The NHS, innovation and productivity

Nigel Keohane
<table>
<thead>
<tr>
<th>CONTENTS</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>About the Author</td>
<td>2</td>
</tr>
<tr>
<td>Acknowledgements</td>
<td>2</td>
</tr>
<tr>
<td>Executive Summary</td>
<td>3</td>
</tr>
<tr>
<td>Chapter 1: Introduction</td>
<td>6</td>
</tr>
<tr>
<td>Chapter 2: The NHS and Productivity – Mapping the Connections</td>
<td>11</td>
</tr>
<tr>
<td>Chapter 3: The Innovation Opportunity in the NHS</td>
<td>17</td>
</tr>
<tr>
<td>Chapter 4: Performance of NHS on Productivity and Innovation</td>
<td>21</td>
</tr>
<tr>
<td>Chapter 5: Barriers to Innovation and Productivity in the NHS</td>
<td>30</td>
</tr>
<tr>
<td>Chapter 6: Policy Measures to Drive Greater Innovation and Productivity Growth in the NHS</td>
<td>35</td>
</tr>
<tr>
<td>Chapter 7: How the NHS Can Drive Productivity in the Wider Economy</td>
<td>43</td>
</tr>
<tr>
<td>References</td>
<td>50</td>
</tr>
</tbody>
</table>
ABOUT THE AUTHOR

NIGEL KEOHANE

Nigel Keohane is the SMF’s Research Director and leads the work on healthcare and commissioning, welfare reform and low pay, and pensions and savings. He is also Deputy Director of the SMF.

Prior to the SMF, Nigel was Head of Research at the New Local Government Network think tank, worked in local government and taught history at Queen Mary College, University of London. He has a BA and MA in history from Exeter University, and a PhD in Political History from Queen Mary.

ACKNOWLEDGEMENTS

The SMF is grateful to individuals who participated in the SMF’s roundtable discussion as part of the project and those who gave up time to meet to talk about the topic. The project was sponsored by Novartis.

The author would like to thank James Kirkup, Hannah Murphy, Kathryn Petrie and Laura Webb at the SMF for their help.
EXECUTIVE SUMMARY

This report analyses why greater innovation and productivity growth is necessary in the NHS, and the policies that could help this be achieved. It goes on to assess how the NHS can drive productivity in the wider economy.

The NHS faces dramatic increases in demand, a consequence of demographic pressures and rising co-morbidities, whilst, at the same time, patients expect better care. Change must be achieved within a severely restricted budget, with £22bn of efficiencies needed over a five-year period.

Part of the answer lies in increasing the levels of spending in the NHS, which the government is promising. However, the other side of the coin is how this money is spent: here lies an equal if not larger challenge and opportunity.

How the NHS spends its money matters

The interconnections between the NHS and productivity are multiple, as Chapter 2 shows.

First, the NHS’s productivity levels have a dramatic impact on the future of the UK public finances. If the NHS operates at its historic rate of productivity improvement (0.8% per year) then the UK’s net debt as a proportion of GDP will double in fifty years. In monetary terms: all other things being equal, if the NHS were to run at its long-run historic annual growth rate of 0.8%, the Government would have to find an additional £6.5bn by 2025, compared to if it were to run at its annual growth rate this decade of 1.4%.

Second, the NHS has a fundamental role in driving higher productivity in the wider economy and addressing the UK’s poor productivity record:

- The NHS has important links into the wider health economy, with the pharmaceuticals sector alone delivering £1 in every £5 of R&D in the UK.
- The size of the NHS as a share of the economy has increased by two and a half times in the last sixty years.
The NHS is an enabler of a healthy and productive workforce. The costs of ill-health are huge to the UK economy, including early retirement, absenteeism, presenteeism and early mortality.

Achieving greater innovation and productivity in the NHS

Chapters 3, 4, 5 and 6 focus on how to drive greater innovation and productivity in the NHS itself. The opportunities are potentially transformative: Chapter 3 sets out six areas where innovation can transform how healthcare is delivered. These range from use of informatics in diagnostics and radiology, patients self-managing their conditions, and new models of care, through to new curative medicines and personalised treatments.

However, Chapter 4 assesses the NHS’s recent record on discovering and adopting innovation and driving productivity, and concludes that:

- The NHS made significant headway on productivity in the first part of this decade and providers have driven out a significant range of inefficiencies, including around £2.1bn in the nine months from April to December 2017.

- Productivity rates have slowed in the last two years and are now well below trend at 0.53% and 0.04% in the last two years. Other indicators also paint a worrying picture – pay restraint is over, trusts continue to submit significant deficits, and the NHS has been switching funds intended for investment in transformation and capital to pay for current operations.

- The NHS’s record on innovation is very mixed and in some local areas poor, with take-up of digital technology highly varied and take-up of NICE-approved medical technologies varying even when adjusted for disease prevalence.

Steps to drive innovation and productivity in the NHS

Chapters 5 and 6 identify barriers that prevent the NHS innovating and driving productivity, including: outmoded payment systems that lock providers into existing activities, a lack of freedom to innovate and
insufficient incentives, and workforce structures and culture. The report puts forward recommendations:

- Establishing, as part of the new NHS funding package, a new Transformation and Innovation Fund with independent oversight, with a strict requirement that funding be used for investment and new practices to drive up productivity.

- Publishing clear and transparent data on take-up of innovation across clinical commissioning groups (CCGs) and providers, and identifying areas that prove resistant to change. Commissioners and providers who perform poorly on innovation adoption or technical efficiency should be ‘Required to Explain’ their poor performance publicly.

- Setting up a £1bn Productivity and Innovation Loan facility so that commissioners and providers can borrow money to invest in new technologies and practices where there is a payoff over a longer time frame.

Enabling the NHS to drive productivity in the wider economy

Chapter 7 describes how the NHS can drive productivity in the wider economy.

- It shows that much of the cost burden of diseases occurs through lost productivity.

- It reveals an important socio-economic dimension: regions with lower employment rates also have higher employment gaps between their general employment rate and their employment rate for those with long-term conditions.

It recommends that:

- The Government should pilot new ways of assessing how future economic gains can be captured and incorporated into commissioning and funding decisions.

- The definition of ‘cost neutral’ under the Accelerated Access Partnership should cover a five or ten-year period, so that the upfront costs of innovation can be recovered.
CHAPTER 1: INTRODUCTION

WHAT IS PRODUCTIVITY AND WHY IT MATTERS

Productivity growth is our ability to achieve the same outputs for less input, and is the only sustainable way of improving living standards in the long term. As such it enables societies to become more prosperous over time, and for healthcare systems to improve the health of the population.

The UK productivity challenge

As Figure 1 shows, the UK’s productivity per hour significantly disappoints against global comparators – including Germany, France, Italy and the USA. This is a longstanding phenomenon. This problem was at the forefront of the Government’s industrial strategy, and motivated an interest in skills, infrastructure, investment and innovation.¹

Figure 1: GDP per hour worked in 2016 – indexed against UK (100)

The NHS productivity challenge

As will be described in Chapter 2, the challenge and opportunity is particularly pronounced in the NHS, because of its centrality to the health of the wider economy as well as its large share of overall public expenditure. In a rationed publicly-funded healthcare system, improving productivity is a realistic route to achieving better healthcare for patients. The funding settlement agreed as part of the Five Year Forward View (FYFV) committed NHS England to efficiency improvements of £22bn between 2015 and 2020.2

The wider context is daunting, with demand for health and social care rising sharply – a consequence of:

• An ageing population and a boom in people requiring support in older age.
• A rise in co-morbidities and in the prevalence of chronic conditions, such as diabetes and dementia.
• Growing patient expectations, the product of a more prosperous and technologically-enabled society.

