access Review: Interim report – Review of innovative medicines and medical technologies*, supported by Wellcome Trust.

3. Transparency of data	<p>The introduction of the Integrated Digital Care Technology Fund provides funding to accelerate implementation of electronic record keeping.</p> <p>There have been a number of recent initiatives that make use of transparent and open data in health and social care:</p> <ul style="list-style-type: none"> • Care Metrics gives information about services to users of health and social care. • Open data on cardiac surgical outcomes have been published, which has led to an estimated reduction of 1000 deaths annually. <p>Open data sets on GP prescribing patterns has allowed NESTA to identify GPs who are early adopters of health innovations.</p>	<p>The amount of data being generated and held by industry and Government is arguably growing faster than information is being made available to the public, hindering bottom-up innovation in healthcare⁹³.</p> <p>There remains a lack of readily available nation-wide data to audit in primary care⁹⁴.</p> <p>There remains a problem with value analysis; it is difficult to access data deep enough across the health system to not only analyse the effects on direct treatment, but also the entire healthcare supply chain.</p>	3
4. Specific policy/strategies to promote healthcare innovation	See 'innovation environment'.	See 'innovation environment'.	N/A
5. Technology	<p>The £65 million Nursing Technology Fund has been introduced, encouraging nursing staff to make better use of digital technology⁹⁵.</p> <p>Technology has been placed at the heart of the NHS innovative drive, including the Innovation Accelerator, Vaguard sites and a new Innovation and Technology tariff category.</p> <p>The UK has a long history of innovation in health technology, and is recognised as one of the world leaders in innovation. Large-scale opportunities within the NHS coupled with world-leading universities mean that health technology is a strong growth sector.</p>	Innovation pathway for some disruptive digital technologies are not clearly defined.	4

⁹³Taylor. R and Kelsey. T, (2016). *Transparency and the Open Society*, Policy Press, University of Bristol

⁹⁴Baird. B, Charles. A, Honeyman. M, Maguire. D and Das. P, (2016). *Understanding pressures in general practice*, The King's Fund

⁹⁵NHS England, (2015). Nursing Technology Fund

6. Accountability and Performance Management	<p>The targets set for the NHS allow for long term plans to be created and financed with the aim of improving specific clinical targets which can improve performance while generating efficiency gains.</p> <p>The NHS Five Year Forward View sets out an ambitious set of targets for local systems to achieve in the coming year, revolving around tangible aims that can be measured and accessed by the public⁹⁶.</p> <p>This allows for individuals and local systems to take responsibility when targets have not been met and can focus innovation in a way which tackles the agreed targets.</p>	<p>Limited accountability for systematically adopting best practice and innovation among health professionals.</p>	<p>3</p>
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D. Cultural Dynamics

