

REPORT

The background of the entire page is a dense, abstract composition of various pills and capsules. The pills are rendered in a 3D style with soft shadows and highlights, giving them a realistic appearance. They are scattered across the page, with a concentration of orange pills in the upper left and center, and a larger number of grey pills in the lower right and bottom. The pills vary in size, shape, and orientation, creating a sense of movement and depth.

# IMPROVED CIRCULATION

UNLEASHING INNOVATION  
ACROSS THE NHS

Harry Quilter-Pinner  
and Rick Muir

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Institute for Public Policy Research

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# 1. INTRODUCTION

We live much longer than our ancestors and it is likely that our children and grandchildren will live longer still. Diseases that used to kill millions are being steadily eliminated around the globe. Conditions that were once inoperable are today amenable to successful surgery. Behind all of these achievements lie advances in scientific knowledge and the development of new technologies, including medicines, medical equipment and digital devices and networks.

Healthcare systems across the developed world are facing both rising (and more complex) demand for services and increased constraints on the funding and resources available to them. New technology is a vital ally in meeting these twin challenges, because it is one of the few tools that is demonstrably capable of achieving the ‘holy grail’ of public policy: better outcomes at a lower cost.

Nevertheless, in England and Wales, the National Health Service (NHS) is not as effective as it could be at adopting new technologies and allowing or encouraging them to spread quickly. This paper asks what we can do to change that.

## The challenge: increased demand and fewer resources

The NHS is widely regarded as one of the best health systems in the world: the Commonwealth Fund recently ranked it first out of 11 developed nations’ health systems (Davis et al 2014). In the same evaluation, the US was ranked 11th, despite spending over twice as much per person on healthcare (World Bank A).

However, demand for NHS services is rising and becoming more complex. Across the UK, the number of people aged 80 and over is projected to rise from 3 million today to 8 million by 2050 (Cracknell 2010). As well as increasing the sheer number of potential patients, longer lives also mean more complex patterns of disease: 58 per cent of people aged 60 and over have a chronic condition, and the number of people with more than one condition is rising (DH LTC 2012).

Increased demand for services means additional resources will be required in the future. NHS England estimates that it will face a funding gap of £30 billion by the end of the 2015–2020 parliament. It has committed to finding over £20 billion in increased productivity gains to help to close this gap, and has argued for additional government funding to meet the remaining shortfall (NHS 2014a).

There are many things that the NHS can do to meet this challenge. It needs to shift the model of healthcare from one focussed on treating people in hospital to one that supports people to stay well at home. It needs to provide care that is integrated around the individual patient, rather than being fragmented between different organisational and clinical silos. It needs to reconfigure its workforce so that it is better equipped to deal with changing patterns of disease. And it needs to empower citizens so that they have a greater capacity to design and manage their own care and support.

However, one of the most important things that the NHS could do is to make better use of innovative technologies. As well as supporting all of the necessary changes noted above, innovation would help to ensure that the NHS is able to boost productivity gains above their historical average of between 1.5 and 3 per cent, which is essential if it is to meet its commitment to closing part of the funding gap (Roberts 2015).

## Performance so far: adopting and spreading innovations in healthcare

Technological innovation should be a powerful tool for improving healthcare outcomes in a constrained funding environment. New medicines should save or improve millions of lives by tackling diseases that are currently incurable, such as cancer or dementia. Breakthroughs in pharmogenetics should radically improve our ability to predict and prevent disease at the individual level. Digital technology, including wearable technology and electronic patient records, should mean that individuals are able to monitor their own vital signs, helping to prevent and manage illness. One day, robotics and artificial intelligence could help to provide care for frail elderly and disabled people in their own homes.

However, when it comes to embracing new and innovative technologies, there is evidence that the UK is lagging behind. The Richards report (2010) compared the level of uptake for key best-practice drugs in the UK and 13 other countries, and found that the UK ranked just eighth overall. What's more, it finished in the bottom four in the case of seven out of the 16 clinical-need types: cancer drugs launched within the last five years and within the last 10 years, second-generation antipsychotics, and drugs for treating dementia, hepatitis C, multiple sclerosis and rheumatoid arthritis.

Another frequently cited example is that of insulin pumps for people with type 1 diabetes. There is evidence that using a pump – compared with self-management – leads to a reduced number of unplanned hospital admissions, complications caused by mismanagement (severe hypoglycemia and diabetic ketoacidosis), and long-term deteriorations (heart disease, stroke, blindness, kidney disease or nerve damage). However, a study by the Medical Technology Group found that uptake averaged just 3.9 per cent in the UK, compared to the benchmark of 12 per cent recommended by NICE. Uptake in the US, Sweden, France and Germany is between 15 and 35 per cent (MTG 2010).

Uptake also varies greatly across the UK. The Innovation Scorecard<sup>1</sup> looks at the uptake of drugs and technologies approved by the National Institute for Health and Care Excellence (NICE) across the UK. It shows that, for example, the use of statins, which is highly recommended for people with high cholesterol, varies between 68 per cent of expected usage at the low end to 196 per cent at the top end. Indeed, significant variation is seen across all 76 medicines and six medical technologies that are included in the scorecard.

Poor uptake of new technologies is not just a problem for medicines, but also affects medical devices and digital tools. Healthcare across the UK is lagging behind other sectors of the economy in its use of digital services. For example, 59 per cent of all UK citizens have a smartphone, and 84 per cent of adults use the internet. However, when asked, only 2 per cent of the population report any digitally enabled transaction with the NHS (NHS 2014b).

In its key report on innovation in healthcare, *Innovation, Health and Wealth*, the Department of Health concluded:

*'Whilst we are good at inventing and developing new technologies, the spread of those inventions within the NHS has often been too slow, and sometimes even the best of them fail to achieve widespread use.'*

DH NHSIE 2011

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<sup>1</sup> See <https://www.england.nhs.uk/ourwork/innovation/innovation-scorecard/>

## Recent progress

NHS England and the Department of Health are aware that in order for the NHS to reach its full potential the service needs to get better at spreading – or ‘diffusing’ – the best innovations. This acknowledgment has led to a range of initiatives to address the problem.

*Innovation, Health and Wealth*, launched in 2011, identified six main barriers to successful diffusion in the NHS:

1. poor access to metrics and evidence on innovations
2. insufficient recognition of innovators
3. financial disincentives to innovate
4. commissioners lacking the tools to drive innovation
5. a leadership culture that is not pro-innovation
6. the lack of a ‘systematic innovation architecture’.

On the back of this report, NHS England launched a series of policy reforms and initiatives to bring down these barriers. For example, it introduced a legal obligation on all clinical commissioning groups (CCGs) to offer NICE-approved technologies to patients, and created a single web portal for all new innovations, creating a one-stop shop for practitioners looking to purchase new products. It provided funding to establish 15 academic health science networks (AHSNs) to bring together academia, private innovators and the NHS to develop, adopt and diffuse innovations (see boxed text below). It introduced a new evaluation system within NICE for medical devices, where previously the regulator had dealt only with medications. And it set out reforms to the tariff system that were designed to reward innovation and allow commissioners to overcome the barriers created by divisions or ‘silos’ in their budgeting.

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### What are academic health science networks?

Academic health science networks (AHSNs) are perhaps the most tangible outcome from the reforms sparked by *Innovation, Health and Wealth*. That report identified ‘silos’ in the innovation process as one of the primary barriers to the adoption and diffusion of new technologies – academia, where the research underlying new innovations is conducted, and the private sector, where products are often developed and commercialised, tended to work at a distance from the organisation most likely to purchase and apply the innovations, namely the NHS.

The report argued that there was a need for a ‘systems integrator’ and ‘delivery mechanism’ to link the different ‘innovation silos’, and called for the creation of 15 AHSNs covering the whole of the UK to fulfil this role.

*‘We will establish a number of Academic Health Science Networks (AHSNs) across the country, the first going live during 2012/13. Working with stakeholders from across the NHS and scientific community, academia, the third sector and local authorities, the AHSNs will link up the system and drive up diffusion of innovation.’*  
DH NHSIE 2011

The key objective of AHSNs, set out in a follow-up report, is ‘to identify, adopt and spread innovation and best practice across the NHS’ (NHS 2012). This is a huge task. Each AHSN covers a patient population of 2–5 million, and a healthcare establishment of hundreds of thousands of medical professionals, more than 10 CCGs, health and wellbeing boards, NHS trusts and local authorities, as well as hundreds of GP surgeries and community health providers. On the other side, they may have relationships with 10 or more universities and thousands of innovators and, in theory at least, they should be working across all medical conditions and all thematic health priorities (empowerment, integration, inequality and so on). And all this is to be achieved on a relatively small budget of around £3–5 million a year for each AHSN.

Individual AHSNs have taken on this broad and ambitious remit in different ways – the areas they chose to focus on and the tools they use to do so vary substantially from one to

the next. Some of this variation is both to be expected and beneficial: at their core, AHSNs are autonomous organisations with devolved powers to reflect and respond to issues in their local health economies. However, our analysis also suggests that variation is more likely to be a result of the need to narrow their focus (given limited resources) and the lack of a clear and overarching approach across the NHS. In large part, this is because it is not yet clear what the most effective approach looks like.

Both innovators and the AHSNs themselves testify to this.