By increasing investment in the UK health economy, innovating and making new effective treatments available, the NHS can drive up the quality of care for patients. But, current evidence suggests that opportunities are being missed, and that greater focus needs to switch to pushing the innovation frontier and ensuring adoption of new technologies, as envisaged in NHS England’s FYFV.3

Why innovation matters

Innovation is a fundamental driver of productivity as demonstrated in multiple studies.4 New technologies and innovations drive more efficient processes, with new approaches making production processes more
In competitive markets, companies are incentivised to innovate or die. In healthcare, new devices, technologies and treatments drive down the costs of some provision and/or increase health improvements for patients. Healthcare systems that do not innovate can be expected to fail to meet rising expectations of patients and to lose control of healthcare spending. Innovation, along with capital investment and higher skills, are the underpinning drivers of productivity.

GROWING POLICY FOCUS ON PRODUCTIVITY AND INNOVATION

There is growing recognition that innovation and productivity improvements are imperative to the UK economy and the NHS. The Industrial Strategy emphasises innovation and investment in the Life Sciences sector. Meanwhile, the significant focus on technical efficiency in the NHS (including the Carter Review and the Naylor Review) is being matched by a growing emphasis on innovation in the NHS, such as through the Accelerated Access Review (and the Government’s response) and the Life Sciences Review.

Building on existing studies, this report seeks to develop the motivation and policies for greater innovation and productivity in the NHS, and for the NHS’s role as a facilitator of productivity in the wider economy to be recognised more prominently in funding and commissioning decisions.
Definitions: Productivity and innovation

In analysing these issues, we use broad definitions of productivity and innovation:

• **Productivity in healthcare**: The total quantity of healthcare output provided (adjusted for quality) compared to the total quantity of inputs (labour, goods/services and consumption of fixed capital) used.

• **Labour productivity in healthcare**: The total quantity of healthcare output provided (adjusted for quality) compared to the total quantity of labour inputs.

• **Innovation in healthcare**: The intentional introduction and application of products, processes or organisational structure, new to the relevant unit of adoption, designed to significantly improve patient health or reduce the costs of achieving health outcomes. We note the important distinction between discovery and adoption.

RESEARCH QUESTIONS AND METHODS

Research questions

This report seeks to answer the following questions:

• What are the interactions between the NHS and UK productivity?

• How has the NHS performed on productivity and adopting new innovations?

• What factors determine the variation in adoption of innovation and productivity performance across the NHS?
• What can we do to increase the use of innovation as a route to improving productivity in the NHS?

• How can we use the NHS as a catalyst for improving productivity in the wider economy?

Research methods

The research draws on:

• Analysis of productivity performance of the NHS and of the take-up of innovation in different parts of the NHS.

• Review of literature and evidence on drivers of productivity in healthcare and the role of innovation in the UK and internationally.

• Discussions with practitioners, officials and experts, including a roundtable event to discuss policy.

REPORT STRUCTURE

The structure of this report is as follows:

• Chapter 2 sets out the importance of productivity within the NHS and the connections between the NHS and the productivity of the wider economy.

• Chapter 3 discusses the innovation opportunity in healthcare.

• Chapter 4 describes the NHS’s recent track record on innovation and productivity.

• Chapter 5 discusses the barriers to innovation and productivity gains in the NHS.

• Chapter 6 sets out policy steps that could be taken to promote innovation and productivity in the NHS.

• Chapter 7 analyses how the NHS can drive productivity in the wider economy.
CHAPTER 2: THE NHS AND PRODUCTIVITY – MAPPING THE CONNECTIONS

This chapter outlines the connections between the NHS and UK productivity.

THE NHS AND PRODUCTIVITY: THE FOUR DIMENSIONS OF INTERACTION

The connections between the NHS and productivity are fundamental and multiple. Figure 2 sets out four dimensions by which productivity affects the NHS and vice versa.

Figure 2: The interactions between the NHS and productivity

1. As one third of public service spending
2. As significant part of UK economic activity
3. As an important link to high productivity Life Sciences sector
4. As enabler of a healthy, productive UK workforce
1. Productivity improvements within the NHS are necessary to ensure fiscal sustainability

Spending on the NHS comprises a large and growing share of public expenditure. Health spending as a proportion of total public service spending has almost tripled in 60 years. Analysis by the IFS reports that, while in 1955–56, health spending accounted for 8% of total public spending and 11% of public service spending; in 2015-16, these proportions had increased to 18% and 30% respectively.⁶

Improvements in NHS productivity are therefore central to productivity performance of the public sector and to the UK’s fiscal prospects. This is demonstrated starkly in Figure 3: if the NHS performs at the average productivity levels achieved historically by the health service, then projected net debt would double from around 80% to over 160% within 50 years.

Figure 3: Net debt projections as percentage of GDP (OBR, 2015)⁷

- Annual healthcare productivity growth of 2.2 per cent (same as whole economy)
- Annual healthcare productivity growth of 1.1 per cent

Productivity in the health care sector has historically lagged economy-wide productivity growth. Health economists describe the phenomenon of ‘Baumal’s cost disease’: despite achieving lower levels of productivity growth, health sector workers expect pay rises in keeping with the wider economy. As such, the costs of delivering the same health service rise over time (all other things being equal).

In the context of growing demand, budget constraints are severe. The NHS is expected to achieve efficiencies of 2-3% per year, a mixture of productivity improvements, pay restraint and technical efficiencies to close a funding gap of £22bn.

2. The NHS is a large share of the UK economy

The NHS is a large and growing part of the UK economy. In 2017, public spending on healthcare in the UK made up around 7.3% of entire economic activity (not including social care). In December 2017, 4.2 million people worked in health and social care activities, an increase of nearly a half (47%) since 1997.

Figure 4 shows that the NHS is now two and a half times as large a share of the UK economy as it was sixty years ago.

Figure 4: Growth in UK public spending on healthcare as percentage of GDP

Source: IFS, UK health and social care spending (2017)
Recent ONS analysis has suggested that part of the UK’s productivity puzzle may be explained by the changing composition of the UK economy. Both in 1997 and 2017, the ‘human healthcare activities’ sector delivered lower than average productivity per hour, yet the proportion of hours worked in this sector rose from 5% to 6.7% between these years.\textsuperscript{14}

In crude terms, if the NHS were to operate at the long-run productivity performance of the UK economy 2.2% as compared to its historic growth rate of 0.8%, then annual UK GDP would increase by around 0.1% all other things being equal.\textsuperscript{15}

3. NHS links to highly productive sectors

The NHS is intimately connected to high-value sections of the wider health economy.\textsuperscript{16} Figure 5 shows that the pharmaceutical sector contributes nearly one in every five pounds of business R&D spending (19\%) in the UK.\textsuperscript{17}

**Figure 5: Expenditure by UK businesses on performing R&D in £ current prices, by largest product groups, 2016 (ONS)**

Source: Data from ONS, *Business enterprise research and development, UK: 2016*
Meanwhile, as Figure 6 below shows, the pharmaceuticals sector is one of the highest value sectors in the economy, and productivity in this sector has grown strongly in each of the last two decades.

**Figure 6: Growth in productivity per hour across the ten highest value sectors in the UK economy £ current prices (ONS)**


Given the productivity premium in allied sectors such as pharmaceuticals and the life sciences, the NHS can act as a gateway and facilitator of innovation and productivity, by how it procures, commissions and makes available its data. This was acknowledged explicitly in Sir John Bell's Life Sciences Strategy published in 2017.¹⁹
4. The NHS is an enabler of a healthy, productive workforce

The NHS is a fundamental contributor to the UK economy through its efforts to promote a healthy and productive workforce. This factor is becoming ever more imperative as individuals are expected to work later into life. Analysis by the DWP showed that halving the employment gap between older people aged 50-State Pension age and those in their 40s could increase nominal GDP by up to one per cent (£18 billion) in 2013. A recent Government review reported that there are 1.2 million people aged 50-64 out of work because of ill health.

The costs of ill-health to the economy are multiple: early mortality, early retirement, absenteeism and presenteeism. By improving health outcomes, the NHS contributes to reducing these costs, and boosting economic output and productivity in the economy.

More productive countries have better health outcomes. A recent paper by the Bank of England’s Silvana Tenreyro reveals that being born in a country with 20% higher labour productivity is associated with higher life expectancy of around one year. While it is unclear which way the causality runs (it probably runs both ways), the association is important. It implies that a productive economy and a healthy population are self-reinforcing.

