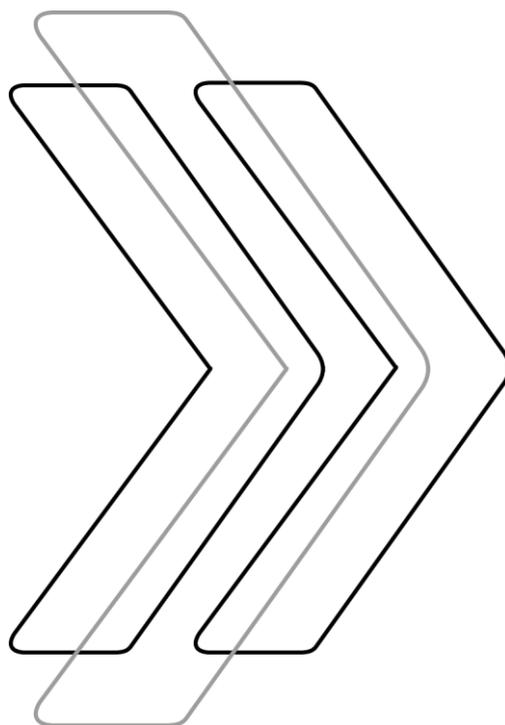


Adoption and spread of innovation in the NHS

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January 2018



This independent report was commissioned by the six academic health science networks (AHSNs) responsible for spreading health innovation in the East Midlands; Kent, Surrey and Sussex; the North West Coast (the Innovation Agency); South London (Health Innovation Network); the West of England; Yorkshire & Humber. The views and conclusions in the report are the author's own.

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1 Introduction

The first large-scale clinical trials of statins were held in the mid-1980s and statins became available on prescription from the NHS in the 1990s. By the early 2000s, the English NHS was prescribing around 8 billion daily doses of statins each year, contributing to dramatic reductions in rates of mortality from cardiovascular disease (Walley *et al* 2005). Meanwhile, despite considerable progress, the NHS, like other health systems, is still struggling to implement basic hygiene protocols such as hand washing in hospitals, 150 years after Joseph Lister published his observations in the *Lancet* on antiseptic methods (NICE 2014). Some innovations are incendiary, spreading with a spark from funders, regulators, professionals or the public. Others seem stubbornly immobile, no matter how easy they appear to implement or how persuasive the evidence base.

Ensuring the adoption and spread of these latter innovations is a challenge in any health system. But anecdotal evidence suggests that the English NHS finds doing so particularly challenging, for example its slow progress in making use of basic communications technologies. Policy-makers express their frustration by commissioning a new report every couple of years decrying the slow pace of change and highlighting the potential benefits of faster adoption of innovation. For advocates of directive leadership, the answer is for the national NHS bodies to play a more active role in mandating adoption of 'proven' good practice, with sanctions for those who fail to do so. For supporters of free markets, the solution is to break down monopolies, support entrants, allow inefficient providers to exit the market, and unleash the creative destruction of competition, although doing so in the NHS has proved difficult in practice.

This paper aims to make a pragmatic contribution to the discussion of what can be done to facilitate faster adoption and spread of service innovation given the current configuration of the NHS, drawing on findings from eight case studies of successful spread of innovation supported by the academic health science networks (AHSNs). For each of the case studies, we interviewed the originators of the innovations wherever possible, and the AHSN staff responsible for supporting adoption and spread, to understand the approach they had taken and the challenges they had encountered.

The good news is that entrepreneurship is alive and well in the NHS, despite different incentives for innovators than in more competitive markets and the significant obstacles that often lie in innovators' paths. Kate Dale, a community psychiatric nurse in Yorkshire and Humber, spent a decade developing physical health checks and running physical health clinics for people with severe mental illness, alongside a full-time day job and without any funding or support. Emma Redfern, an emergency medicine consultant at University Hospitals Bristol NHS Foundation Trust, found time alongside a hugely pressured day job to review performance and devise a strategy to prevent harm to patients in overcrowded emergency departments. We were struck by the enthusiasm and determination of the entrepreneurs themselves and of the AHSN staff supporting their projects.

The case studies also demonstrate the transformative power of simple, low-cost innovations in improving health and care services and the dramatic difference they can make to people's lives. One patient struggling with longstanding mental illness received a routine thyroid test for the first time, revealing hyperthyroidism. Two years later, a person who had struggled to leave the house was free of depression and living a happy life. An isolated person with Asperger's syndrome can sleep at night thanks to a text-messaging service. Thousands of patients are receiving treatment for arthritis, diabetes, cardiovascular disease and chronic liver disease who might otherwise be neglected.

While technology was often a key enabler, it was not necessarily the most important feature of the service innovations we studied. For many of the innovations in our case studies, success depended on much earlier diagnosis and intervention than delivered by previous approaches; fundamental changes to staff roles, in particular the roles of GPs, community services and hospital consultants in local systems; empowering patients to play a more active role in administering their own care. Patients take more accurate blood pressure readings, monitor glucose levels more effectively and may identify appropriate warfarin doses faster if supported to manage their conditions themselves.