*'We have experienced huge variation in the kind of support provided to us by AHSNs across the country. Whilst we have had some good experiences – the best providing us with introductions in a systematic way and guidance on what evidence is needed and where funding can be found – some have been equally as unhelpful. Notably, some have said that we don't qualify for their support, either because our product doesn't fall into their thematic medical area of expertise or because they only look at products which have been adopted elsewhere in the system.'*

Michael Brooks, PatientSource, online health records management system

*'The scale of the objectives AHSNs have been set – identification, adoption, diffusion and wealth creation over populations of millions of people and thousands of NHS organisations – has meant that they have had to target who they are going to help and how, at the expense of other innovators and other approaches. Furthermore, we don't have clear evidence or criteria for which innovators or approaches to use in looking to achieve our aims. This is one of the primary causes of variation.'*

Commercial director, AHSN

The challenge for AHSNs is how to most effectively use their limited resources to take a coherent, informed and targeted approach to facilitating the adoption and diffusion of innovations. The analysis in this paper is intended to help them achieve this.

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## The challenge ahead

The NHS is changing to support the adoption and diffusion of innovations. *Innovation, Health and Wealth* identified many of the key barriers faced by entrepreneurs trying to have their innovations taken up. The resulting reforms were both well-intentioned and sensible, and many have been implemented successfully – such as the new legal obligation on CCGs to offer NICE-approved technologies.

However, as we will show in this paper, a number of major barriers to innovation in the system remain, and further reforms are required. If the NHS is to meet the challenge it now faces – achieving £20 billion in increased productivity by 2020 – more must be done to facilitate innovation. As with *Innovation, Health and Wealth*, our approach has been to focus on innovators' experiences, as they have sought to get their innovations into wider circulation.

In this context, then, we have set out to identify the most significant remaining barriers to the adoption and diffusion of innovations, and to distinguish between those that are systemic or related to the overall structure of the health economy and those that exist at the level of individual organisations. This, we hope, will help to guide policymakers at the national levels, and organisations within the NHS at the local level – including practitioners, commissioners and external bodies like AHSNs – to create a more innovative and effective health service.

## 2. IDENTIFYING BARRIERS TO INNOVATION

In this chapter we define the scope of our paper, and detail the analytical approach and methodology we have used to identify the barriers to adoption and diffusion of innovations across the NHS.

### Scope

Innovation is defined in *Innovation, Health and Wealth* as:

*'An idea, service or product, new to the NHS or applied in a way that is new to the NHS, which significantly improves the quality of health and care wherever it is applied.'*

DH NHSIE 2011

However, in order to keep the scope manageable and the analysis focussed, this paper does not look at changes in services, only products. Of course, this does not mean that product innovations are not motivated by a desire to change the way services are delivered, or do not lead to improvements in service provision.

Furthermore, we are focussed primarily on the later stages of the 'product development cycle' as set out in *Innovation, Health and Wealth*:

- **Adoption:** putting the new idea, product or service into practice including prototyping, piloting, testing and evaluating its safety and effectiveness.
- **Diffusion:** the systematic uptake of the idea, product or service into widespread use across the whole service.

Crucially, we are not focusing on the earlier stage, **invention**: coming up with and developing the originating idea for a new service or product, or new way of delivering a service.

It is also worth noting a distinction that can be made (and often is) between two groups of products:

- **Medicines:** A drug or medicine that is used to treat or prevent disease.
- **Non-medicines:** Any product that is not a drug or medicine which is used in healthcare provision across the NHS. These may include medical devices, digitalcare or IT platforms.

These two products groups are very different in terms of how they are developed and the ways in which they are ultimately used. However, we do not use any finer distinctions – such as 'medtech' or 'telemedicine' – because we are looking for broad systematic risks, rather than specific categorical or local barriers to innovation.

### Analytical framework

In seeking to identify barriers to innovation in the NHS, it is important to adopt a framework through which to view and understand the problem. Healthcare products are bought and sold in a market, and so it makes sense to bring to bear economic theory relating to how markets work as part of that framework.

Any market contains buyers (in this case, principally NHS providers such as hospitals and GP practices) and sellers (innovators). If this was a ‘perfect market’ then all those products that improve health outcomes, subject to a constraint on resources, should achieve successful adoption and diffusion. This in turn implies that unsuccessful adoption and diffusion of innovation occurs when these perfect market conditions do not exist: when market imperfections or failures distort the outcome and lead to the inefficient allocation of goods and services.

### A very brief introduction to perfect markets

In traditional economic theory, markets are the interaction of demand and supply for a product or products. The demand curve shows the quantity of a good or service that consumers are willing and able to buy at different prices in a specified period. There is usually an inverse relationship between price and the quantity demanded. Traditionally, economic theory suggests that a number of factors affect demand, including: consumer preferences, income, price of competing products or services, ability to borrow (interest rate), and consumer population.

The supply curve shows the quantity of a good or service that producers are willing and able to supply at different prices in a specified period. There is a positive relationship between price and supply: an increase in price will lead to an increased willingness to supply. Traditionally, theory has suggested that the factors impacting on supply include: changes in production costs, government taxes or subsidies, and the number of producers in the market (competition).

When supply and demand are equal, the economy is said to be at equilibrium. At this point in a perfectly competitive market – that is, in a market that has many sellers producing identical products and who are free to enter or exit the market, and that has many buyers with perfect information about the products available in the market – the allocation of goods will be at its most efficient.

In terms of the healthcare system, then, operating at equilibrium in a perfectly competitive market would imply that all products, new or existing, which improve efficiency in terms of health outcomes – that is, which improve longevity and quality of life for one individual without worsening the longevity or quality of life of others – would be supplied for those who are demanding them at a price they are willing and able to pay. The market therefore plays a key role in deciding which products are ‘in demand’, and which are not.

The perfect market view is undermined by various market failures and imperfections, which result in some level of inefficiency in how goods are distributed. These are – or at least point towards – ‘barriers’ of the systemic kind that we are looking for.

**Table 2.1**  
Market imperfections in theory

	Definition
Asymmetric information	Where one party in a transaction has superior information to the other. Usually it is the supplier who has better information than the consumer – for example, the effectiveness of a healthcare product is only known to the producer, leading to its over- or undersupply.
Market power	Where either the supplier (monopoly) or buyer (monopsony) has disproportionate market power, giving them the ability to manipulate market prices. Also known as ‘imperfect competition’.
Externalities	Where producing or consuming a good has an impact (positive or negative) on third parties directly related or factored into the transaction – for example, where healthcare is provided by the private sector and does not take proper account of wider societal benefits.
Government failure	Where government intervention leads to the inefficient allocation of resources – for example, through over-regulation or ‘crowding-out’ in the market for healthcare products.

Comparing the reality of how our healthcare economy functions to the theory is illustrative, because it can help us to determine whether the structure of our health market itself is one of the factors that is inhibiting the adoption and diffusion of innovations. However, it should be noted that a ‘market failure’ framework is less useful for the development of appropriate solutions. This is because even if we succeed in identifying a systemic market failure, such a ‘failure’ may be the result of an inevitable – perhaps even desirable – feature of our health system. In fact, there are a number of reasons why markets for healthcare products in the UK do not operate as the perfectly efficient markets of orthodox economic theory – as, of course, no market does.

First, on the demand side, we do not purchase healthcare as individual consumers, as we would in a perfect market. Instead, we do so collectively. This is justified on grounds of:

- **Fairness:** we do not want people to be unable to access healthcare due to lack of funds. This is why the NHS provides its care ‘free at the point of use’, funded through general taxation.
- **Security:** the NHS is a very effective way of pooling risk. We all pay into a collective insurance pot so that we do not have to worry about paying for treatment in the event of falling ill.
- **Efficiency:** pooling risk in a single national ‘pot’, as opposed to multiple competing pots, has been found to be a particularly successful way of achieving economies of scale (see Trogden et al 2014). This is one reason why the NHS performs so well on cost effectiveness in international comparisons between healthcare systems, as noted in Davis et al 2014.

Second, on the supply side, it is inevitable in many major healthcare markets that competition between producers is limited. This is because there are enormous sunk costs involved in researching and developing effective medicines, which means that one firm can supply the market’s entire demand at a lower price than two or more firms could. This lack of competition is part of the nature of the market for highly specialised healthcare products, including drugs, and there is little that can or indeed should be done about it.

In summary, then, this framework of market failures and imperfections can help us to identify barriers to innovation, and distinguish between those which are systemic and those which are more localised. However, having done so, our response should not be to develop solutions aimed at creating a more perfect market, which is in critical respects unfeasible and undesirable. Instead, our aim should be to use this understanding to help to develop solutions that are appropriate within the context of a collectively financed healthcare system that is free at the point of use.

## Methodology

Having developed this analytical approach to identifying the barriers to adoption and diffusion of new innovations in the NHS, we identified over 20 detailed case studies of innovative healthcare products. These case studies were identified in discussions with a range of health specialists, and for each we conducted one or more detailed interviews with the innovators involved.

Through these interviews, we aimed to trace the pathway that an innovation takes in reaching the market and to highlight the barriers that innovators come up against along the way. We asked how the innovators tried to overcome these barriers, who were the significant ‘enablers’ that supported their efforts, and what changes they would make to the system in light of their experiences. Where the products were being used in other countries, we also took this opportunity to gauge whether innovators had seen easier or more complete adoption and diffusion abroad, and if so why that was the case.