SUMMARY

The NHS must achieve significant productivity to ensure that it remains fiscally sustainable. Meanwhile, the NHS plays a crucial role as a contributor to productivity in the wider economy through its connections to the life sciences sector and by supplying a healthy and productive workforce.

The next chapter discusses the innovation opportunity in the NHS.
CHAPTER 3: THE INNOVATION OPPORTUNITY IN THE NHS

This chapter describes the innovation opportunity in the NHS.

THE INNOVATION OPPORTUNITY AND NEED

The UK has been at the forefront of past health advances, including the invention of the small pox vaccine and discovery of the underlying structure of DNA. The NHS is now on the cusp of a new wave of technological innovation, which can help meet rising patient expectations and deliver better value for money. The UK’s health service is uniquely well-placed to deliver on these opportunities, combining a single procurer with colossal buying power, strong academic and research networks, world-leading advances in genomics, a widely-respected NICE evaluation, and a huge reservoir of patient data in the NHS.24

WHAT TECHNOLOGY COULD MEAN FOR THE FUTURE OF THE NHS

Evidence suggests that new technologies comprise innovations that are cost-saving, zero-cost and health improving.

Table 1: Innovation opportunities in the NHS

<table>
<thead>
<tr>
<th>Self-management of conditions by patients</th>
<th>Informatics, computerisation and new roles for healthcare professionals</th>
<th>Advice, consultation and monitoring at a distance</th>
</tr>
</thead>
<tbody>
<tr>
<td>New medicines and personalised treatments</td>
<td>New and more patient-focused care pathways</td>
<td>Technologies that allow new forms of operational efficiency</td>
</tr>
</tbody>
</table>
Self-management of care facilitated by tech

Patients are increasingly expecting to manage care themselves and to be empowered to make their own decisions. Greater use of AI through smart diagnoses will enable patients to understand their illnesses and what steps to take. The work of Dr Eric Topol, of the Scripps Research Institute, has put forward a vision of how smart-phone apps could revolutionise healthcare. This could include patients accessing all their health records, scans and genomic profiles, and having remote diagnoses. Self-monitoring will evolve to enable embedded sensors to monitor biomarkers for diseases.

As NHS England acknowledges, patient demand for information and data is growing. GP practices and hospitals are moving to universal use of e-referrals by October 2018. Other countries have gone further. In Iceland, the National Citizen Health Portal (VERA) offers patients access to their health information and digital health services. This is integrated into the electronic health record, allowing a single digital access point for citizens to access their health information, contact professionals securely and request e-prescriptions.

Informatics, computerisation and new roles for healthcare professionals

There is huge scope for deployment of AI and machine learning to computerise more routine health tasks. For instance, academics at Stanford University have developed a radiology model which can predict the probability of abnormality by using images. It achieved performance comparable to that of radiologists (outperforming radiologists in some areas and underperforming in others).

Developments such as these do not mean that there will be no role for radiologists, but it does mean that devices will be able to complete significant aspects of the job, whilst radiologists will monitor outputs, verify, interpret and carry out higher value functions. This holds huge prospects for reducing the costs of preventative interventions such as screening.
Advice, consultation and monitoring at a distance

Technology-enabled healthcare includes many measures and devices:

- Text messages can promote medicine and therapy adherence.\(^{29}\)
- Video appointments can be reasonable substitutes for physical visits in some cases but are likely to be cheaper.\(^{30}\) Questions remain over take-up and acceptability to patients, but more geographically-remote areas could benefit.
- In Mexico, MediCall allows patients to have phone consultations, with two thirds resolving their queries over the phone, thus reducing visits to general practice.\(^{31}\)
- Home-based telemonitoring can improve blood pressure control.\(^{32}\)

New medicines and personalised treatments

New treatments are entering the market that offer credible treatments and cures for previously untreatable diseases. A new medicine has turned Hepatitis C from an illness that required on-going treatment to one that can be cured. New cancer drugs are offering more effective treatments. Noctura 400, a new treatment for diabetes patients has been shown to reverse eye disease, via a light therapy sleep mask rather than invasive treatment.\(^{33}\) New forms of surgery are also made possible that are less invasive and cheaper, such as the balloon treatment used in coronary angioplasty to unblock narrowed or blocked arteries.\(^{34}\)

The market is evolving rapidly to develop more personalised treatments based on real-world evidence and deep mining of large patient datasets. New treatments will be targeted at specific patient subgroups thus reducing side effects and boosting efficacy. Novel methods of discovery will be opened by big data, genomics and phenomics.
More patient-focused care pathways

Through the FYFV, initial steps are being taken to evolve a new care system, where patients are treated in more appropriate settings and receive more patient-centred care, in a system that is more integrated and preventative. This has been taken forward through the development of Sustainability and Transformation Partnerships (STPs) by 44 local health and care economies. NHS England notes that new care models are already delivering some improvements.35 International examples, such as that in Canterbury New Zealand, indicate a significant reduction in nursing home admissions and duration of stays, as well as reduced emergency admissions.36 In contrast, there have been moves to consolidate and merge more specialist services such as stroke and pathology.

Technologies that allow new forms of operational efficiency

NHS England and NHS Improvement are making significant headway on operational efficiency drives, many of them underpinned by technologies. More widespread use of ICT and data transfer enable different parts of the NHS to share information speedily, reliably and cheaply. For instance, using electronic rostering, one Trust has cut its use of agency staff by half.37 Devices are available that can alert staff when hospital beds become available thus enabling real-time recording of bed occupancy and better flow of patients.
CHAPTER 4: PERFORMANCE OF NHS ON PRODUCTIVITY AND INNOVATION

This chapter explores the NHS’s recent track record on productivity and innovation.

PRODUCTIVITY PERFORMANCE IN THE NHS

The UK’s international performance leaves significant room for improvement.

International comparisons indicate that the UK performs reasonably well on efficiency but that it could make significant improvements.\textsuperscript{38} A study of four European countries which used an activity weighted method for analysing productivity in the 2000s ranked the UK joint first for productivity along with Germany.\textsuperscript{39} Under the Commonwealth Fund methodology, the UK emerges as the highest performing among 11 advanced healthcare systems and comes third for administrative efficiency. However, the structure of the assessment favours the UK because some measures assessed for administrative efficiency are inherently not present in a publicly-funded system (such as time spent on insurance and medical bills).\textsuperscript{40} Moreover, the UK comes second to last on health outcomes.

More enlightening is analysis published which measures the distance of different countries from the efficiency frontier (i.e. the lowest cost per health outcome). Analysis published in 2015 indicates that the UK would be able to make improvements equal to around two years of life expectancy if it operated at the efficiency frontier.\textsuperscript{41}

Productivity performance in the NHS over time

The best estimates conclude that long-term productivity growth in the NHS has been about half that in the wider economy. Figure 7 sets out how healthcare productivity has performed in contrast to the wider economy and the wider public sector over the last twenty years.\textsuperscript{42} Longer-term data we take from the ONS and covers the UK, and more recent data from the University of York.
Notable trends include:

• In the two decades to 2015, productivity growth in UK public service healthcare ran at 0.8% per year according to the ONS. In the more recent past productivity improvement has been somewhat stronger: since 2009/10, the annual productivity improvement in the English NHS has been 1.4%, according to the University of York. Operating at these different productivity rates matters hugely. To put this into monetary terms: all other things being equal, if the NHS in the future were to run at its long-run historic annual growth rate of 0.8%, the Government would have to find an additional £6.5bn by 2025, compared to if it were to run at 1.4% (its annual growth rate this decade).

• Quality improvements (i.e. healthier outcomes) comprise around half of the gains.

• The NHS significantly outperforms the wider public sector.

• Productivity growth was weaker during periods of high spending growth (early 2000s). This is likely because the NHS could not increase its outputs at as quick a rate as inputs were increased; meanwhile the dividend from investment may be experienced later.

• Productivity growth has risen more rapidly than in the wider economy since 2009.