Many of the innovations delivered dramatic improvements by improving access to services for the most vulnerable and neglected patient groups, for example people with severe mental illness, vulnerable older people and adolescents. It was also striking that many innovations in our case studies achieved improvements by addressing different underlying needs to traditional health and care services. Age UK's care co-ordinators draw on

voluntary sector services and community groups to reconnect older people with their communities, addressing loneliness and isolation rather than simply focusing on their health challenges.

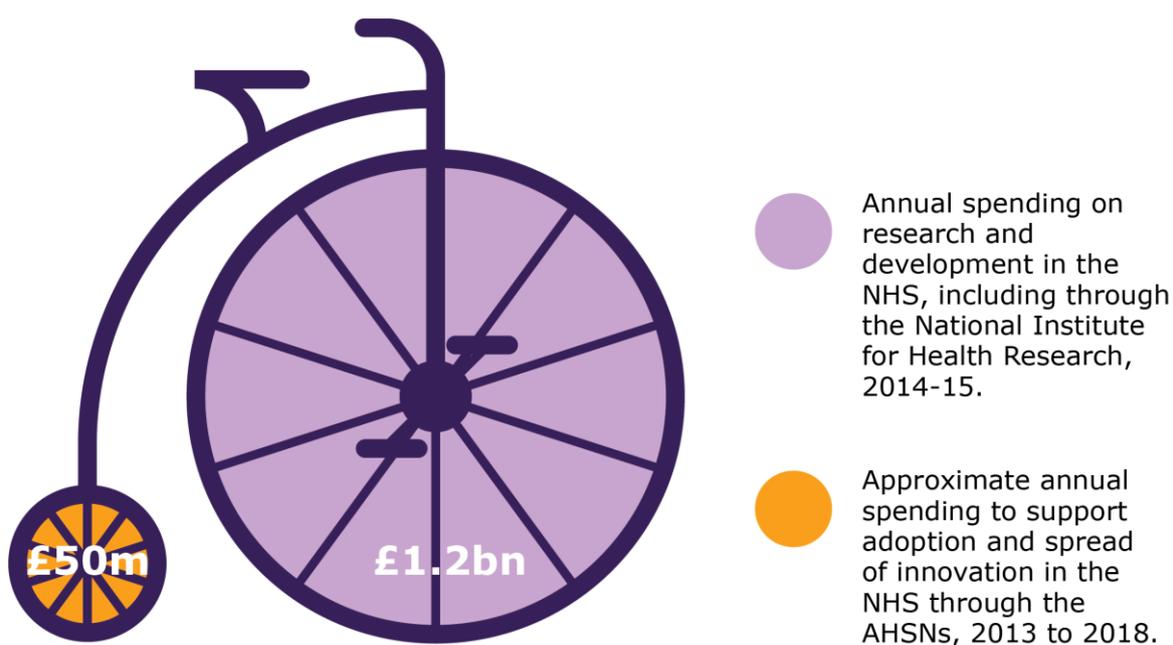
The case studies therefore highlight the opportunities for improvement that come from overcoming siloed thinking as much as operational silos. Some of the big wins appear to come from organisations overcoming a 'that's not our job' mentality, taking a broader perspective on their social purpose, and exploring a wider range of options for delivering the greatest impact for their communities. These include addressing needs that might technically be another health or care organisation's responsibility, taking a more holistic approach to people's physical and mental health, and addressing social challenges as a major cause of ill health rather than a second-order concern.

Some of the findings on how to support adoption and spread are embarrassingly simple. Innovators and adopters need to be able to access appropriate funding quickly to ensure rapid adoption of innovation. Professor Mike Hurley found it relatively easy to secure the initial funding to design his ESCAPE-pain programme for people with chronic hip and knee pain. However, he hit a 'brick wall' at the point when he needed to secure funding for adoption and spread of the programme. Suddenly the resources disappeared, and trusts began to discontinue successful pilots. By the early 2010s, Mike was seriously considering making a career change. In his own words, 'what was the point in dedicating a decade to research if it was just going to sit on a shelf?' Emma Redfern explained that some trusts were unable to find £15,000 to £18,000 to implement her checklist for crowded emergency departments, despite its dramatic impact in reducing serious incidents.

Things appear to have got a little better. Mike Hurley described being thrown a lifeline when the newly created Health Innovation Network, the AHSN for south London, decided to support his programme in 2013. Nevertheless, the lack of adequate funding, and the startling mismatch between resources for innovation and resources for adoption and spread, remain a substantial barrier. As long as the NHS sets aside less than 0.1 per cent of available resources for the adoption and spread of innovation, a small fraction of the funds available for innovation itself, the NHS's operating units will struggle to adopt large numbers of innovations and rapidly improve productivity (see Figure 1). These choices are in stark comparison with some private multi-nationals that set aside up to 25 per cent of turnover to promote their innovations, in many cases significantly more than they dedicate to research and development.