Having identified the primary barriers to innovation, we investigated each in turn. This research drew on a series of interviews with clinicians, civil servants and health policy specialists, and on a review of the existing literature in each area. We present the results of this analysis in detail in chapters 3, 4 and 5 – including specific recommendations for further reform – before outlining a vision for the future in chapter 6.

### 3.

## BARRIER 1: SEARCH FRICTIONS, OR HOW TO BRING BUYERS AND INNOVATORS TOGETHER

The first major barrier identified by our research is that innovators and buyers within the NHS often have difficulty locating each other. This is a classic example of a **search friction**, a form of market failure caused by asymmetric information.

Just because a market includes buyers and sellers, both of whom would benefit from trading with each other, it still may not be sufficient for trade to actually occur, at least in the short term (see Mortenson and Plissades 1994, Petrongolo et al 2010). This is because in most markets the ‘perfect competition’ conditions do not exist. Notably:

- potential trade partners do not have perfect information about each other; instead, sellers and buyers must invest time and money simply to find out about (and locate) each other
- the products are not actually identical – indeed, they differ significantly. This produces informational asymmetry, as the producer knows the benefits and disadvantages of a product to a greater extent than the buyer. This means the producer has to invest time and money in convincing the buyer that they are not purchasing a ‘lemon’ (per Akerlof 1970).

The result of these imperfections – especially if mechanisms are not put in place to overcome them – is that the market does not ‘clear’ – that is, it does not achieve equilibrium – and therefore delivers a suboptimal outcome. In our context, that means a less good outcome in terms of the adoption and diffusion of innovative technologies across the NHS.

The rest of this chapter explores these two forms of market imperfection further: first, barriers to locating trading partners and, second, the costs of overcoming the ‘lemons’ problem.

### Making it easier to locate buyers in the NHS

The first element of this problem is the size and complexity of the NHS. Despite the common conception that the NHS is one entity, it is in fact thousands of individual organisations, all of which are potential consumers: NHS England, Public Health England, 211 CCG’s, 168 acute trusts, nearly 11,000 GP surgeries, and thousands of community providers.

*‘How to get into the system is a key challenge for non-medicine based innovations. There are thousands of potential routes in, none more efficient or clearer than the others.’*

Bruce Hellman, uMotif, health management app

*‘To diffuse a product across the system you would have to speak to over 200 CCGs and thousands of hospitals and GP surgeries.’*

Mike Casey, Futurenova, medical-grade case for iPad tablets

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### Case study: uMotif health management app

uMotif is a clinically led patient engagement and digital health self-management tool. It allows patients – particularly those with chronic diseases such as diabetes, heart failure and Parkinson's – to manage their care remotely. It also helps patients collect data about their own health (heartrate, blood pressure, blood sugar level), which clinicians can use to monitor progress and diagnose treatment more effectively. The product delivers cost savings by significantly reducing untaken medication, missed health appointments and emergency admissions caused by poor self-management, while also increasing patient satisfaction. The platform is increasingly being adopted across the NHS, with almost 40 deployments across primary, secondary, community and mental health settings. International adoption is beginning, with the first clients signed in Australia and the US.

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The second element of this problem is a lack of transparency regarding the structures and purchasing processes within each NHS organisation. Most innovations are focussed on a certain condition or a certain part of a care pathway. So innovators not only have to find the correct organisation but also the correct people within that organisations. Even then there are often multiple people with influence over the procurement process, all of whom need locating, and it is often unclear who is responsible for making the final decision on a purchase or commission.

*'The NHS is not always a very transparent organisation; locating the right people within it, to push forward adoption is time consuming and sometimes virtually impossible.'*

Mike Casey, Futurenova, medical-grade case for iPad tablets

*'Each client organisation is made up of different groups, often including clinicians, financial managers, commissioners and, as this is an IT-based product, IT managers as well, all of whom have some say in the adoption decision. Getting an innovation adopted therefore means identifying and bringing together numerous people within each organisation. This means that while making an initial sale is difficult, driving rapid widespread adoption is very challenging.'*

Bruce Hellman, uMotif, health management app

For some products, this problem has been overcome centrally. For some medicines, for example, NICE's technology appraisal simplifies this process by providing a single entry point, conducting an assessment of the economic and clinical evidence concerning the new medicine (a point to which we shall return later in this paper) and taking a centralised decision. There is then a legal obligation, via the funding mandate, on each CCG and local provider to procure and provide the medicine at the local level. In this way, the innovator overcomes the problem of locating potential buyers across the NHS.

However, the NICE technology appraisal route applies only to a minority of medicines (around 40 per cent)<sup>2</sup> and to no non-medicines at all. We recommend that all medicines should go through this kind of centralised NICE process; however, we also recognise that the case for non-medicines is weaker. This is because there is often a huge number of very similar products (such as apps) in the market and because the evidence for and against each product is minimal in clinical terms and is often location-specific. The challenge for AHSNs, therefore, is to try to overcome these search frictions locally for all products that are not eligible for a centralised technology appraisal by NICE.

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2 Interview with GlaxoSmithKline and Decideum.

## Recommendations for national government

In the current system, the entry point for non-NICE-approved, specialised and highly specialised medicines is unclear. This leads to confusion among innovators, delays in adopting new medicines, and inefficient replication of the assessment and decision-making process across the country.

**Recommendation 1:** We recommend that all significant medicines<sup>3</sup> – including those that are specialised and highly specialised, and those that have not previously been assessed by NICE – should now be assessed by NICE. This would see NICE follow the model of the Scottish Intercollegiate Guidelines Network (SIGN), which currently produces assessments on the majority of all medicines in Scotland.

**Recommendation 2:** We also recommend that NICE, in combination with NHS England, should have the power to recommend that groundbreaking new medicines – such as recently introduced hepatitis C drugs – are placed into a newly created ‘early access facility’, to speed up widespread adoption. Unlike the current system – which is ad hoc and lacks clear criteria – this scheme would be transparent and fair.

## Recommendations for AHSNs

AHSNs can help innovators to locate the right potential buyers within the NHS through a direct intervention: they can set up mechanisms which channel innovators towards the organisations and people within the NHS that are most relevant to their particular innovations. In most cases, this will be achieved by engaging with each innovator about the nature of their innovation and the extent to which it is ready for use, using their knowledge of the NHS to locate the organisations and people best placed to discuss the innovation further, and facilitating an introduction. That is, AHSNs should play a ‘market-matching’ role between innovators and buyers. However, as it stands, the ability of AHSNs to perform this role is undermined first by innovators simply not knowing that AHSNs are set up to do so, and then, even once they do become aware, by the medical and thematic specialisms adopted by different AHSNs, which make it difficult for innovators to know which AHSN will be willing and able to help them.

**Recommendation 3:** AHSNs should work together as a network to publicise their role, collect information on all innovators who might benefit from their assistance, and set up a system which directs them towards the appropriate AHSN. Innovation Connect, a service run by NHS England, has already begun to do this, and so could be expanded, as could other schemes at the national level, such as the Innovation Nexus.

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### Case Study: Innovation Nexus, set up by Greater Manchester AHSN

‘The Innovation Nexus – set up by Greater Manchester AHSN – brings together information and resource to help guide companies through the complexity of working with the NHS, and enable access to expertise and specialist services offered directly or via our Innovation Nexus Associates, as well as highlighting funding opportunities. Companies, especially SMEs, can face significant challenges to introduce their new and innovative products into the NHS. The complexity of public procurement, patient safety and a risk-averse culture across multiple organisations can be daunting. The Innovation Nexus aims to provide a single source of resource that can help companies, particularly SMEs, understand the steps that need to be taken to support their business planning and engage with the NHS more easily, thus progressing the adoption of their innovation at pace and with fewer unanticipated obstacles.’

Innovation Nexus website<sup>4</sup>

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3 That is, all those that are not very similar reproductions of existing medicines, or so-called ‘me too’ medicines.

4 See <http://www.intohealth.org/>

## Overcoming the 'lemons' problem

The second element of the search friction problem is that of asymmetric information regarding the quality and characteristics of a particular innovation. Informational asymmetries of this kind exist in most markets; however, the size of the asymmetry in the healthcare market is particularly large because the issues are highly technical and specialised, and because many products are unusually expensive to purchase. This increases the usual risks associated with purchasing innovative products – especially because the purchase is funded by the taxpayer – and thereby inhibits their adoption and wider diffusion.

Once again, this is a concern that, for some innovations, has been addressed through NICE's technology appraisal process and (for specialised and highly specialised medicines) through NHS England, whereby assessment is undertaken centrally and innovations are only procured if they meet certain economic and clinical standards. But for many other medicines and all non-medicine products, this process must occur locally, and repeatedly.

*'Most medicines – over 50 per cent – are not eligible for a NICE programme. This means the CCG or local provider must make an assessment of its efficacy locally. CCGs often don't have the skills, resources or time to do this for the breadth and number of products out there. This means many just get passed from 'pillar to post'. Furthermore, if they do get admitted into local formularies via local assessment processes across the country it is highly inefficient for the NHS and the innovator; the same or similar processes are being undertaken simultaneously across the country.'*

Representative, large pharmaceutical company

This problem is even more acute for non-medicines.

*'There is no clear consensus regarding what evidence – either in terms of the level of evidence or the type of evidence – is needed to facilitate the adoption of non-medicine innovations. It would be beneficial to have a clear 'signal' to providers that innovations are beneficial to the NHS – but this must be coupled with clear funding routes to lead to increased uptake.'*

Bruce Hellman, uMotif, health management app

However, even if a clearer evidence threshold and effective 'signalling' programme was in place, there would still be significant problems.