• Productivity growth has slowed markedly during this decade, averaging annual growth of 0.8% in 2012/13 to 2015/16, compared to 2.7% in 2010/11 to 2011/12.
Signs that productivity in the NHS may be slowing

Data collected on the efficiencies achieved by NHS Trusts also shows some real achievements in recent years. Under the cost improvement programmes (CIPs), Trusts have achieved nearly £3bn of savings annually from 2013/14 to 2016/17.47

However, a combination of factors indicates that the scope for efficiencies and productivity growth under the current operating model is running low. First, productivity growth has weakened significantly in recent years: just 0.53% in 2013/14 to 2014/15 and 0.04% in 2014/15 to 2015/16 according to the latest data from the University of York.48
Second, the avenues pursued for other efficiencies in healthcare are drying up. Wage policy has made a major contribution to recent efficiency savings: between 2010/11 and 2014/15 non-labour costs grew at 2.2%, whilst labour costs rose by only 0.6% per year. Pay restraint is now over, with staff set to receive a proposed cumulative increase of 6.5% over the three years from 2018/19.

Third, NHS Improvement analysis of provider performance and efficiency in 2017/18 reveals that while the sector had delivered significant efficiencies, there was a shortfall of £329m against targeted efficiencies for the year to date. Moreover, there has been a growing reliance on non-recurrent (or one-off) savings as part of these efficiencies, growing from 13% in 2013/14 to a forecast 22% in 2017/18.

Finally, the Government has resorted to filling in provider deficits with capital spending and with Sustainability and Transformation Fund spending, leading to warnings by the Health Select Committee and the National Audit Office (NAO). As the NAO noted, in 2016-17, the NHS used ‘measures to rebalance its finances, some of which have restricted the money available for longer-term transformation’. Figure 8 below from the NAO shows the level of surpluses and deficits among trusts since the beginning of the decade. In 2015-16, NHS providers ran up deficits of £2.5bn. The Sustainability and Transformation Fund has since been used to incentivise financial discipline and reduce deficit levels. This has led to criticisms that the funding is not being used to invest in new service models. Of equal concern, capital funding has been used as revenue spending in successive years (see Chapter 6 for more detail).
Variation in productivity

The analysis above describes trend performance in the NHS, but there is also colossal variation within the NHS, as revealed by the Carter Review. The latter identified one-off savings of £5bn from procuring the same medical products, in rostering and use of staff, in use of digital services and in medicine optimisation. More recently, the Naylor Review has set out potential efficiencies in the management of NHS estates.

Analyses of productivity among acute hospitals by the Health Foundation in 2015 and 2016 has reinforced the picture of variation. It showed that providers in London, the North East, South Central and the East Midlands are on average the least productive. Analyses by the Health Foundation and the University of York have both found that there is little change in relative productivity of providers over time.
NHS RECORD ON TAKE-UP OF INNOVATION

Evidence on the take-up of innovation nationally

New statistics collected by the NHS show the actual take up of ten innovative medicines in England against the expected take up (based on disease prevalence). The medicines treat a range of diseases such as metastatic colorectal cancer, chronic heart failure and multiple sclerosis. In three of the ten cases the usage is within the expected range. But, in six of the ten cases the take-up is lower than expected (much lower in many cases) and in one case it is higher.60

Meanwhile, analysis by the Office for Life Sciences shows that the uptake of new medicines in the UK – both NICE and non-approved medicines – is much lower than in comparator countries.61 Figure 9 shows how uptake of new treatments varies between the UK and other advanced countries, with the percentage figure the UK’s proportion of take-up relative to the average across the countries studied (i.e. 21% in Year 1). This has important direct implications for patients who cannot receive the best and latest treatments, as well as indirect implications for the incentives for manufacturers to discover and develop new devices and treatments in the UK.

Figure 9: Per capita uptake of medicines with a positive NICE recommendation against per capita uptake for 15 comparator countries, 2012-1662

Source: Office for Life Science, Life Science Competitiveness Indicators (2018)
Local variation in take-up of new technologies and treatments

By common consent, the NHS has been slow to adopt information technology. Adoption also varies significantly by CCG area. The charts below demonstrate variation across CCGs in their use of digital interactions between primary and secondary care.

Figure 10: Use of digital interactions between primary and secondary care by CCG (%)


While there is much less discussion about take-up of innovative devices and medicines across the NHS, the variation is huge. Patient charities have voiced concern about the adoption of NICE-approved technologies. For instance, Diabetes UK has repeatedly complained that self-monitoring blood tests are not available to patients in all localities and is a postcode lottery.

Our analysis below looks at variation in adoption of approved medicines by CCGs. NHS Digital publishes data regularly in the Innovation Scorecard on the use of technologies that have been approved by NICE as being cost effective.
The NHS Innovation Scorecard sets out use of actual daily doses of three drugs used to treat diabetes versus the number of patients in each locality. Figure 11 uses the same underlying data (Innovation Scorecard data on medicine use and QOF data on number of patients in the locality) to chart this as a scatter graph. As we would expect we see a strong positive correlation. However, equally notable is the variance, with some CCGs with the same prevalence rates using the new treatments at very different rates. This raises concerns about potential unwarranted variation and why this may be occurring.

Figure 11: Use of NICE-approved diabetes medicines versus number of patients on the QOF register by CCG (Q4, 2016-17)

A study by Nesta exploring adoption of innovations in primary care also revealed significant variation in the rate of take up of NICE-approved medicines, ICT and new practices. GP practices that were larger and closer to other early adopters were more likely to use innovative treatments.
SUMMARY

This chapter has shown that:

• Productivity in the NHS has historically run at around half that of the wider economy.
• Performance in the first part of this decade was stronger, particularly in comparison to a weaker economy.
• There is evidence that NHS productivity is slowing down and that new mechanisms for achieving efficiency need to be found.
• There is huge unwarranted variation in technical efficiency across the NHS that must be reduced.
• The NHS’s performance on adopting innovations is very mixed.

The next chapter explores what barriers prevent innovation and productivity in the NHS.
CHAPTER 5: BARRIERS TO INNOVATION AND PRODUCTIVITY IN THE NHS

This chapter discusses the barriers that prevent innovation and productivity improvement in the NHS. Past studies, including by the Department of Health, Rand and the Health Foundation suggest that a combination of factors determine the ability of a health system to innovate and improve productivity.69

1. ABSENT, INSUFFICIENT OR POORLY-DESIGNED INCENTIVES AND PAYMENT REGIMES

Innovation is risk. In markets, competition forces suppliers to innovate and increase their productivity otherwise they face the threat of losing customers to suppliers who can offer similar products and services at lower prices or attract customers with new products. But, competitive pressure is largely absent in the NHS, and NHS providers are not allowed to fail. Therefore, the incentive to innovate is necessarily diminished.

Commissioners and funders must seek to re-create these incentives, but the scale and consistency of these is questionable.70 Payment by Results (PbR) is the principal form of imbursement received by NHS providers, accounting for £6 of every £10 in income.71 Despite the terminology, these payments are based not on results or outcomes but rather on activities. There are significant downsides. First, providers are incentivised to create more opportunities to perform the activities for which they get paid. Second, providers are disincentivised from discovering or adopting new methods of improving patient health because they will not be remunerated.
2. NOT KNOWING HOW TO LET GO: DECOMMISSIONING SUPERSEDED TREATMENTS

Arguably as important as the methods for allowing innovations to enter the healthcare system are the mechanisms for stopping outmoded treatments and creating space for innovation to occur.

Incidents of decommissioning are described as low (though increasing).72 A recent large-scale study explained why attachment to existing procedures materialises. It identified consistent and widespread ‘resistance to change’ from stakeholders, including patients and clinicians. Such resistance arose for a wide range of reasons including ‘sunk costs’ or ‘losses’ experienced by clinicians, patients and manufacturers.73 In addition, it noted that clinicians may be resistant to change ‘in the face of established clinical training and practice paradigms’.74 Anecdotally, we heard through the research that the hierarchical structure in healthcare means that managers often defer to clinicians and that there may be resistance to centralised measures among clinicians.