None of this would matter if the adoption of service innovation was a simple, technical process such as replacing a branded drug with a generic. But our cases studies consistently highlighted the complexities of transferring even simple, well-designed innovations from one site to another. When Neil Guha and Guru Aithal, two hepatologists, started to carry out proactive fibroscanning in GP practices, they immediately doubled the number of people diagnosed with chronic liver disease. Unable to cope with increased patient numbers, they needed to make fundamental changes to the roles of GPs, nurses and consultants in treating the condition. Meanwhile, proactive diagnosis highlighted the need for better services to support people with earlier stage liver disease.

Figure 1: Comparison of spend on innovation and on adoption and spread of innovation in the NHS (see end note)



Sources: Department of Health 2016; NHS England 2017.

In this and other examples, the decision to introduce one innovation had a domino effect, triggering a series of changes to diagnosis, treatment and the roles of staff and patients and revealing new patient needs – in short, a lengthy period of iterative testing and refinement. This goes a long way towards explaining why the spread of service innovation in the NHS, as in other industries, is a difficult and costly process even if the innovations appear simple. Adoption of most service innovation needs to be seen as part

of service improvement rather than the process of 'rolling out' a 'proven' approach.

Given these complexities, the types of service innovation covered in our case studies are unlikely to spread rapidly through traditional NHS approaches such as presenting information on them at conferences or developing toolkits (McCannon *et al* 2007). Instead, almost all the case studies highlighted the importance of putting 'boots on the ground': senior clinicians able to spend substantial time convincing colleagues of the benefits of innovations, experienced project teams to help providers implement innovations, and continued support for providers in evaluating the impact of changes and sharing learning. While individuals often played key roles in developing and spreading innovations, success depended on effective teams with a range of skills including investment appraisal, marketing, change management, service improvement and evaluation. Otherwise, as Dr Julia Reynolds, the head of programmes responsible for the Innovation Agency's atrial fibrillation programme explained, 'there is a risk that only the most "sticky" innovations get adopted or only the most enthusiastic individuals are able to introduce them sustainably.'

Despite this, many of our interviewees explained that they were preparing to revert to more passive strategies, for example developing toolkits and websites, for when funding for active dissemination programmes was withdrawn. Given funding pressures, most of our innovators had only received funding to support active spread of their innovations for a couple of years. Many described encountering unrealistic expectations about the speed with which they could ensure widespread adoption and impact. The risk in reverting so quickly to passive dissemination is that programmes lose momentum well before adoption across large parts of the NHS has been achieved.

Frustrated with the slow pace of change, there have always been voices in the NHS advocating national direction, or the use of highly directive incentive schemes, to speed up adoption of innovation. We see limited advantages in central bodies mandating adoption for the types of service innovations considered in these case studies. Local health services are complex, interconnected systems with different starting points, different challenges and finite skills and resources for innovation and improvement (Plsek and Greenhalgh 2001). External bodies are ill placed to determine which service innovations would deliver greatest value within a local system or how they should be adapted to deliver greatest impact. In any case, the evidence for

service innovations is constantly shifting, with new innovations emerging. If so, calls for national directives betray outdated thinking on the nature of service innovation that needs to be challenged.

Entirely to the contrary, these case studies highlight opportunities to accelerate spread by transferring decision-making to local systems and frontline services. They illustrate how the current performance management regime and financial incentives restrict innovation by focusing attention on narrow measures of performance, short-term rather than longer term improvements, and improvements within organisations rather than across systems. Interviewees described commissioning as a remote tier of decision-making that slowed the adoption of even small-scale changes in how services were delivered. Innovators could make faster progress when commissioners delegated responsibility for improving services to providers. Rather than mandating innovations, the AHSNs were connecting innovators with NHS organisations, helping providers to identify solutions to their challenges that would work in the local context.

As the case studies make clear, the attitudes of local leaders and the working environment within provider organisations have a significant impact on the speed of innovation and spread. Some interviewees described local leaders who actively championed innovation: helping to articulate clear and ambitious goals for their organisations; encouraging staff in the search for new ideas; encouraging staff to connect with colleagues within and across organisations; supporting staff in accessing the funds, tools and expertise to execute their plans. Other interviewees described pursuing innovation despite the discouragement of leaders who would prefer them to focus on their day job. This suggests that there is still a need to convince at least some leaders that innovation is a solution to the NHS's challenges, rather than an unaffordable luxury, and of the role they should play in supporting it.

Finally, our interviewees highlighted the challenges of ensuring rapid adoption of innovation given the current fragmentation of health and care services. Unlike some other health systems, health and social care services in England are compartmentalised in both service silos and geographic silos, meaning that there are few formal mechanisms for transmitting learning across sites. The AHSNs were playing an important role in connecting sites through learning collaboratives and developing actionable data to support improvement. Nevertheless, Phil O'Connell, the developer of the Florence telehealth application, noted the differences between working with the NHS and working with large integrated health systems and hospital chains in

Australasia and the United States. In those systems, organisations could deploy innovations across multiple sites and draw on established systems and accumulated experience to support implementation.