*'Gathering evidence in favour of non-medicines is extremely difficult, because these products are often not conducive to the type of evidence-gathering exercises (such as double-blind trials) used for drugs. The only really effective way of overcoming this problem is getting your product trialled in the NHS. But this is incredibly difficult.'*

*'Innovators must negotiate trials with the local provider. These providers often don't want to commit time and resources towards the pilot. There are often a large number of people involved in the negotiation, all of whom have veto power. Providers perceive all sorts of unrealistic risks in doing the pilot, but they are often blind to the inherent risks in their existing systems, even risks that the pilot is intending to improve. For example, trusts have worried about the theoretical risk of our electronic prescribing system failing on occasion to spot a harmful drug interaction – but their current paper drugs charts have no mechanism whatsoever for detecting any drug interactions.'*

Michael Brooks, PatientSource, online health records management system

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#### Case study: PatientSource, online health records management system

Currently most patient record data is written down on paper. This leads to inefficiencies and mistakes. PatientSource puts it all on one platform which is therefore accessible on iPhones and tablets making it mobile. Using it in clinical setting cuts errors in drug charts from 45 per cent (of charts) to just 5 per cent. This is a perfect example of the type of products needed for the NHS to meeting the Department of Health's 'Paperless by 2018' target. However, so far the product but has yet to be fully adopted and has not experienced mass diffusion although it has been trialed in multiple clinical environments.

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In the case of medicines, informational asymmetries can be lessened through our previous recommendation to expand the role of NICE; however, assessment of non-medicines is likely to remain a local matter. This is an area where AHSNs have a significant role to play.

#### Recommendations for AHSNs

As with the 'locating buyers' problem, AHSNs can help to overcome the lemons problem through direct intervention. First, they can identify and clearly communicate the evidence thresholds for innovators looking to enter the NHS: what type and level of evidence are they expected to provide to CCGs and care providers? Beyond this, there are numerous mechanisms available to innovators to help them obtain this evidence – the role of AHSNs should be to guide them towards these resources.

For example, there are a number of schemes that help to set up and fund evidence-gathering for new innovations which show promise, such as the Small Business Research Initiative (SBRI)<sup>5</sup> and the Diagnostic Evidence Co-Operatives (DECs) run by the National Institute Health Research (NIHR).<sup>6</sup> There are also other programmes – such as NICE's Medical Technologies Evaluation Programme (MTEP) – that enable innovators to signal to potential buyers that their product is not a lemon.

**Recommendation 4:** AHSNs should play an expanded role in directing innovators towards programmes and mechanisms that support them to prove the credentials of their innovation and thereby reduce the risks (real and perceived) taken on by buyers within the NHS.

AHSNs can also set up pilots for new products. Being adopted or trialed in one NHS trust is often a prerequisite for being trialed in another, and so it is often the case that the biggest barrier for innovators is getting into the system for the first time. This is especially valuable for non-medicine innovations, which are poorly suited to traditional evidence-gathering exercises. AHSNs could set up programmes that offer innovators support to launch a pilot in a local NHS organisation – indeed, some already have. In running these programmes, clear eligibility criteria should be set (stage of development, clinical or thematic focus, size of company and so on) to ensure it remains fair and transparent.

By providing this additional support, AHSNs would undoubtedly help to drive the adoption and diffusion of innovations in the future. However, although AHSNs have an important role in pushing innovations from the outside into the NHS (which is the focus of the policies discussed in this chapter), there must be demand within the NHS for such innovations. Without that demand, it is likely that these approaches will have limited success. Indeed, our research highlighted the lack of demand for innovation as one of the most significant barriers – the next two chapters look at steps to help correct this.

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5 See <https://sbri.innovateuk.org/>

6 See <http://www.nocri.nihr.ac.uk/research-expertise/diagnostic-evidence-co-operatives/>

## 4.

# BARRIER 2: THE PRINCIPAL-AGENT PROBLEM, OR HOW TO ENSURE THE NHS SEEKS OUT INNOVATION

The second major barrier identified by our research is that there is a lack of systematic demand for innovation from within NHS organisations. In part, this lack of demand is caused by financial blockages or disincentives which prevent a healthcare provider from acting on their demand – this is discussed in chapter 5. But in large part it is simply because the demand does not exist in the first place – NHS organisations are not looking for new products. In this chapter we argue that this is a result of the *principal-agent problem*, and set out steps to overcome it.

### The nature of the principal-agent problem

Under normal market conditions, demand is determined by the preferences of the consumer. At the most basic level, assuming perfect information and rationality, the consumer's preference for goods and services is determined by a desire to maximise their usefulness or utility relative to their cost. In the case of healthcare, then, we can assume that utility is maximised when healthcare outcomes are maximised in the most efficient way. This implies that any innovation which increases welfare – increases healthcare outcomes while reducing costs or at worst holding them steady – would be demanded by an individual consumer in that market.

However, in the UK healthcare market, demand for innovations is not expressed by the consumer but by an agent of the consumer: commissioners and providers. There are good reasons for this 'outsourcing' of the procurement process, as listed in chapter 2: a collectively funded system is fairer, it provides greater security for individuals, and it achieves better value for money than more market-oriented alternatives. The final benefit can be expanded to recognise that it would be prohibitively expensive for the vast majority of individual patients to procure many of the complex and advanced products and services on the healthcare market, and that individuals are highly unlikely to have a sufficiently strong understanding of healthcare services and innovations to make informed procurement decisions, even if they were financially able to do so.

Nevertheless, outsourcing procurement decisions from the consumer to 'state actors' does create other tensions, including the principal-agent problem. This arises when the consumers' agent – in this case, NHS providers and commissioners – fails to consistently act in the best interests of the people they are representing (the principal). More specifically, in this case, we argue that outsourcing procurement decisions may undermine and weaken demand for health innovations, for two reasons:

- it distorts the accountability mechanism and the procurer's perception of risk – the agent may prioritise the budget where the individual would prioritise outcomes and innovation
- the procurer may have imperfect information about the preferences of the individual/principal.

## Managing accountability and risk in the healthcare market

The first crucial aspect of the principal–agent problem centres on the accountability mechanism to which the agent is subject, which may lead them to have a different perception of risk to the principal and thus to demand less innovation.

As we have already described, in a normal market the individual will demand any good and service which maximises utility – in this case, their healthcare outcomes – subject to their income. Crucially, they are accountable only to themselves: their decision to demand a new product or service depends entirely on their preference for it and on their calculation of the costs and benefits – *or risk* – of buying or not buying it. When an individual is unwell, they are likely to perceive the main risk of a healthcare ‘purchase’ to be continued ill-health or a deterioration in their condition. As a result, they will demand any innovations which can help to mitigate this risk – that is, any innovation that helps them to get better, or at least to not get worse.

However, in the UK, it is clinicians and commissioners rather than individuals who purchase health innovations. These agents are subject to a very different accountability mechanism to the individual, and so perceive risk differently. Notably, NHS providers or commissioners are not accountable (at least not directly) to the patient, but they are accountable to the state, acting on the patient’s behalf. While the accountability mechanism attempts to ensure that the actions of the health service are aligned with the patient’s best interests, it is undoubtedly imperfect.

For example, NHS providers and commissioners are (rightly) held accountable for a range of outcomes that extend well beyond simply maximising the patient’s health. Perhaps the most important of these is to budget for healthcare across a whole population, and thus to maximise ‘total’ rather than individual health.

*‘Of course providers want to give patients the best care they can and they also want to innovate. However, directors in the NHS are not fired and hospitals don’t go into special measures for failing to innovate. But directors do get fired, hospitals do go into special measures, for going over budget and spending too much money. This makes commissioners and providers more likely to put aside innovation and prioritise budgeting. It makes them more risk adverse.’*

Commissioner, CCG

*‘CCGs are relatively new organisations which have tight fiscal targets and the expectation that they have to make further savings. This, as a combination, often makes them risk-averse. This is a problem. Innovation by definition is risky. It needs CCGs to be bold and prepared to learn through innovation. They often aren’t: this is the crux of the problem.’*

Dr Shahid Ali, Vitrucare, health management platform

In short, providers and commissioners may not demand the optimal level of innovation because they perceive the risk of going over budget to be greater than the risk of delivering marginally less effective care.

A second dimension to this issue is that when an individual spends their own money but the agent (the NHS) spends someone else’s money.

*‘The pressure providers are under regarding cost-effectiveness tends to lead to risk aversion when it comes to innovation. Notably, when an individual buys something it is their money, they bare the risk, and it’s only them that suffer if they make the wrong choice. NHS commissioners are highly aware that it’s not their money and that their decisions impact of thousands of people. This often reduces the willingness of commissioners to try new ways of delivering services or make big investments.’*

Commissioner, CCG

While standard economic theory would in fact predict the opposite – that the principal-agent problem would lead to overspending – it seems that the pressure and scrutiny in the NHS may contribute to underspending on innovation.

This accountability problem extends down to the individual commissioner or clinician. That is, no one individual within each NHS provider is responsible for demanding innovation. Instead, it is implicitly embedded in each staff member's contract, which as noted will usually hold them directly accountable for a wide variety of outcomes, health-related or not.