3. FUNDING STREAMS TIE THE HANDS OF COMMISSIONERS AND PROVIDERS

A common barrier to innovation and efficiency in healthcare systems is the allocation of resources between in- and out-patient care.75 Multiple analyses have demonstrated an association between lower levels of productivity in acute trusts and incidents of patients being kept in hospital for longer periods of time and delayed transfers.76 Despite this, the health system is adjusting only slowly. The most recent NHS Improvement report found that there were 470,000 bed days across acute, community and mental health providers occupied by delayed discharge patients, equating to 4.6% of all bed days in Quarter 3, 2017/18.77

One of the major underlying barriers has been the lack of financial tie-in between primary, community, secondary care and social care. This is starting to be addressed through integrated care models, though it needs to be locked in more systematically. Budget caps on spending on medicines are another example of arbitrary funding siloes.
4. SHORT-TERM FUNDING LIMITS INVESTMENT APPETITE

Short-term funding limits the ability to make investments that pay off beyond the annual or short-term budgeting cycle. For instance, screening or preventative measures may incur an initial cost which can reduce the likelihood of a larger cost being incurred in the future. For instance, an estimated 16,000 people a year die from bowel cancer. Bowel Scope is a new test being introduced in England for those over the age of 55, which removes any polyps that could turn into cancer, and can reduce the mortality rate of this group by 43% and incidence can be reduced by 33%. Earlier treatment costs less than treatment when the disease is more developed: the cost of treating stage 1 bowel cancer is £3,373 whereas stage 4 is £12,519.

A recent evaluation of the NHS Innovation Accelerator found that time and resource constraints within the NHS were preventing proper consideration being given to innovation. Imminent funding pressures meant examples where NHS Trusts’ financial decisions about purchasing innovations were ‘evaluated solely on their potential to deliver immediate cost reductions, e.g. in staffing.’ Resource constraints reduced readiness for risk-taking.

5. WORKFORCE ADAPTABILITY AND SKILLS-MIX

To innovate and improve productivity, organisations and workforces must adapt. This is very important as staff costs account for around two-thirds of all operating costs by NHS providers. There has been significant focus on the costs of agency staff in recent years, falling from a peak of 8% in July 2015 to 4% in December 2017, as well as on rostering, sickness levels and optimal nurse staffing levels on wards.
More generally, labour productivity is affected by the skills mix in healthcare settings and how well these complement existing and new technologies. Recent studies have concluded that consultant productivity declined between 2009/10 and 2015/16 by an average of 2.3% per year. In this period, the number of consultants rose by 22%, whilst the number of nurses grew by just 1% and the number of GPs fell. There is also huge variation in consultant productivity, with output per consultant 29% higher in the most productive hospitals. Factors associated with higher productivity include the skills-mix of the hospitals such as a higher proportion of nurses and of clinical support staff within the hospital workforce. Research by the NAO has found associations between lower-than-expected costs and a higher proportion of junior (sub-consultant level) doctors in relation to total doctor numbers; fewer GPs per person; and higher levels of staff education and training and in primary care. How the NHS adapts to achieve the right skills-mix is partly influenced by the structure and configuration of the clinical professions.

Meanwhile, there is little to no evidence that NHS productivity is undermined by having too many managers, despite the popular appeal of this theory. First, data on NHS Trusts and CCGs in England, shows that the number of managers fell by 5,237 between September 2009 (the earliest available figure in the statistics) and January 2018, representing a 13% reduction. Managers as a proportion of all NHS Trust and CCG staff fell from 3.4% to 2.8% during this period. Second, the Labour Force Survey shows that in the economy at large in 2017 10.7% of employees were classed as managers, directors and senior officials; the figure in health and social services was 4.4%. Care must be taken with these statistics because the sectors do not map directly onto the NHS and the evidence base remains incomplete. However, they do suggest that a more rounded and honest debate is needed and that further evidence gathering – including international comparative work – would be beneficial.
6. LEADERSHIP AND CULTURE

Roundtable discussion participants noted the importance of leadership and the culture in an organisation or a local place which could make it open to innovation and change. As the Nuffield Trust has argued, NHS organisations are also unusual in comparison to private sector companies in that they typically do not define innovation as the core of people’s roles.90

It is also worth reemphasising Chapter 4’s findings that, despite operating under the same incentives regime, adoption of innovation varies across different localities. This indicates that the regime of incentives and funding is not the only factor, and that factors such as culture matter.

7. NETWORKS, RELATIONSHIPS AND CONNECTIONS

As argued in the AAR, the complexity of the innovation supply chain means that networks and connections are important mechanisms for developing and diffusing innovation. The UK has fifteen regional Academic Health Science Networks which connect NHS and academic organisations, local authorities, the third sector and industry. Following the AAR, AHSNs will also coordinate Innovation Exchanges, which will enable better sharing of information, best practice and allow sharing to take place nationally.91

8. HIGH QUALITY EVIDENCE AND DATA ON TREATMENTS AND INNOVATIONS

The UK is fortunate to have a highly-regarded health technology assessment process overseen by NICE. This provides a core base of evidence on new treatments that are assessed. It is widely accepted that better real-world data is also needed to help inform innovations themselves as well as best practice. A 2013 OECD study reported that the UK was one of the leading countries in terms of linking data across national datasets to understand pathways and outcomes.92 The Prime Minister has rightly identified patient data as a huge opportunity for the NHS to develop new treatments and identify patterns of disease.93
CHAPTER 6: POLICY MEASURES TO DRIVE GREATER INNOVATION AND PRODUCTIVITY GROWTH IN THE NHS

The previous chapter showed that there are fundamental underlying barriers to discovery and adoption of innovation and productivity improvement across the NHS. This chapter describes steps that could be taken to promote innovation and productivity improvement in the NHS. These build on the policies that are already underway.

Existing policy initiatives

There are a wide range of existing policies focused on promoting innovation and productivity in the NHS. These include:

- **Accelerated Access Review**: Policy measures adopted include – the Accelerated Access Pathway, which seeks to fast track five major transformative medicines, informed by the Accelerated Access Collaborative; the NHS Innovation Accelerator; Digital Health Technology Catalyst; Academic Health Science Networks; and, the NHS England Innovation and Technology Tariff.94

- **Model Hospital initiative**: The Model Hospital initiative run out of NHS Improvement builds on the analysis and conclusions of the Carter Review. It provides a 'digital information service designed to help NHS providers improve their productivity and efficiency'. Other initiatives such as use of estates will also be part of this initiative.

- **Getting it Right First Time**: This replicates the Model Hospital Initiative with a focus on medical practice and care, with a goal of reducing unwarranted variation.95

- **Reforms to commissioning**: The FYFV envisioned a radical reform to how health and social care is commissioned, including through Vanguards, STPs, and new care models.
1. MEASURING HEALTH OUTCOMES NOT OUTPUTS

For understandable reasons, the healthcare system focuses on what it can measure: payment regimes focus on the activities undertaken by health providers (operations carried out, consultations completed), as do efficiency programmes. This is problematic because health systems often innovate by substituting one form of provision for another.

However, good data on health outcomes and the ability to attribute these to health interventions is still weak. We note that this problem affects public services more generally and has received academic attention. A system-wide effort to collect better data on outcomes would help address the problem.

Systematic and standardised data collection and datasets would have advantages for innovation and productivity in the NHS. First, it would provide a richer evidence base of real-world data, allowing the impact of innovations to be measured more quickly and systematically; second, the information could underpin better drug trials using real-world evidence; third, as the Prime Minister has argued, the data could be used to help detect patterns that indicate disease.

**Recommendation:** The NHS should develop an Office for Patient Outcomes which would provide the infrastructure for patient outcomes to be collected in a standardised way, enabling greater scrutiny and accountability, analysis of effectiveness of interventions, and for data to be made available to help develop new innovative treatments.