Looking to the future, the development of more integrated local health and care systems in England presents an opportunity to address many of the barriers to adoption and spread identified in this report. At least in theory, emerging accountable care systems may be able to establish more appropriate objectives, financing mechanisms and performance management to support innovation. Within more integrated local systems, it may be possible to establish stronger relationships between professional groups and deeper connections between services, more effective mechanisms for sharing of ideas and learning, a common language and shared methodologies for innovation and improvement.

We are grateful to six AHSNs for commissioning and funding the report and to all of the AHSNs for proposing case studies. The chief executives and other staff in the six sponsoring AHSNs, and Lucy Sitton-Kent and Chris Taylor at the East Midlands AHSN in particular, offered valuable advice and insight throughout the project. The King's Fund made the final decisions on which case studies to include and the report and findings are our own.

Summary of key messages

- Entrepreneurship is alive and well in the NHS despite the substantial barriers that often lie in innovators' paths.
- These case studies demonstrate the power of simple, low cost innovations to improve the quality of health services and the dramatic impact this can have on people's lives.
- In practice, transferring even simple innovations from one NHS organisation to another is a complex process requiring adaptation, testing and re-evaluation.
- As a result, few of the service innovations considered here are likely to spread across the NHS through passive approaches such as publicising them at conferences or producing toolkits.
- Instead, these case studies highlight the need to put 'boots on the ground' for spread to happen, with senior clinicians to convince colleagues of the benefits and experienced project teams to support services in adopting innovations.
- Success depends not just on innovators but teams bringing together a range of skills including investment appraisal, marketing, change management, service improvement and evaluation.
- However, lack of adequate resourcing is a major barrier to adoption and spread, holding back the introduction of even extremely low-cost innovations that deliver immediate benefits.
- As long as the NHS sets aside less than 0.1 per cent of available resources for the adoption and spread of innovation, a small fraction of the funds available for innovation itself, the NHS's operating units will struggle to adopt large numbers of innovations and rapidly improve productivity.
- There is little reason to believe that the national NHS bodies can usefully mandate the types of service innovation studied in this report. Providers need to be able to select and tailor innovations that deliver the greatest value given local challenges and work in the local context.
- Instead, there are opportunities to accelerate spread by transferring decision-making to local systems and frontline services.
- The case studies highlight the chilling effect of the current performance management regime, payment systems and commissioning structures on

innovation. Commissioners need to delegate greater authority to providers to make decisions on how to improve services.

- The attitudes of local leaders and the working environment within providers have a significant impact on the speed of innovation and spread. Some local leaders actively champion innovation, while others encourage staff to focus on the day job.
- There is still a need to convince some leaders that innovation is a solution to the NHS's challenges, rather than an unaffordable luxury, and of the role they should play in supporting it.
- The AHSNs are helping to connect sites through learning collaboratives and to support joint working on improvement, including by collecting actionable data for improvement.
- However, the current fragmentation of NHS services remains a barrier to adoption and spread of innovation, making it harder develop shared approaches and transmit learning across sites.
- At least in theory, the establishment of accountable care systems in England presents an opportunity to address many of the barriers to adoption and spread identified here and establish organisations with stronger mechanisms for sharing learning and improvement.

2 Key themes from the case studies

We invited all 15 AHSNs to propose examples of innovations in the delivery of health and care services for inclusion in the report. We asked them to propose innovations with good evidence of effectiveness and that had been adopted across multiple sites. We selected the eight case studies that we thought best illustrated the challenges faced by innovators and effective approaches to supporting adoption and spread, rather than necessarily those with the strongest track record.

An overview of the innovations in our study

While the focus of the research was on adoption and spread of innovation, the case studies also shed light on some of the main opportunities for innovation to improve the effectiveness of health and care services. It was notable that most of our case studies highlighted clusters of quite similar changes in service delivery such as the introduction of an effective, low-cost technology, more proactive intervention, changes to staff roles and greater engagement of patients in their care.

Introducing new technologies

The Innovation Agency's atrial fibrillation team supported the adoption of hand-held diagnostic tools to identify irregular heart rhythm. The scarred liver team in the East Midlands supported more effective use of fibroscanners to identify people with early-stage liver cirrhosis. The Florence telehealth application and ChatHealth used text messaging to improve communication with patients. However, interviewees described new technologies primarily as an enabler of other changes to improve services, for example changes in roles of staff and patients, new treatment pathways and shifting care from hospital to GP surgeries or into the home.

Intervening earlier

In the East Midlands, systematic fibroscanning for people with particular risk factors made it possible to identify patients with chronic liver disease at a stage when changes to alcohol consumption and lifestyle could still be effective, rather than making the initial diagnosis when patients arrive in

accident and emergency departments with jaundice or gastrointestinal bleeding, at which point they often have irreversible liver damage. In Yorkshire & Humber, the introduction of systematic physical health checks for patients with severe mental illness identified large numbers of patients with previously undiagnosed and untreated chronic conditions such as cardiovascular disease and diabetes.