*'On a day-to-day basis most people within the NHS (the agents of patients) look to maximise the patients' health, but in a very immediate way – given the time and resources they have, given the numerous different priorities they have – rather than by looking at the care pathway as a whole and asking how they could innovate to maximise health outcomes. The best healthcare professionals do this: they put themselves into the patient's shoes and design care based on the individual's perspective. But it's no one's job to go out and do this, it's no one's job to demand innovation – or, to put it another way, it's everyone's job, but the service suffers from a significant free-rider problem.'*

Director, AHSN

*'No one felt it was their job to go out and demand that our innovation be implemented. In the end we funded it out of our own deficit: it only went ahead because of strong clinical leadership and a desire to provide the best service to the patient. There are clinicians that overcome their organisation's risk adversity on a regular basis, but not nearly enough.'*

Director of Innovation, Princess Alexandra Hospital, Harlow

Far from seeking to incentivise overspending within an already-straitened NHS, the challenge is to increase the perceived risk that providers and healthcare workers attach to a *lack* of innovation.

### Recommendations for national government

In the long term, the challenge for the NHS is to ensure that a culture of innovation is embedded, in order to drive the demand for new processes and products.

**Recommendation 5:** NHS organisations should begin to recruit 'innovation scouts' to identify areas where innovation is needed, search out best-practice innovations to fill these gaps, and help to bring down barriers to adoption and diffusion. Ideally, these 'scouts' would focus on specific conditions or areas of care. They would also seek to empower clinicians and commissioners to demand innovation and overcome barriers to innovation themselves.

For larger organisations, like NHS trusts or hospitals, a director of innovation – a position that already exists at Princess Alexandra hospital, among others – could be established to lead a team of innovation scouts and drive their agenda. This would ensure that there are people in the NHS who are responsible and held accountable for supporting innovation, and move the service towards a so-called 'ambidextrous' organisation model.<sup>7</sup>

### Recommendations for AHSNs

AHSNs can directly encourage, set up and potentially fund embedded innovation scouts or innovation directors within local NHS organisations. Some NHS trusts have already begun to do this; however, it is still unclear how these embedded innovation leaders can be most effective, and what lessons can be taken from those who have already created this kind of position.

<sup>7</sup> For more on the concept of an ambidextrous organisation, see O'Reilly and Tushman 2004.

**Recommendation 6:** The creation of these innovation leadership roles should be considered a strategic objective of AHSNs, because their ultimate aim should be to embed the role currently played by AHSNs into local NHS organisations. As well as making the case for these roles to be created, it should be a key responsibility of AHSNs to monitor best practice, help to define the new roles, and set out how these positions will work alongside the AHSN.

Recruiting and embedding innovation scouts will be a first step in the right direction. In the future, AHSNs should be working towards creating comprehensive innovation ecosystems across the NHS, like those that exist in top private-sector companies, such as Procter & Gamble.<sup>8</sup>

### Closing the information gap between patients and providers

In the previous section, the principal-agent problem represents a form of moral hazard: the patient is unable to hold the provider to account for *not* consistently prioritising their health outcomes over and above the other measures of success that NHS staff and organisations are held accountable for. However, this may not be the only plausible analysis of how the NHS's commissioning and procurement models inhibit demand for innovation. Another important factor may be the informational asymmetry between commissioners and patients.

This information gap works on two levels. The first of these is the patient-clinician gap. This gap occurs because the patient-clinician relationship has traditionally been a paternalistic one, with the former a passive recipient and the latter an active specialist. Today, however, the growth in complex and chronic conditions means this is often no longer the case. Indeed, the patient may well be better informed about the nature of their condition, how it interplays with other conditions, its effect on their mental wellbeing, and the level of support they have at home and in the community. Encouraging clinicians to accept, understand and respond to this information, usually by redesigning care pathways and health interventions, would undoubtedly increase demand for innovation.

*'The NHS overwhelmingly focuses on the clinical aspects of health and care. However, when you sit down with patients, particularly those with chronic conditions, and ask them what they want from their care they often don't want drugs or further treatment, but independence from the health service, more control over managing their condition, increased mobility or reduced loneliness. Achieving this kind of care will require our health service to go out and find a whole range of innovative new approaches to delivering care. It will require us to demand innovation rather than wait for it to occur.'*

Representative, COBIC

Closing the information gap between patients and their clinicians – that is, by empowering patients<sup>9</sup> – will be a key part of driving innovation in the types of care which are delivered in the NHS. We discuss what this means in policy terms below.

Second, this kind of informational asymmetry also exists in the gap between the patient-clinician and the commissioner – that is, between care and procurement. This is equally important, because commissioners have a key role in adopting and spreading new services and innovations. However, our research suggests that commissioners are often more likely to prioritise financial over clinical risk, and to have poorer information about the type of care patients are demanding. This is largely a result of the distance between commissioner and patient.

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8 For more on innovative ecosystems, see Huston and Sakkab 2006.

9 For more, see Muir and Quilter-Pinner 2015 forthcoming.

*'One of the biggest barriers to getting innovations through historically has been getting commissioners on board. Previously they have blocked innovation because they are concerned about the cost – which they see very clearly – but don't fully understand the benefits, which they don't experience in their day-to-day job. This time around we got our innovation adopted partly because we brought the CCG on board from day 1. They were involved in focus groups with patients and discussions with clinicians, and understood why we wanted to invest in it. This was vital.'*

Director of Innovation, Princess Alexandra Hospital, Harlow

*'Commissioners have a huge impact on the type of care people receive and how innovative service provision is. They help to determine the care pathway that is put in place and the level of integration, as well as rubber-stamping new drugs added into the formulary and investments in devices and equipment. They therefore help determine how much the NHS demands innovation. And yet they work remotely from the patient and are therefore not faced, on a day-to-day basis, with the need for innovation, which is often what drives clinicians to demand new products and services. Getting [commissioners] closer to the patient, closer to the clinician, closer to the benefits of innovation will drive demand for innovation in future.'*

Representative, COBIC

While empowering patients in their dealings with clinicians, and allowing information to flow between them, is a step in the right direction, the same process of opening up needs to occur between the patient, clinician and commissioner.

### **Recommendations for national government**

As we have described it in this chapter, the principal-agent problem has both risk and informational aspects. In both cases, the best response is to empower patients so that they are able to demand innovation wherever possible and, where it is not, to ensure that they are a central part of the design of care and the procurement decisions that flow from this. This is an underdeveloped part of the patient empowerment agenda, which has instead focused on giving patients more rights (NHS Constitution), voice (patient reported outcome measures, or PROMs) and choice ('Choose and Book'). In addition to these important initiatives, we propose several mechanisms to stimulate demand for patient-focused innovation.

#### ***Coproduction of care pathways***

In most cases, today's care pathways are a hangover from the way in which the NHS was designed in 1948 (based on existing silos) and how treatment has evolved over the decades since. However, these care pathways often do not reflect the needs of patients with complex health conditions, make poor use of the best new innovations, and fail to deliver the kind of care patients want. Many of these care pathways will need to be redesigned so that they remain fit-for-purpose, and this is what the integration agenda is looking to achieve.<sup>10</sup>

**Recommendation 7:** We believe that care should be built around specific patient populations, with segmentation based on specific conditions (such as diabetes, mental health or musculoskeletal conditions) or a frailty index.<sup>11</sup> Crucially, these care pathways should be designed through a process of coproduction involving patients, clinicians and commissioners.<sup>12</sup>

The process of coproduction often utilises a narrative-based approach and experience-led commissioning: patients are asked to describe deficiencies in their existing care and set how they would like future care to differ.

<sup>10</sup> For more on the integration agenda, see Bickerstaffe 2013.

<sup>11</sup> An index which classifies and quantifies frailty, against a specific definition of it.

<sup>12</sup> For more on coproduction in healthcare, see Corrigan et al 2013.

**Recommendation 8:** Providers should be held to account for delivering on these care pathways by making part of their payment dependent on meeting a set of coproduced outcomes – that is, outcomes identified in partnership with patients – which address both clinical and social need.

Moving in this direction should have numerous benefits in terms of innovation (as well as the quality of healthcare delivered more generally). One of the main mechanisms holding clinicians and commissioners to account will be more closely aligned with patients' preferences, to help correct the perverse risk incentives at play in the principal–agent relationship. It will also bring patients, clinicians and commissioners into closer and more frequent contact, helping to narrow the informational asymmetries between these vital groups. Both of these changes should increase the demand for innovation within the NHS.

Looking back at the first major barrier discussed in the previous chapter too, there are additional benefits. Splitting providers and commissioners into pathways characterised by condition or illness type will make it easier for innovators to identify and locate the relevant people in NHS organisations, and help to ensure that all those involved in a procurement decision are more closely aligned around patients' needs.

#### *Personal budgets*

In some cases, the need for patient empowerment is so great that there is a strong case for reversing the decision to outsource the procurement decision from patient to the state. This can be achieved through the use of personal budgets, through which the money usually spent by the state on a patient's behalf is given to the patient themselves, who spends it based on decisions shared with their clinician. In short, the patient becomes the commissioner.