2. REFORMING PAYMENT METHODS

Payment systems that favour innovation must offer providers and commissioners greater freedom to discover and adopt new methods of operating. Crucially, commissioners must be free to select across the widest range of interventions: acute care, primary care, community care, social care, medtech and medicines. The current structure of Payment by Results Tariffs does not provide this freedom.
For this reason, there is growing interest in the UK and abroad in different forms of whole-population outcomes-based commissioning, capitated payments and accountable care organisations. Each of these approaches tasks an organisation (or group of organisations) with achieving predetermined health outcomes for a target population, and pays them according to whether these outcomes are achieved. The organisations are free to achieve the health goals in the way they see to be most effective, including via preventative and public health programmes. The most mature versions of this concept function in countries such as the USA and Spain, where early results are promising. Ten Integrated Care Systems in England are developing a strain of these structures in England, with NHS providers, commissioners and local authorities working in partnership. However, they are the exception rather than the rule, and local commissioners and providers in these new structures will require much greater flexibility over how they receive and spend their money.

**Recommendation:** NHS England should develop a schedule for phasing out reliance on Payment by Results in 2019 when the agreement ends and moving to a principle of paying for health outcomes achieved in their population. This could evolve as more local areas adopt approaches like integrated care systems.

The SMF has previously argued in favour of moving to a system of outcome-based reimbursement for medicines. This would see the NHS agree a payment structure whereby the manufacturer would only be reimbursed fully if predetermined health outcomes were achieved among the patient population taking the new treatments. The benefit would be that the NHS would be able to more confidently procure innovative treatments.

**Recommendation:** The Department of Health should trial an outcomes-based system of reimbursement of medicines for innovative treatments with a view to adopting the approach more widely.
3. ACCOUNTING FOR INNOVATION: DEVELOPING A LONGER-TERM VIEW ON FUNDING

Studies from the OECD, the OBR and others have concluded that the costs of technology are a significant contributor to rising costs of healthcare over time.\textsuperscript{102} However, as noted above, technologies bring a mix of treatments that are cost-saving, zero-cost and health improving.

Strategically, the NHS needs to move away from a purely short-term focus on cost towards a medium- to long-term view of value. This would enable greater investment in innovation, and facilitate productivity in the NHS and in the wider economy. While the fiscal context of the first part of this decade made a focus on short-term efficiency inevitable, the NHS now needs to pivot towards longer-term priorities.

- **Capital funding:** Capital intensity is a core component of labour productivity, enabling substitution of labour for machinery and devices. However, in recent years, capital budgets have been raided for revenue spending.\textsuperscript{103} In 2015/16, the Department of Health allocated £950m of its £4.5bn capital budget to fund operational activities;\textsuperscript{104} in 2016/17, £1.2bn was switched. In each year this accounts for one fifth of capital spending. The Department of Health notes that it intends to discontinue this practice by the end of 2019–20.\textsuperscript{105}

- **Funding for transformation and re-structuring:** Of equal, if not greater, concern has been the use of the STP funding for addressing current provider deficits. This is especially problematic given that existing provision often must be run simultaneously when new treatments are introduced.\textsuperscript{106} Indeed, this was explicitly accepted by NHS England and the Government. As John Appleby and others for the Kings Fund have noted, when private sector firms restructure they set aside significant one-off costs.\textsuperscript{107} If the NHS is serious about adopting more innovative care models, then it must fund the cost of double-running services and the costs of innovation in a systematic way. As others have noted, such funding also needs to be put on an independent footing so that it achieves its long-term objectives.\textsuperscript{108}
• **Short-term budget caps**: Policy treatment of costs is often short-term. Under the Health Service Medical Supplies (Costs) Act 2017, NICE and NHS England have implemented a budget impact test. Any new medicine that passes NICE’s cost effectiveness evaluation will also be subject to a commercial negotiation if the total net budget impact exceeds £20m in any of the first three fiscal years post launch. The budget test means that the number of patients who can receive a treatment each year are limited. For instance, it is estimated that 215,000 people in the UK have hepatitis C, an infectious disease that affects the liver. However, only around 10,000 patients a year have been receiving the new curative treatment.\(^{109}\) This is despite the fact that research conducted in 2013 showed that without changes in the treatment of hepatitis C the healthcare costs of the disease would rise to £115 million in 2035 and productivity losses would be between £210m and £427m.\(^{110}\)

• **Achieving greater funding and budgeting stability and certainty**: There is an ongoing debate about the quantum of funding that should be made available for the NHS and how to raise it. But, the structuring of funding matters. As the SMF argued in 2016, the pattern of feast and famine undermines investment in innovation and productivity.\(^{111}\) Chapter 4 showed that in periods of rapid growth of inputs, the healthcare system struggles to translate these into outputs and health outcomes. In contrast, during famines, it is difficult to find the cash to take investment opportunities or to re-design services to improve care and drive productivity (see for example the raiding of capital budgets for operational spending).

• **Longer-term funding certainty**. Funding certainty over the medium to long-term would help commissioners make decisions on productivity-enhancing investments in the health service via technologies, care models and better treatments for patients.\(^{112}\) Local areas were required to assess how Sustainability and Transformation Plans could be delivered on a five-year cycle. However, the overall NHS funding settlement does not reflect this principle and does not provide predictable and steady increases in funding.
Recommendation: The new funding framework should provide certainty to commissioners and providers over the mid- to long-term: the minimum should be a five-year allocation and budgeting cycle.

Recommendation: NHS England should work with the National Audit Office to review the Budget Impact Test and assess its impact on innovation and value for money in the short-term and the long-term.

Recommendation: The Government should establish a new Transformation and Innovation Fund which would be overseen independently by HM Treasury and the OBR, as part of the new NHS funding package, with a strict requirement that funding be used for investment and new practices.

Recommendation: Major funding reforms are likely to take time to decide and implement. In the short-term, there will be a need for finance to fund innovations that do not pay off across the usual annual or two-yearly budgeting cycles. The Treasury should establish a £1bn Productivity and Innovation Loan facility – this would allow NHS commissioners and providers to borrow to invest where there is a payback within five years.

4. APPLYING PRESSURE TO ADOPT INNOVATIONS

Innovation requires freedom. Equally, there should be stronger pressure on CCGs and providers to adopt new technologies when the evidence is available that they work and are value for money. Notable has been the substantial increase in the proportion of generic (rather than branded) medicines that are prescribed, in part a consequence of financial incentives and other concerted policy initiatives. Meanwhile, hospitals are currently incentivised to prescribe generic and biosimilar drugs where possible.

The Model Hospital has instituted a form of peer pressure for NHS providers and CCGs by making their performance on technical efficiency open to scrutiny by peers and patients. This principle could be applied more widely and with greater force within the NHS. We note that transparency can drive significant media and political attention. For instance, the gender pay reporting requirement obliges employers to publish average pay for male and female employees.
As the AAR proposed, this principle should be broadened out beyond technical efficiency to include take-up of innovative medicines and medtech. Crucially this information must be made more easily comprehensible and comparable.

**Recommendation:** As part of its response to the AAR, the Government should publish data that makes it easy for local areas to compare their performance to others on their take-up of innovation. This should be based on the Innovation Scorecard and include data on take-up of NICE-approved medtech and medicines, adjusted for disease prevalence, as well as other data sources.

**Recommendation:** NHS Improvement should institute a ‘Requirement to Explain’, which would oblige NHS commissioners and providers in the bottom quartile of performance on innovation or operational efficiency measures to explain their performance. The ultimate sanction could be that funding increases are withheld for those areas that cannot provide a reasonable explanation for low take up of NICE-approved medicines and devices.

5. INCENTIVISING TAKE-UP THROUGH AN INNOVATION RESERVE FUND

We heard through our work that more focus should switch to diffusion and dispersion of innovation rather than discovery.

Given variation in take-up of technologies, the size of the pot available for the Innovation and Technology Tariff should be increased. Currently the fund offers alternative funding for a small number of innovative treatments. In some cases, this means that the costs of the treatments are borne entirely by the central NHS rather than the local commissioner.\(^{115}\)

This could also be an opportunity to simplify what is a bewildering array of funding pathways for innovation in healthcare.\(^{116}\) Potential options for reform and simplification include: more straightforward segmentation of funding into ‘discovery’ and ‘adoption’, or moving to regional pots of funding.
**Recommendation:** A large reserve fund should be created to incentivise the adoption of NICE-approved medicines and medical devices by significantly expanding the funding available and scope of the Innovation and Technology Tariff.