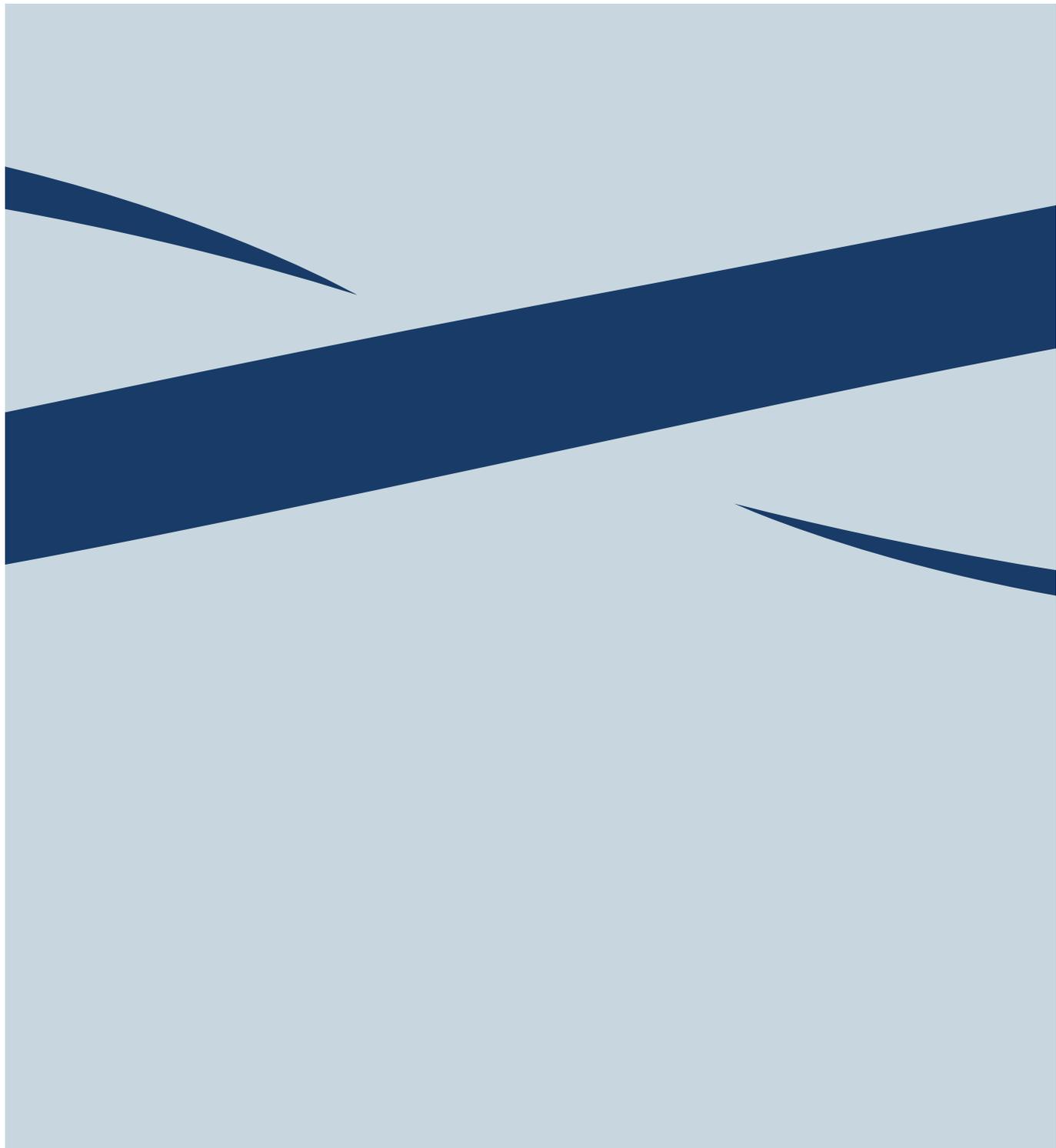
1. The Patient – to include health literacy, trust and engagement and potential for behavioral change	<p>New technology, and new generations of digitally literate citizens, can create more opportunities for populations to become informed health consumers.</p>	<p>There remains low levels of health literacy; in England 42% of adults cannot understand everyday health information, which increases to 61% if numeracy is also needed⁹⁷.</p> <p>There is limited evidence on interventions that work in influencing long-term behavioral change, needed to create a population more engaged with their health.</p>	<p>2</p>
2. Adapting Innovations to suit local context	<p>The system of CCGs can help foster a climate of encouraging innovation which is area-specific.</p>		<p>4</p>
3. Identifying and supporting innovation champions	<p>In recent years there has been a push to promote innovation champions within the NHS. Different approaches to this include recruiting leading clinicians to champion specific innovations or technologies, or the Innovation Scouts programme which uses a network of individuals to source and champion innovation and promote best practice within the NHS⁹⁸.</p>	<p>Barriers to effective use of innovation champions include a lack of a career pathway once the champions have been identified, as well as a lack of collaborative working across the system which can hinder these champions⁹⁹.</p>	<p>4</p>

⁹⁶The National Health Service Commissioning Board, (2015). *Delivering the Forward View: NHS planning guidance 2016/17 – 2020/21. Version number 2*. Accessed at <https://www.england.nhs.uk/wp-content/uploads/2015/12/planning-guid-16-17-20-21.pdf>

⁹⁷Rowlands. G, Protheroe. J, Price. H, Gann. B and Rafi. I (2014). *Health Literacy: Report from an RCGP-led health literacy workshop*, Royal College of General Practitioners. Accessed at: <http://www.rcgp.org.uk/news/2014/june/-/media/Files/Policy/RCGP-Health-Literacy-2014.ashx>

⁹⁸Wellcome Trust, (2016). *Galvanising the NHS to adopt innovation: The feasibility and practicality of recommendations from the interim report of the Accelerated Access Review*. Accessed at: <https://www.gov.uk/government/publications/galvanising-the-nhs-to-adopt-innovation>

⁹⁹ Ibid.



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