**Recommendation 9:** Anyone with a long-term health condition should have the right to a combined personal health and care budget if they want one. This should be accompanied by measures to support the effective use of personal budgets, including genuine shared decision-making in care planning, and support from personal brokers and advocates. Local councils and CCGs should work to create a vibrant market of products and services, and to develop tools for collective purchasing and the pooling of personal budgets.<sup>13</sup>

This would allow patients to reveal and act on their preferences for care directly, and would undoubtedly lead to more innovative uses of the overall health and care budget. It would in effect overcome both the risk and informational aspects of the principal–agent problem in one go, while preserving state provision that is free at the point of use.<sup>14</sup>

#### **Recommendations for AHSNs**

**Recommendation 10:** As personal budgets are introduced across the system, AHSNs should help with the creation of e-marketplaces – Amazon or eBay-style digital platforms – that allow self-funded patients and personal budget holders to search for and purchase products and services, in line with their personal care plans, while allowing the NHS to regulate (to some degree) the quality of the products that public money is spent on.

In particular, AHSNs could take on the key coordinating role of populating these e-marketplaces with products and services, and of channelling innovators towards them.

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<sup>13</sup> For more on the effective use of personal budgets, see Fox 2014.

<sup>14</sup> The case for a major expansion of personal budgets is set out in more detail in a forthcoming IPPR report on patient empowerment – see Muir and Quilter-Pinner 2015, forthcoming.

## 5.

# BARRIER 3: MISALIGNED INCENTIVES, OR HOW TO ALLOW MONEY TO FLOW AROUND THE NHS

The third major barrier to the adoption and diffusion of innovations identified by our research is that even where NHS providers are demanding innovation they are often unable to act on that demand because of the way money flows around the system and the disincentives that these flows create. This is not a classic market failure – although it could be argued that it is a form of government failure – as these are artificially created incentives rather than innate market incentives.

### Understanding the payment mechanism in the NHS

We have already argued that a collectively funded NHS free at the point of use is desirable because:

- it is fair: healthcare is not allocated according to need dependent on ability to pay
- it provides security: individuals do not have to worry about potentially punitive healthcare costs if they become seriously ill
- it is efficient: it enables the state to mobilise economies of scale to get better value for money than would be available to individual consumers.

As a result, money is not allocated as it would be in the private market – based on competition between providers and the choices that private consumers make – but instead must be allocated through a central planning system. This is known as the payment mechanism. Traditionally, this has seen commissioners of products and services (Public Health England, NHS England, primary care trusts and CCGs) make block or lump-sum payments to the providers of healthcare (hospitals, GPs, community care providers). However, since the 1990s, there has been a growing recognition that this system left healthcare providers with little incentive to increase either the quantity or quality of their provision.

This led to a change whereby incentives, set by the centre, were attached to the payment mechanism to encourage care providers to raise quality, efficiency and innovation. Notably, in the early 2000s, Labour introduced payment by results – where providers are paid a set price for each unit of care provided – into most of the acute sector. Combined with an increase in the ability of patients to choose a care provider, which in theory should allow money to ‘follow’ the patients as it does in a market, this has created better incentives in the system.

However, payment by results (or PBR) is just one of many such changes in the healthcare system. An alphabet soup of ‘payment by performance’ reforms have been introduced, ranging from the Quality Outcomes Framework (QOF) in primary care, to Best Practice Tariffs (BPT) in acute care, to Commission for Quality and Innovation (CQUIN) payments across the board. The latter two in particular have been used to drive up demand for innovation in the NHS. However, while this move towards payments based on activity as a means of creating an internal market in the NHS has clearly yielded some positive results – there is significant evidence of efficiency savings – there is little evidence that it has driven better health outcomes (see Appleby et al 2012, Charlesworth et al 2014).

Furthermore, our research suggests that in many cases the payment mechanism is actually suppressing demand for innovation in the NHS. Primarily this is occurring because providers are disincentivised from investing in innovations or are unable to redirect money towards new innovations. In this chapter, we consider in greater detail three manifestations of this problem: payment for outputs rather than outcomes, fragmentation, and intertemporal disincentives (where the investment is required upfront but the savings are long term).

## Paying for outputs rather than outcomes

The first aspect of this problem is that payment by results incentivises outputs rather than outcomes. Thus, innovations which achieve better outcomes while also increasing efficiency (reducing healthcare activity) are *disincentivised*. This is primarily a problem in the acute sector, although payment by results is being introduced across the mental health and community sectors as well.

Illustrative examples are provided by the adoption of a new cancer testing procedure at Princess Alexandra Hospital in Harlow, and the low uptake of Ferinject, an iron deficiency treatment.

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### Case study: intraoperative tests for detecting the spread of breast cancer into the sentinel lymph node

The sentinel node is the first lymph node to which cancer cells usually spread from a primary tumour. A sentinel lymph node biopsy is the removal and testing of the node – a process that can take up to two weeks – to determine whether the cancer has spread. If this returns a positive result – meaning the cancer has spread – a second surgery is needed to remove more lymph nodes.

However, doctors at Princess Alexandra Hospital have developed a molecular test which allows them to test the sentinel node for the spread of cancerous cells and receive results within 30 minutes of the biopsy. If this returns a positive result they can remove further lymph nodes immediately, reducing the number of operations needed and increasing the quality of care for the patient. So far, this has only been adopted in one hospital throughout the country.

*‘Because of the payment by results system currently operated across secondary care, the hospital gets paid for each operation it undertakes. Our innovation cuts the number of operations undertaken by the hospital in half, and therefore cuts income for the hospital trust in half, while marginally increasing its costs, as it has to introduce the new test but on the old tariff.’*

Chief Medical Officer, Princess Alexandra Hospital, Harlow

### Case study: Ferinject for iron deficiency

Ferinject is an intravenous drug for more severe cases of iron deficiency, produced by Vifor Pharma. Iron deficiency makes people tired and susceptible to other illnesses. GPs usually refer people to a high-street pharmacy to buy over-the-counter iron tablets, but these are often ineffective, and so lead to increase healthcare costs down the road. Following ineffective initial treatment, a serious case of iron deficiency is usually treated intravenously at a hospital, during five or six hour-long visits over the course of a month.

Ferinject means that the same dose of medication can be administered but in a single 15-minute sitting. Despite this, Ferinject has a reasonably low uptake in terms of its share of the patient population, especially when compared to other countries, such as Switzerland.

*‘The payment by results system can often lead to perverse incentives, as it can provide a financial reward for each treatment administered, stimulating activity rather than efficiency. Thus, the older methods of dealing with iron deficiency anaemia can increase the income of hospitals by five times compared to our more innovative and efficient approach, leaving little incentive to change product, even though the experience provided by our newer product is better.’*

Derek Williams, Vifor Pharma

There are several short-term ‘patches’ that can be used to iron out the disincentives inherent to the payment mechanism. However, these are not being universally applied.

One of these is the shared savings formula, which sees the savings made by introducing an innovation in one place shared equally by the CCG and provider, or by multiple providers across the health and care system (for example, by a hospital and primary care provider). Another is the flexible tariff or local variation, which allows local CCGs to adjust the standard tariff (set centrally) if the treatment provided by the care provider differs from the standard treatment. In theory, this means that the payment mechanism is infinitely flexible. However, it is clear from our research that, in practice, providers and commissioners are not using these mechanisms consistently. We need to increase awareness and, as a consequence, uptake.

The key challenge for the NHS, therefore, is to move towards a system that incentivises the pursuit of *outcomes* rather than *outputs*, so that providers are allowed – indeed, encouraged – to adopt new innovations that improve outcomes for patients.

The outcomes agenda has already been pushed forward at the local level in some areas, and outcomes have been embedded into the accountability mechanism in both the NHS Outcomes Framework (NHSOF) and CCG Outcomes Framework (CCGOF). But much more must be done.

The introduction of the NHS and CCG outcomes frameworks under the previous Coalition government was an attempt to change the way in which NHS England and local commissioners are held to account. The desired outcomes – rather than outputs or processes – of healthcare are set centrally, but then local providers are given freedom to work out how best to deliver those outcomes. In theory, this should encourage innovation: there is an incentive for NHS providers to deliver the best care at the lowest cost, but they have freedom to determine how that is achieved.

However, these outcomes frameworks are not well aligned with the payment system, which still incentivises processes and outputs. The way around this problem is to align the payment system with the NHSOF and the CCGOF by implementing making the switch from payment by results to payment by outcomes (PBO).

There is much evidence that this does deliver better, more innovative services, for less money. For example, in 2011, Milton Keynes PCT – alongside COBIC, a private consultancy firm – introduced one of the first PBO contracts for their drug and alcohol misuse programme. As a result, ‘the service transformed in weeks, providing measurably better quality and experiences than before’, with care services becoming joined up around the patient and focused on achieving their preferred outcomes. At the same time, it led to a 25-per-cent saving in the cost of provision. Similar results have been found in multiple case studies across the UK and beyond (Corrigan and Hicks 2011).

However, these payment-by-outcomes pioneers also highlight the need to overcome a number of barriers:

- **Setting good outcomes:** This requires effective segmentation of the population (usually into condition-specific groups) and coproduction of outcomes with those patients.
- **Measuring outcomes:** Although some of the relevant data is collected and measured already – for example, through the Health and Social Care Information Centre, QOF, the Secondary Uses Service or PROMs – new collection and measurement strategies will be needed for some outcomes.
- **Contracting for outcomes:** Outcomes often cross traditional care silos – for example, if the outcome after knee surgery is ‘able to walk’, the operating hospital alone cannot be held responsible. So it is often necessary to ‘bind’

providers together, in order that they can share responsibility for the outcomes. This may require different forms of contract – such as alliance or prime provider contracts – and also longer contract terms, of up to 10 years, in order to manage risk and allow for the upfront investment that is needed.