Changing staff roles

In the atrial fibrillation project, the introduction of new diagnostic equipment meant that GPs, primary care staff, and more recently members of the fire and rescue service, could carry out tests for irregular heart rhythm that previously needed to be carried out in specialist clinics. In the scarred liver programme, the introduction of more systematic testing for liver disease triggered substantial changes in the roles of GPs and hospital specialists. As part of its care co-ordination programme, Age UK trains its own staff to co-ordinate health, care and voluntary sector services for vulnerable older people, in doing so fundamentally changing aspects of the care that patients receive.

Engaging patients in their care

In the West Midlands, cardiologists and endocrinologists use the Florence application to prompt patients to take blood pressure and glucose readings at home, improving accuracy and engaging patients in the management of their conditions, while avoiding trips to health services for routine check-ups. In the North West Coast, the Innovation Agency is testing the impact of allowing patients with atrial fibrillation to monitor their blood at home to ensure optimal warfarin doses.

Meeting a different underlying need

Age UK's care co-ordinators for older people focus much more on individuals' overall wellbeing than typical health and care services, addressing isolation and disconnection as an underlying cause of their health and care challenges. The ESCAPE-pain programme seeks to challenge patients' beliefs about chronic arthritic pain and to develop their coping skills, rather than simply improving muscle strength and endurance. Physical health checks for people with severe mental illness address a tendency to overlook these patients' physical health needs or to ignore the possibility that physical health problems are a cause of or contributor to, rather than a symptom of, mental illness.

Improving access for vulnerable groups

In Yorkshire & Humber, the introduction of physical health checks for people with severe mental illness identified extremely large numbers of patients with previously undetected diabetes and cardiovascular disease, helping to address a striking disparity in the quality of care for these patients in comparison with the general population. Meanwhile, the ChatHealth messaging portal has made it easier for children and young people to contact school nursing services for advice on sensitive issues, substantially increasing the number of requests for help from adolescent boys, who were previously less likely to contact services.

The table shows which types of innovation were found in our case study sites.

Table 1: Overview of types of innovation in the eight case studies

Case study examples	Type of innovation / opportunities for improvement					
	New technology	Intervening earlier	Changing staff roles	Engaging patients in their care	Meeting a different underlying need	Better access for vulnerable groups
Florence telehealth for long-term conditions	✓	✓		✓	✓	✓
Diagnosis and treatment of chronic liver disease	✓	✓	✓	✓		✓
Physical health checks for patients with severe mental illness		✓	✓		✓	✓
ESCAPE-pain programme for chronic hip and knee pain	✓		✓	✓	✓	
ChatHealth messaging to contact school nurses	✓	✓	✓			✓
Diagnosis and treatment of atrial fibrillation	✓	✓	✓	✓		
Age UK care co-ordinator roles		✓	✓		✓	✓
Emergency department checklists			✓			✓

Money talks

Innovators and adopters in the NHS need to be able to access small amounts of funding quickly and easily to support rapid adoption and spread of effective innovations. Some of our interviewees described spending years 'in the wilderness', attempting to keep their innovations alive alongside their day jobs without support from within their organisations or external bodies. Others described leapfrogging from one small pot of funding to another, often with substantial delays. These challenges explain directly why some simple and effective innovations in our case studies took a decade or more to be adopted and spread at any scale within the NHS. Meanwhile, a handful of more recent projects, started after the AHSNs were fully established, have been able to access funding more easily and to move from piloting to adoption and spread within a few years.

Professor Mike Hurley was able to secure the initial funding to design his ESCAPE-pain programme for people with chronic hip and knee pain. By the late 2000s, he had developed a programme that built on traditional physiotherapy and had demonstrated the impact in clinical trials and evaluations. An economic assessment showed that the programme delivered comparable outcomes to traditional physiotherapy at half the cost. However, he struggled to secure funding to support adoption and spread once the development phase had been completed. Mike attempted to promote the programme through writing papers and attending conferences but with little success. It was only in 2013 that the newly created Health Innovation Network provided funding for Mike to work part time on promoting the programme with support from a dedicated project team.

In the early 2000s Kate Dale became concerned about the quality of physical health care for patients with severe mental illness. She started carrying out systematic physical health checks for her patients, identifying large numbers of vulnerable patients with undiagnosed chronic conditions. She kept her physical health clinics going alongside her day job without any funding and while managing a full caseload. She waited a decade for funding to refine and test her model for physical health checks and a further five years for funding to enable adoption and spread.

As mentioned above, clinical leaders are struggling to find £15,000 to £18,000 to put in place checklists to prevent harm to patients in crowded emergency departments. Across the country, emergency departments face such severe staffing shortages and funding shortfalls that there is little scope to release

any staff from frontline duties to pursue improvement opportunities, even in cases where these projects will deliver almost immediate improvements and cost savings.