**Recommendation:** The Office for Life Sciences and the Department of Health and Social Care should review innovation funding with a view to simplification.

---

**6. LEADERSHIP, MANAGEMENT AND TRAINING**

The culture of innovation derives from the very top. Within their own spheres, leaders of CCGS and providers establish the risk appetite and the prevailing culture. Research has noted that the NHS, in part due to accountability structures, exhibits risk aversion and that this contributes to underspending on innovation.\(^{117}\)

We believe that further thinking should take place to establish innovation culture as a metric on which providers, and their leaders, are assessed by regulators. This could be based on both qualitative assessments with staff and patients but also through quantitative analysis of innovations adopted.

The Health Secretary has recently asked Dr Topol to review training of NHS workers to help them adapt to a digitally-enabled health system.\(^{118}\) Examples from elsewhere, such as Canterbury, New Zealand, reveal the importance of staff training in innovation and change management when new commissioning models are introduced.\(^{119}\) In a 2014 survey conducted by Nesta, GPs cite ‘not enough resources put into staff training about new innovations’ as the third most important barrier to innovations after financial and time constraints.\(^{120}\) An important aspect for consideration will be how innovation can be incorporated into professional training so that clinicians are able to adapt effectively to new treatments. Further work should also be done to assess NHS management and its capabilities.
CHAPTER 7: HOW THE NHS CAN DRIVE PRODUCTIVITY IN THE WIDER ECONOMY

The previous chapter described policy steps that can be taken to improve innovation and productivity in the NHS.

We conclude, in this chapter, by looking at the role of the NHS in promoting productivity in the wider economy.

DEVELOPING A DEEPER UNDERSTANDING OF VALUE IN THE NHS

In contrast to most other sectors of the economy, technological innovations can push up short-term costs in healthcare because the productivity-enhancing improvements that they trigger in delivery may be less significant than the opportunities they create for additional spending (through new treatments, heightened expectations among consumers and expansion of access to treatments). For this reason, innovations and technologies in the NHS are often perceived as ‘cost-drivers’.

However, this is a narrow and false view. Innovative new treatments and approaches may reduce the future costs of care. They also often contribute to higher productivity in the economy by expanding access to, or improving the efficacy of, treatments. By promoting longer healthy lives, such advances in turn can boost labour market participation, economic growth, productivity improvement and higher tax revenues. As the OBR notes this may offer opportunities for recovery of (at least part of) these costs in the longer-term. Historically, economists have noted the specific impact on economic productivity of eliminating specific diseases, including the reducing incidents of malaria in countries such as Paraguay and India.

This doesn’t mean that we should pursue an ultra-rationalist approach and only pay for health interventions that deliver economic and fiscal gains or that reduce future demand on the NHS. That would be unnecessarily reductionist and would lead to disinvestment in services provided to older people and those unable to work, and it would obviate the inherent purpose of a universal health system.
THE PRODUCTIVITY GAINS FROM HEALTH IMPROVEMENTS

Figure 12 shows the distribution of costs to society imposed by a range of chronic diseases. It shows that the direct health-care costs are significant. However, in the instances of cancer and coronary artery disease (ischemic heart disease) they are lower than the costs of lost production from mortality alone, let alone wider productivity losses. This demonstrates the importance of thinking broadly and in the long-term about the potential gains from investment in healthcare.

Figure 12: Costs of diseases to the UK (OHE)

Other evidence suggests that huge productivity enhancements could be achieved if the health of the workforce were to be improved.

- In 2016, PwC estimated the cost to business of sickness absence at £29bn.\textsuperscript{123}
- Analysis suggests that the costs of presenteeism to the UK economy is somewhere between 1.5 and 2.6 times the costs of absenteeism.\textsuperscript{124}
- Disease-specific productivity losses are significant, for instance £8bn per year for cardiovascular disease.\textsuperscript{125}

It is important to note that the labour market impact of chronic diseases reinforces existing regional economic social and economic inequalities.\textsuperscript{126} Those areas with lower employment rates and lower GVA, also have higher employment gaps between their general population and those with long-term conditions. The data also shows that long-term conditions have a much larger impact on employment rates in lower level occupations.

**Figure 13: Employment of people with long-term conditions, Quarter 3, 2017**

\[
y = 0.76x + 69.889 \\
R^2 = 0.9366
\]

Source: SMF analysis of NHS England, Outcomes Framework data\textsuperscript{127}
INTRODUCING MECHANISMS TO PROMOTE LONG-TERM VALUE

A central dilemma is that financial gains from a healthier population do not flow to the organisation that intervenes but instead to the Treasury through higher tax receipts and lower benefit payments. Currently there is very limited scope for capturing those gains in commissioning and funding decisions.

The over-arching policy goal should be that future gains in NHS productivity and economy-wide productivity are reflected better in commissioning decisions and funding systems. This would help commissioners decide the best method of intervening including, preventative care and diagnostic tools. We put forward a mixture of measures for the immediate future and the longer-term. We note that the NHS is starting to take steps. The West Midlands Combined Authority is piloting a ‘Wellbeing Premium’, a tax incentive that would reward employers who are proactive in supporting workers with mental ill-health. The NHS Outcomes Framework contains a measure on the Employment rate of people with long-term conditions. But, much more needs to be done.

IMMEDIATE STEP

Defining ‘cost neutral’ in the Accelerated Access Pathway

Through the Accelerated Access Pathway (AAP), the Government will take forward five transformative innovations each year and give them breakthrough product status. It has stated that these must be ‘cost neutral’: ‘Across this basket of products, any products placed on the AAP that are cost additive will need to be offset by products that deliver cost savings, beyond those already factored into NHS plans.’ The paper is unclear on whether ‘cost additive’ refers to in-year accounting or what types of benefits will be captured. Requiring innovations to pay off in-year or within the NHS would limit the field of innovation.
It would be beneficial for the AAP to be allowed to take a broad definition informed by the value that the innovation drives in the wider economy, so that the transformative technologies are cost neutral over a five- or ten-year period when accounting for wider societal benefits. This could be a helpful test for how such an approach could be rolled out more widely.

**Recommendation:** A broad definition of ‘cost neutral’ should be applied to innovations taken forward in the AAP: namely that they create wider value (in terms of employment and productivity improvement) amongst the target patient population that covers the cost of the treatment over a period of five-years or longer if appropriate.

**LONGER-TERM MEASURES**

In the longer-term, the Department of Health should seek to establish evaluation and commissioning mechanisms that better reflect wider societal impact and future productivity gains.

**Broadening the QALY measure**

NICE health technology assessments include costs to public services, but do not routinely include productivity losses associated with the health condition.\(^{131}\) International comparisons indicate a range of approaches. Several countries include productivity costs within their health technology assessments either as standard or on a case-by-case basis. In Canada, the primary analysis focuses on costs borne by the publicly-funded healthcare system, but wider costs (e.g. individuals returning sooner to work or costs realised by other public agencies) are reported separately when it is likely they would have an impact on the outcomes.\(^{132}\) In Sweden all relevant societal costs associated with the treatment and illness are identified, quantified and evaluated.\(^{133}\) While there are a range of accepted methodologies for calculating productivity gains,\(^{134}\) we note that some aspects are very difficult to monetise (such as presenteeism).
Creating a more universal method of assessing value

While NICE has a robust and widely-respected mechanism for evaluating the costs and benefits of new medicines and technologies, other healthcare interventions are subjected to different assessments. In recent years there have been attempts by NICE to provide more guidance on initiatives such as public health interventions (e.g. smoking cessation interventions). This type of work needs to continue so that rigorous comparisons can be made between public health initiatives and other possible alternative measures, including exploring how a reduced version of the HTA methodology could be developed and applied more systematically to healthcare interventions.135

Addressing ethical concerns

The endeavour to understand the wider productivity implications of healthcare should not become a reductionist exercise. There are important moral issues around whether society should prioritise patients with certain characteristics over others.