- **Shifting the culture:** This requires providers and clinicians to move away from paternalistic relationships with the patient and away from working in silos, towards integrated working. It also requires them to take on more risk, at least in the short term.

### Recommendations for national government

**Recommendation 11:** Central government should ensure that providers across the country are being sufficiently ambitious in advancing the payment-by-outcomes agenda. This could include requiring PBO in contracts for specific types of care, or in new ‘trailblazer’ schemes, such as the Vanguard programme.

Having done this, they also need to create a PBO unit – jointly between Monitor and NHS England – to provide support and guidance for local providers in overcoming the barriers noted above. This may include the creation of a national training programme for commissioners looking to move their organisation towards PBO.

### Recommendations for AHSNs

**Recommendation 12:** AHSNs can encourage and support local NHS organisations, notably CCGs, to pilot and expand the use of payment by outcomes. AHSNs should do this by bringing together commissioners from different providers in their region, helping them to select a specific service area (such as diabetes or musculoskeletal care), helping them to design the PBO scheme to fit and overcome barriers where necessary, and then by playing a role in collating and publishing the data. This will allow AHSNs to help both in the testing of PBO and also in the creation of greater competitive forces within the chosen service area.

AHSNs can also help to push this initiative forward by lobbying central government for a broader UK-wide strategy on PBO, which could include an expansion of the PROMs programme, the creation of a Best Practice Outcomes Database, or the creation of a PBO Unit to help spread best practice. Clearly these are all indirect interventions, but it seems likely that they will lead to higher levels of innovation in the future.

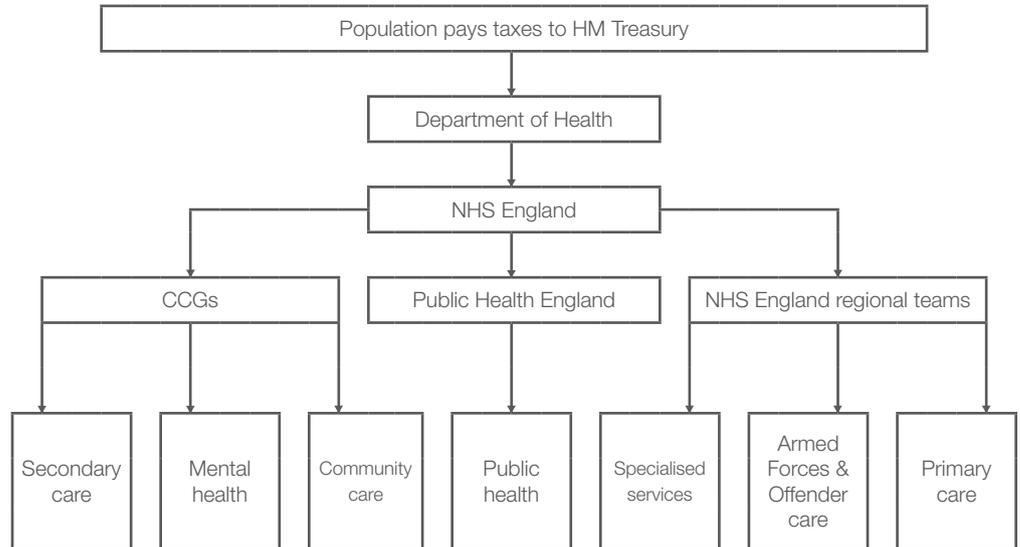
### Fragmentation of the system

The second aspect of the payment system problem is that it reflects and reinforces the fragmentation that already exists in healthcare provision. This occurs because money is channelled down through the same silos as already separate one care area from another. Notably, the procurement of secondary care, community care and mental health at the local level is done by different commissioners to those responsible for preventative healthcare, for one, and specialised care and primary care, for another (see figure 5.1). So any innovations that seek to move care between these silos – and thus call for money to move between silos – are disincentivised or inhibited.

Examples of the inhibitive effect this has on the spread of innovation are provided by the introduction of intraoperative radiation therapy at Princess Alexandra hospital, Harlow, and Vitrucare, a health management platform.

**Figure 5.1**

The fragmentation of NHS commissioning and provision



Reproduced from Marshall et al 2014

### Case study: Intraoperative radiation therapy

Traditionally, radiotherapy is undertaken, five days a week for five or six weeks, after surgery to remove cancerous cells. This is usually undertaken in specialised hospitals around the country.

Intraoperative radiation therapy, by contrast, delivers a concentrated dose of radiation therapy during the surgery, which occurs at the patient's local hospital. This saves the patient time, stress and money. Just as importantly, it preserves more healthy tissue and reduces the side-effects of the treatment. Furthermore, from the NHS's point of view, it saves a significant amount of money in terms of equipment and practitioners' time.

However, it has proven difficult to spread this innovative approach through the system.

*'Money is supposed to follow the patient, but it's not that simple. There are significant problems with silo budgets, and this makes moving money across the system, and therefore care across the system, very difficult. In our case the difficulty was around moving funding from Specialised Services, which is commissioned by NHS England, to our local hospital, where commissioning is undertaken by the CCG. We were told that unless the amount of funding was deemed significant – which ours was not – no funding would move. It would have to come directly out of the trust's own deficit.'*

Director of Innovation, Princess Alexandra Hospital, Harlow

### Case study: VitruCare, health management platform

VitruCare is a cloud-based health management platform, integrated with SystmOne, which enables patients to book practice appointments and local services, order repeat prescriptions and see their electronic healthcare records. Patients can manage wellness, prevent disease, and manage long-term conditions and the last days of life using VitruCare. Care is personalised depending on individual requirements. VitruCare is designed to facilitate the holistic treatment of patients throughout their lives while being linked to their clinician. Patients register with VitruCare and access a series of apps via their computer, tablet or smartphone. They can set their own goals, actions plans and trackers to take control of their care and discuss these with their clinician. Secure messaging and video consultation provide the immediacy needed to enable improved outcomes and productivity. VitruCare has been adopted in Bradford, Cumbria, and North Yorkshire but is yet to be spread across the country.

*'Vitrucare enables better self-care to prevent ill health, reducing A&E attendances and acute admissions thereby moving care out of the hospital and into the community. This sometimes means that we come up against opposition from those who have incentives to retain the status quo, particularly those organisations who benefit from payment by results and thus want to increase rather than decrease healthcare activity.'*

Dr Shahid Ali, Vitrucare, health management platform

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The long-term solution to this problem lies in the integration of health and social care with pooled and capitated<sup>15</sup> budgets. Clearly, these reforms will have to be led by providers and commissioners themselves, as well as through centrally run programmes, such as the Pioneer and Vanguard programmes.

### **Recommendations for national government**

The key to overcoming these barriers will be to deliver on the integration agenda. The *NHS Five Year Forward View* (NHS 2014a) puts integrated care at the heart of future reforms:

*'The NHS will take decisive steps to break down the barriers in how care is provided between family doctors and hospitals, between physical and mental health, between health and social care.'*

NHS 2014a

It recognises that integration is complex, difficult to achieve, and will vary from place to place. However, it does set out several potential models of integration, which are being trialled across the country through the Pioneer and Vanguard programmes. These include multispecialty community providers, primary and acute care systems, and urgent and emergency care networks.

**Recommendation 13:** To consolidate progress, we recommend that by the end of the next parliament:

- Services for those with complex needs should be jointly commissioned by the local authority and the CCG through the local health and wellbeing board, using a pooled budget.
- Health and wellbeing boards in turn should commission these services on the basis of a capitated budget, including a payment by outcome element.

### **Recommendations for AHSNs**

AHSNs have a role to play in supporting this shift also, through both direct and indirect interventions.

**Recommendation 14:** In terms of direct actions, AHSNs should work closely with commissioners and providers to encourage and educate them on the use of shared savings formulas (as described in the previous section) and flexible tariff/ local variation.

For example, AHSNs could host innovation conferences with commissioners, to discuss the barriers to innovation and set out possible solutions, perhaps drawing on the expertise that already exists within NHS England and Monitor.

Indirect interventions could include encouraging and supporting local NHS organisations, notably CCGs, to pilot and expand local integration initiatives, for example by segmenting the patient population, tendering an alliance or prime provider contract, and creating a multiyear capitated budget. AHSNs also have a role in identifying which types of integration lead to the most innovative practices – and therefore to an increase in demand for innovation – and then in spreading that

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<sup>15</sup> Capitated payment or capitation means paying a provider or group of providers to cover the majority (or all) of the care provided to a target population, such as patients with multiple long-term conditions, across different care settings.

model. Furthermore, where it is useful, AHSNs could use their position – sitting over various NHS organisations across a region – to take a leading or coordinating role in certain aspects of regional integration initiatives, for example by convening an assessment of IT compatibility.

### Intertemporal disincentives

The final key aspect of the payment system problem that is raised by our analysis is that of intertemporal disincentives, which occur when the cost of an innovation must be met up-front yet the savings are accrued at some indefinite point in the future. Almost all innovations are subject to some form of intertemporal disincentive, as they all include an upfront investment, but this is more prohibitive in some cases than in others.

One case study that exemplifies the intertemporal disincentive to innovate is provided by VitruCare, which looks to deliver a more holistic health service. While this is ultimately a success story, VitruCare demonstrates the barriers that must be overcome in order to innovate, including cultural change, commissioning, local buy-in and the evidence-base.