We encountered only one example of timely, seamless funding for the design, testing and adoption and spread of an innovation – the ChatHealth portal to enable secure text messaging between school nurses and schoolchildren. In this case, school nurses gained support from their community trust’s communications team to develop their proposal for a messaging service. With this support, they put forward a business case and secured funding from within the trust to develop and test the service. Once they had demonstrated the impact of the innovation, they secured funding from NHS England and the East Midlands AHSN to support wider adoption and spread. The ChatHealth team was able to develop, test and start disseminating its innovation within three years. In contrast, many of our innovators took a decade or more to achieve adoption at any scale.

Many interviewees explained that they had only been able to secure funding to support adoption and spread for a couple of years. The expectation was often that project teams would need to make rapid progress while developing an alternative model for supporting adoption and spread once the funding ran out. In a few cases, interviewees explained that they had been able to establish a sustainable financing model. For example, a social enterprise is now responsible for promoting the Florence telehealth app, charging trusts a small licence fee to cover its running costs. In other cases, however, it seems clear that continued external funding is needed to support adoption and spread. For example, innovators are unlikely to be able to persuade providers to fund improvements across a local system, rather than centred within an individual organisation, or investments in primary care.

More generally, interviewees highlighted the absence of almost any slack resources within NHS organisations to support adoption of innovation. It was extremely difficult for clinicians to protect any time away from their day jobs to maintain social networks, develop partnerships with other organisations, exchange ideas or experiment. In most organisations, it was difficult for staff to secure support to develop business cases and to pilot innovations. Given the complexity of the adoption and spread process, this inevitably places substantial limitations on NHS organisations’ ability to adopt significant numbers of service innovations quickly and effectively.

Adoption or adaptation?

Few of our interviewees described the adoption and spread of their innovations as a simple, linear or technical process such as replacing a branded drug with a generic version. Instead, they highlighted the complexities and challenges of transferring even simple, well-designed and well-evidenced innovations from one site to another and establishing them on a sustainable basis. In many cases, the decision to introduce an innovation triggered a series of other changes, for example to the approach to diagnosis, the treatment pathway, systems and processes, and the roles of staff and patients in delivering care. Rather than adopting a new piece of technology or applying 'best practice', staff typically embarked on a lengthy period of testing, refinement and evaluation.

In the early 2010s, Neil Guha and Guru Aithal, two hepatologists at Nottingham University Hospitals, successfully piloted the use of fibroscanners in GP surgeries and community-based clinics to identify early signs of liver disease. They screened GP practices' entire lists and carried out scans for all patients with significant risk factors, delivering a 100 per cent increase in the number of patients diagnosed with cirrhosis and a substantial increase in detection of early stage liver disease.

As they established fibro-scanning in more GP practices, Neil and Guru found that they needed to make radical changes to staff roles and the treatment pathway. The local hospital didn't have enough specialists to hold fibroscanning clinics at dozens of GP practices, assess the results of hundreds of new tests, or treat the growing number of patients diagnosed with liver disease. Faced with these challenges, the hospital consultants began to train GPs to carry out the initial assessments and treat a larger number of patients in the community. GPs in four clinical commissioning group areas now screen their own lists to identify high-risk patients, send patients to hospital clinics for fibroscans, interpret the results of the hospital tests, and decide which patients they can manage in the community. This means that the hepatologists can focus their efforts on the growing number of patients diagnosed with more severe stages of chronic liver disease.

As diagnosis has improved, it has become clear that more effective behavioural interventions are needed for large numbers of patients with early-stage liver disease. The team are evaluating the impact of providing advice on changes to alcohol consumption and lifestyle. Meanwhile, they are planning to pilot the use of fibroscanners within drug and alcohol clinics to help patients

monitor the impact of lifestyle changes on their conditions. The team is also considering how to adapt the model for areas where the local district general hospital doesn't have its own team of hepatologists.

Other case studies reveal similar patterns of incremental adaptation. Rather than simply slotting proven innovations into existing processes, staff needed to adapt them to work in the local context and make, in some cases, dozens of subsequent changes to achieve the full benefits. In many cases the introduction of better diagnostics revealed significant new groups of patients requiring care and inadequacies in current services, leading to more radical changes to staff roles and treatment pathways to meet patients' needs with available resources. As innovations spread, new sites often made improvements that could be shared with the originators.

These examples go a long way to explaining why the adoption and spread of service innovation in the NHS, as in other industries, is a complex, difficult, costly and time-consuming process, even when the innovations themselves often appear simple and easy to implement. They help to explain why adequate resourcing, experienced project teams, careful modification and evaluation appear key to the effective transfer of many innovations from one site to another, while perfunctory approaches to 'rolling out' innovation across multiple sites may deliver disappointing results.

Evidence or proof?