Ethical concerns could potentially be addressed in the following ways. First, the Government could commit that the policy would result only in additionality – i.e. in more treatments say for children with specific diseases. Second, the policy could be pursued on a case by case basis, giving priority to diseases for which there are no existing treatments, and devices and medicines that are unusually innovative. Third, the Government could seek to estimate the aggregate economic gains and then distribute these across all treatments (i.e. by adjusting the QALY measure).

**Recommendation:** We propose that the Government should initiate a public discussion on whether and how wider societal outcomes should be measured and pilot some different approaches to appraisal.
ANNEX 1: IMPACT OF DIFFERENT PRODUCTIVITY RATES IN MONETARY TERMS

Table 2: Impact on the value of the NHS budget under different productivity assumptions (£bn, 2017-18 prices)

<table>
<thead>
<tr>
<th></th>
<th>Productivity at 2.2% (Historic economy wide rate)</th>
<th>Productivity at 0.8% (Historic healthcare rate)</th>
<th>Productivity at 1.4% (NHS rate this decade)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2017-18</td>
<td>124.70</td>
<td>124.70</td>
<td>124.70</td>
</tr>
<tr>
<td>2018-19</td>
<td>127.44</td>
<td>125.70</td>
<td>126.45</td>
</tr>
<tr>
<td>2019-20</td>
<td>130.25</td>
<td>126.70</td>
<td>128.22</td>
</tr>
<tr>
<td>2020-21</td>
<td>133.11</td>
<td>127.72</td>
<td>130.01</td>
</tr>
<tr>
<td>2021-22</td>
<td>136.04</td>
<td>128.74</td>
<td>131.83</td>
</tr>
<tr>
<td>2022-23</td>
<td>139.03</td>
<td>129.77</td>
<td>133.68</td>
</tr>
<tr>
<td>2023-24</td>
<td>142.09</td>
<td>130.81</td>
<td>135.55</td>
</tr>
<tr>
<td>2024-25</td>
<td>145.22</td>
<td>131.85</td>
<td>137.45</td>
</tr>
<tr>
<td>2025-26</td>
<td>148.41</td>
<td>132.91</td>
<td>139.37</td>
</tr>
</tbody>
</table>
REFERENCES

14. Data from Figure 3 and Figure 5 ONS, *Division level labour productivity estimates: February 2018* (2018); https://www.ft.com/content/55e85d94-0bf8-11e8-839d-41ca06376bf2. Accessed 23.05.2018.
15. Calculation: 1.4% (difference between 2.2% and 0.8%) x 7.3%
16. HM Government, *Life Sciences Industrial Strategy – A report to the Government from the life sciences sector* (2017); See also Maintaining and growing the UK’s world leading life sciences sector in the context of leaving the EU (2016)
31. Sally-Marie Bamford, Ben Franklin, Dean Hochlaf and George Holley-Moore, Towards affordable healthcare: Why effective innovation is key (ILC, 2017)
36. Sally-Marie Bamford, Ben Franklin, Dean Hochlaf and George Holley-Moore, Towards affordable healthcare: Why effective innovation is key (ILC, 2017)
38. International comparison is difficult and typically relies on one of three methods: comparison of incidents of inefficient and inefficiency actions; replication of productivity analysis across different countries focusing on quality-adjusted health activities; and, comparison of health inputs to health outcomes.
40. Commonwealth Fund, Mirror, Mirror 2017 (2017)
41. João Medeiros and Christoph Schwiercz, Efficiency estimates of health care systems (European Commission, 2015)
42. The two most widely-used analyses of healthcare productivity are produced by the ONS and the University of York, which use similar though not identical measures. ONS, Public service productivity estimates, healthcare: 2015 (2018), and associated data tables. Adriana Castelli, Martin Chalkley and Idaira Rodriguez Santana, Productivity of the English National Health Service: 2015/16 Update (2018)

44. Adriana Castelli, Martin Chalkley, Idaira Rodriguez Santana, *Productivity of the English National Health Service: 2015/16 Update* (CHE, 2018). We report the mixed method. This is the headline measure reported by the University of York in its summary.

45. Based on an annual budget of £124.7bn in 2017-18.

46. Note the University of York analysis covers financial years, whilst the ONS data used runs by calendar year. Data from: UK economy: ONS, *Labour productivity, UK: October to December 2017* (2018), Figure 1: Output per hour and output per worker; University of York:

47. NAO, *Sustainability and transformation in the NHS* (2018)


49. https://www.ifs.org.uk/publications/9186


58. Sarah Lafond, Anita Charlesworth and Adam Roberts, *Hospital finances and productivity: in a critical condition?* (Health Foundation, 2015)


60. NHS Innovation scorecard data, *Estimates of predicted use compared to observed use, NICE Technology Appraisals in the NHS in England (Innovation Scorecard): to June 2017* (January 2018)

61. Office for Life Sciences, *Life Science Competitiveness Indicators* (2017). Comparator countries include: Australia, Austria, Belgium, Canada, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Spain, Sweden, USA.

62. Office for Life Sciences, *Life Science Competitiveness Indicators* (2018). Comparator countries include: Australia, Austria, Belgium, Canada, Finland, France, Germany, Ireland, Italy, Japan, Netherlands, Spain, Sweden, USA.


66. https://app.powerbi.com/view?r=eyJrIjoiMjM0NGQ4MzAtMDI0Ni00ZjlmLWFiMi00YTBlODViNDYyM2QzIlwiLCi6jiUwZiYwNzFmLWJiZmUtNDAxYS04ODAzLTY3MzcDOGU2MjIlMlIsImIiOjNh9. Accessed 23.05.2018.


68. Kathleen Stokes and Professor Richard Barker, *Which Doctors take up promising ideas?* (Nesta, 2014)


84. NHS Improvement, *Performance of the NHS provider sector for the month ended 31 December 2017* (February 2018)
88. NHS Hospital & Community Health Service (HCHS) monthly workforce statistics – Staff in Trusts and CCGs. Data for England.
89. Data taken from ONS, EMP04: All in employment by status, occupation and sex, Q2, Apr-Jun 2017 (August 2017); and ONS, EMP13: All in employment by industry: People (not seasonally adjusted) (May 2018)
96. A. Atkinson, *Measuring Health Output, Productivity and Equity: Future Challenges* (OHE, 2010); see also studies by the ONS and the University of York.

98. ‘May plans NHS data revolution to fight cancer’, *The Times*, 21 May 2018.


107. John Appleby, Amy Galea and Richard Murray, *The NHS productivity challenge Experience from the front line* (King’s Fund, 2014)


113. Hugh Alderwick et al, *Better value in the NHS: The role of changes in clinical practice* (Kings Fund, 2015);


116. The recent study by RAND noted that: ‘There is a need for better visibility of the funding sources available and a mapping of where they sit in the innovation pathway, as well as for better coordination of current funding.’ Sonja Marjanovic, Megan Sim, Talitha Dubow, Jennie Corbett, Emma Harte, Sarah Parks, Celine Miani, Joanna Chataway, Tom Ling, *Innovation as a driver of quality and productivity in UK healthcare Creating and connecting receptive places: Emerging Insights Report* (RAND, 2017)


118. Chris Smyth, ‘Smartphones ’will become default way to see doctor’’, *The Times*, 27.04.2018

120. Kathleen Stokes and Professor Richard Barker, *Which Doctors take up promising ideas?* (Nesta, 2014)

121. Mirko Licchetta and Michal Stelmach, *Fiscal sustainability analytical paper: Fiscal sustainability and public spending on health* (OBR, 2016)


127. NHS England Outcomes Framework Release, February 2018


136. Expenditure figure from Rachael Harker, *NHS Funding and Expenditure* (House of Commons, 2018)
The NHS faces dramatic increases in demand, a consequence of demographic pressures and rising co-morbidities, whilst, at the same time, patients expect better care.

This report analyses why greater innovation and productivity growth is necessary in the NHS, and the policies that could help this be achieved. It goes on to assess how the NHS can drive productivity in the wider economy.