*'The procurement of VitruCare by the NHS requires the CCG to make upfront investment. However, this investment is compensated in terms of a saving for the NHS and the GP surgery of around £1.5 million for every 10,000 patients involved. Indeed, we estimate that if this was used across most patients with chronic conditions, the average GP surgery would require one less doctor. The problem comes because this saving is accrued over time in the form of a reduction in future patient visits to the GP surgery and emergency admissions based on failed self-management. This is a problem, because short-term commissioning doesn't take this into account.'*

Dr Shahid Ali, Vitrucare, health management platform

The same problem can be seen in the case of the intraoperative radiotherapy introduced at Princess Alexandra hospital.

*'This product required a huge upfront investment – for the machine which conducts the radiotherapy – however the long-term gains for the NHS are significant. The problem is persuading the CCG or hospital trust to make that initial investment.'*

Director of Innovation, Princess Alexandra Hospital, Harlow

Our research highlights several other factors that exacerbate this intertemporal disincentive. One key factor is the cost pressures being placed on CCGs.

*'Unless the NHS is given the ability to make upfront investments, it will struggle to save later. At the moment, the legal obligation on CCGs to balance their books – even if deficits are accrued against future costs savings – makes it impossible to make some of these investments.'*

Dr Shahid Ali, Vitrucare, health management platform

Another exacerbating factor is the paucity of national investment funds available to the NHS commissioners looking to make upfront investments.

*'There are funds out there. The Better Care Fund has a significant pot of money, some of which goes towards innovation, and there are smaller funds like the Regional Innovation Fund. However, funds are limited.'*

Melanie Ogden, Innovation Team, NHS England

This point is made repeatedly by innovators themselves.

*'If adopting technologies came with a pot of money – if there was a fund large enough to do this – suddenly CCGs and trusts will become a lot more “can-do” about pilots.'*

Michael Brooks, PatientSource, online health records management system

*'One of the reasons that Guy's and St Thomas' NHS Foundation Trust has such a good record in innovation is because it has committed resources to it, working closely with Guy's and St Thomas' Charity to nurture innovation from within. There is no comparable fund facilitating and incentivising innovation for the NHS, and the collaboration with the trust has seen important steps like the set-up of a new fund to back commercially viable ideas from staff. Without the backing of a solid fund and the trust's commitment, it would take longer for the best innovations to diffuse, because they often 'pump-prime' or add costs to commissioners who are already under financial pressure.'*

Michael Wright, Guy's and St Thomas' Charity

A final factor lies in the short-term commissioning cycle of the NHS.

*'The commissioning process in the NHS is inherently focused on the short term. This is because we generally operate one-year commissioning cycles, so if innovations fail to make a return in the short term then there is a smaller incentive to invest in them. Furthermore, CCGs can't take financial savings they've made in year, or take deficits this year – caused by long-term investment – over to the next.'*

Dr Shahid Ali, Vitrucare, health management platform

## Recommendations for national government

**Recommendation 15:** The NHS should move from a one-year commissioning cycle to a three- or even five-year cycle. This would give CCG's more certainty, allowing them to plan capital spending and invest in innovations with the potential for longer-term payoffs.

This should be trialled in certain areas first: perhaps in those most in need of long-term capital expenditure, such as providers of more holistic and integrated care for chronic conditions.

**Recommendation 16:** The legal requirement on CCGs to balance their books – while financially prudent in most cases – should be relaxed in cases where the deficit is due to investments that will deliver cost savings later.

As it stands, this is a significant barrier to making much-needed long-term investments, as it means that only investments which deliver dividends now can be considered.

## Recommendations for AHSNs

Again, there is potential for AHSNs to support this shift in both direct and indirect ways.

In terms of direct interventions, there are numerous funds available to providers and commissioners which are specifically designed to encourage the adoption of innovations requiring upfront (pump-priming) investment. These include the Regional Innovation Fund, the Community Innovations Fund, Mental Health Innovations Fund and the Nursing Technology Fund.

**Recommendation 17:** AHSNs should take on a role in matching innovations at risk of being ruled out by commissioners due to the level of upfront investment required with potential sources of funding.

AHSNs may also be able to use their convening power to connect sources of private investment to innovations that the NHS wants to introduce, including through the use of social financing (see the boxed text below).

Indirect actions could include encouraging NHS England and the Department of Health to make the central changes we have recommended – that is, to lengthen commissioning cycles and to relax rules around CCG deficits – and to work with local providers and commissioners to embed longer commissioning cycles into local integration initiatives.

Taken together, these changes should allow commissioners and providers to move money around the system more flexibly and thus allow them to be more responsive to the potential of new innovations.

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#### **Social finance**

Individual Placement and Support (IPS) is a proven programme that supports people with mental health problems back into employment. However, there is a shortage of places available, despite the programme's potential to save public costs. Imperial College Health Partners is therefore working with Social Finance<sup>16</sup> to issue social impact bonds to social investors in order to increase the number of places in the programme. These will be paid off through funding from the Cabinet Office and local CCGs and councils through an outcomes-based mechanism that aligns incentives across health and employment services.

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<sup>16</sup> See <http://www.socialfinance.org.uk/>

## 6. CONCLUSIONS

The NHS needs to deliver ‘more for less’ in the coming years. Critical to this is the adoption and diffusion of new technologies and innovations, the best of which simultaneously improve outcomes and reduce costs. However the NHS is often perceived as being slow to adopt and diffuse new technologies across the service.

This paper has argued that the UK healthcare system suffers from three forms of what economists would describe as ‘market failures’, which combine to slow down or curtail adoption and diffusion:

- **Search frictions:** the opacity and complexity of the commissioning process and NHS organisations makes it difficult for innovators to find their way into the system.
- **The principal–agent problem:** the risk aversion of patients’ agents (commissioners and providers) reduces the demand for innovation from within the system.
- **Misaligned incentives:** the siloed structure of budgets and payments makes it hard for commissioners to access or move funds around the system in order to act on the demand for innovations.

Some of these barriers are intrinsic: they reflect a system in which funding is pooled and spent collectively and an NHS that is state-funded and free at the point of use. These are cornerstones of the NHS, ensuring fairness, security and cost-effectiveness, and we do not recommend undoing them. The challenge, therefore, is to come up with ways of overcoming or lessening these market failures in order to unleash innovation within the NHS, speeding up and extending adoption and diffusion, without moving to a marketised health system as exists in the US. This paper makes a range of recommendations designed to do just that.

We argue that national government can:

- overcome ‘search frictions’ by greatly expanding the role of NICE in the assessment of medicines
- minimise the principal–agent problem and increase demand for innovation by providing funding for new leadership roles – innovation scouts and directors of innovation – across the service, driving forward coproduction of new care pathways for those with long-term conditions, and expanding the use of personal budgets
- correct misaligned incentives by promoting reform to the payment mechanism in the NHS to focus on outcomes and by promoting integration and capitated budgets by expanding the role of health and wellbeing boards to include commissioning.

There is also a role for local organisations such as AHSNs in supporting and fostering innovation in the NHS, much of which can advance more quickly and flexibly than major national reforms.

We argue that AHSNs can:

- help innovators to overcome informational asymmetries by channelling innovators towards potential adopters in the NHS (partly through the expansion of Innovation Connect and the Innovation Nexus) and by providing innovators with evidence-gathering support and opportunities (pilot schemes)

- address the principal–agent problem by helping to create, embed and support innovation scouts in their local NHS institutions
- work against the misaligned incentives in the payment mechanism by promoting and supporting payment reform and integration initiatives within their region.

Table 6.1 summarises the range of recommendations we have made for AHSN interventions, drawing a distinction between their direct and indirect actions.

**Table 6.1**

Summary of recommendations for AHSNs

Barrier to innovation	Direct action	Indirect action
1: Search frictions	Asymmetric information: channel innovators manually or through a virtual marketplace into NHS (eg, Innovation Connect).	
	Lemons problem: communicate evidence thresholds and create evidence-building opportunities.	
2: Principal–agent problem	Risk: create incentives for staff to innovate (eg, innovation scouts).	Information: encourage and participate in the coproduction of care pathways.
3: Misaligned incentives	Fragmentation: encourage use of the shared savings formula and flexible tariffs/local variation.	
	Intertemporal disincentives: map potential sources of financial support.	Payment by results: encourage shift to payment by outcomes.
	Fragmentation: encourage and develop integration initiatives.	

With both national government and local organisations, such as AHSNs, promoting innovation in the ways discussed above, we believe that the market for healthcare innovation would work more efficiently and effectively. There would be a clear and efficient way for innovators and potential buyers to identify and contact each other; NHS institutions would start to develop a culture of innovation, driven by changes in the accountability mechanism that would increase demand for innovative new practices; and once they had decided to take up a new innovation, changes to the payment system would allow them to move resources around – to turn demand into transactions – even where this requires an upfront, pump-priming investment, based on savings to be banked at a later date.

Achieving this more efficient and effective system will be crucial in the ability of the NHS to meet the challenges of the future. Even though the new government has pledged to fill the £8 billion funding gap over the next parliament, the efficiency challenge the service faces is huge. Notably, the NHS will have to deliver significantly higher productivity gains than its historical average of between 1.5 per cent and 3 per cent (Roberts 2015). Technology and innovation is one of the main drivers of productivity in any economy. Only by increasing the adoption and spread of innovations in the NHS by undertaking the reforms discussed at length in this paper will the system really be able to achieve its potential in the coming decade.

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