Interviewees for our case studies highlighted the importance of developing a robust evidence base so that potential adopters could assess the benefits of their innovations. At the same time, the case studies shed light on inherent limitations and rapid evolution of the evidence for some service innovations within complex systems. It was possible to provide evidence that the introduction of an innovation, alongside other changes, had delivered benefits at a particular site. It was rarely possible to carry out a randomised controlled trial. Some NHS organisations appeared to struggle to interpret the evidence in favour of service innovations and apply an appropriate standard of proof.

In the West Midlands, for example, endocrinologists at Sandwell and West Birmingham Hospitals NHS Trust have used the Florence telehealth application to improve glucose monitoring and adherence to medication among adolescent diabetic patients. This has allowed them to make more effective use of resources, for example, reducing the amount of time spent giving

routine advice and freeing up time to support patients who are struggling to manage their conditions.

So, there is good evidence that Florence has delivered substantial benefits in this context. However, success depends not just on implementing the original telehealth innovation, but on a range of follow-on innovations and the ability of a large, complex system to adapt to them. Whether other organisations can achieve similar results is inevitably uncertain, depending on how well they refocus on those most in need, how well they motivate patients to manage their conditions using the application, the effectiveness of the other services they put in place to support patients and so on.

In the East Midlands, the AHSN has worked with hepatologists at Nottingham University Hospitals NHS Trust to develop the evidence base for proactive fibroscanning to identify liver disease. This has led to two articles in the *British Medical Journal* highlighting the low costs per quality-adjusted life year of faster intervention for patients with fatty liver disease. As diagnosis has improved, the team has developed new services for patients with early-stage liver disease. It is currently assessing the impact of giving advice on lifestyle and the scope to use fibroscanners to motivate behavioural change in drug and alcohol clinics. Like the innovations themselves, the evidence regarding the types of innovations covered in our case studies is continually evolving, ambiguous and open to challenge.

If our case studies are representative, the evidence for many service innovations is likely to remain ambiguous and contestable, with the need for continual development and reinterpretation. In our case studies, the leaders of innovative organisations reviewed the existing evidence to support a management decision on whether to trial the adoption of a new service innovation. Relevant questions included whether the innovation had the potential to address concrete challenges for the organisation at a reasonable cost, whether there were examples of successful use of the innovation at other sites, what changes might be needed and whether it could be piloted in a controlled way. This was a very different approach to seeking unambiguous proof of cost effectiveness.

By contrast, interviewees suggested that some NHS organisations were looking for a very different standard of proof before deciding to adopt service innovations, for example, evidence comparable to that provided in clinical trials of a new drug. Opponents of innovations might discredit them by reference to an unattainable standard of proof. Meanwhile, sensible, small-

scale changes may be held up for lack of compelling evidence that they would deliver cost savings.

Boots on the ground

According to our interviewees, the types of service innovations in these case studies are unlikely to spread rapidly across the NHS through passive approaches such as presenting information at conferences, in journals or on social media, establishing websites or developing toolkits. Instead, all the case studies highlighted the importance of 'boots on the ground': senior clinicians able to spend substantial time engaging colleagues about their innovations, experienced project teams to help providers implement innovations and adapt them to the local context, and support for providers to share learning and test the impact of further changes in how services are delivered.

In most of the case studies, senior clinicians with relevant expertise, strong reputations and large professional networks played a leading role in supporting adoption. Emma Redfern played a key role in persuading consultants at neighbouring hospitals to adopt her emergency department checklist to prevent medical errors. A local GP, Ruth Chambers, and an endocrinologist, Dr Parijat De, were instrumental in persuading colleagues to adopt the Florence telehealth application in the West Midlands. As we know from other research, clinicians are not passive recipients of innovations. Adoption depends on interpersonal influence through social networks, with staff most influenced by credible colleagues from their own professional groups (Flodgren *et al* 2011). Where managers rather than clinicians led these influencing campaigns, they often struggled to gain traction.

Interviewees explained that the AHSNs were playing important brokerage roles, helping innovators to identify and connect effectively with organisations that were most likely to benefit from adopting their innovations. In Kent, Surrey and Sussex, Lisa James explained that the AHSN was helping Age UK to identify local health systems that were well placed to adopt its care co-ordinators - for example, those with sufficiently strong partnership working across a range of health and care services. Nick Hamilton, the project manager for the East Midlands AHSN's scarred liver programme, explained that he tried to push on open doors, identifying CCGs that were eager to make improvements in diagnosis and treatment of liver disease. In some cases, the AHSNs helped to bridge the cultural barriers between innovators in

the private sector and the NHS, for example, helping pharmaceutical firms to engage in supporting service improvement.

In addition to senior figureheads, Julia Reynolds highlighted the importance of experienced project teams who could provide practical support and help adopters to adapt innovations to local context. Julia's team was helping pharmacies, adult social services, GP practices and the fire and rescue service to carry out new diagnostic tests for atrial fibrillation. Jimmy Endicott's team was supporting school nurses in operationalising and making best use of the ChatHealth application.

In many cases, the project teams also played a longer-term role in supporting organisations to adapt innovations to the local needs, evaluating changes and measuring performance. Participants in Age UK's care co-ordinator programme join a forum to share data on performance and exchange ideas on the development of multidisciplinary community teams. In the North West Coast, the Innovation Agency is providing hands-on support through a learning collaborative with clinical commissioning groups and GP practices to improve preventive services for people with atrial fibrillation. Participants in the learning collaborative benchmark performance as a basis for identifying new opportunities for improvement. They are also using a range of approaches including education, support for quality improvement and developing more effective teamworking.

While interviewees emphasised the need for boots on the ground for a significant period, many were nevertheless preparing to revert to more passive strategies for spreading their innovations when funding for active programmes came to an end. Most were developing websites and toolkits that adopters could use without hands-on support. While this is an understandable response to funding pressures, there are few reasons to believe that these approaches in isolation will translate into continued, rapid adoption of service innovation.

Delegating downwards

Our interviews highlighted the stifling effect that a top-down culture and hierarchical management structures can have on the adoption of service innovations. There are opportunities to accelerate the spread of innovation by removing regulatory barriers and transferring decision-making on the adoption of innovation closer to the front line. This is consistent with a body of research indicating that decentralised management structures are more effective than top-down instruction in supporting the adoption and spread of many innovations (Greenhalgh *et al* 2004).

Commissioners and providers faced pressure to meet targets focused on the financial performance and narrowly defined measures of service quality within individual organisations. This meant that local leaders had strong incentives to make investments that would improve their organisation's financial position or the relevant measures of quality. Conversely, they were unlikely to make investments to deliver improvements in other aspects of quality or improvements elsewhere in the system. Similarly, commissioners and providers faced pressure to meet short-term targets, making them less willing to invest in improvements over longer timescales. Nick Hamilton highlighted challenges in persuading commissioners to invest in improvements in the diagnosis and treatment of liver disease, since the benefits would materialise years in the future.

This combination of factors goes some way towards explaining why so many of the innovators in our case studies struggled to persuade individual commissioners or providers to invest in their innovations. In most of our case studies, there was a need for investment across primary, community and hospital services to achieve system-wide benefits. It also helps to explain why innovators were struggling to develop a sustainable financing model for when national or regional funding ran out.

Professor Mike Hurley described the difficulties he faced persuading commissioners to procure the ESCAPE-pain programme. In South London alone, he needed to approach 12 commissioners to secure funding. In many areas, he needed to persuade commissioners to agree to changes to service delivery within providers. Commissioners were often disconnected from providers, with a lack of understanding of services, making it difficult to convince them of the benefits of a new approach.

Similarly, the scarred liver team in the East Midlands highlighted the challenges of persuading commissioners to support the introduction of new diagnostics and treatment approaches for chronic liver disease. While there had been some successes, clinical commissioning groups had limited capacity to engage in discussions on service change. In some cases, they faced such severe funding challenges that they focused exclusively on opportunities for immediate cost reduction, with little capacity to engage in supporting longer term improvements in population health.

The case studies suggested that adoption would happen faster if commissioners delegated greater responsibility for operational decision-making to providers. Mike Hurley was able to make faster progress in areas where commissioners allowed providers greater autonomy to improve services under a looser contract. Jimmy Endicott was able to ensure rapid adoption of ChatHealth in part because he could market it direct to trusts without the need for commissioners to approve it.

Interviewees also highlighted the impact of payment systems and incentives on providers' autonomy to decide how best to improve services. Less restrictive payment systems such as block grants or some forms of capitation gave providers broader flexibility to decide whether to adopt innovations. Others restricted providers' freedom of action by focusing their efforts on narrow measures of performance such as output. Some interviewees explained that providers were reluctant to adopt innovations that would reduce Payment by Results revenues. As Mike Hurley put it, 'Sometimes they could hear the madness as they articulated these concerns.'

An alternative to delegating downwards would be for national bodies to play a more active role in incentivising or mandating the adoption of particular service innovations across the NHS. Some interviewees explained that national decisions to incentivise introduction of their innovations had accelerated adoption, for example including provision of physical health checks for patients with severe mental illness in the Quality and Outcomes Framework. Others highlighted the risks of a model where local leaders looked upwards for direction rather than focusing on local priorities.

Overall, there are many reasons to doubt whether the national bodies could usefully incentivise or mandate many of the service innovations in these case studies. As discussed above, the effectiveness of many of these innovations varies depending on local challenges and context. In some cases, there is a range of innovations with a good track record to choose from. For these types

of innovation, it would often be difficult to provide the type of evidence of effectiveness to justify mandating adoption. However, leaders in the national bodies were playing a useful role in raising awareness of innovations. Meanwhile, the AHSNs were connecting innovators with NHS organisations, helping providers identify solutions which would work in the local context.

Supportive leaders and workplaces

The case studies highlighted the critical roles that leaders throughout organisations played in either supporting or holding back the adoption of service innovation, as well as the importance of provider organisations having appropriate skills and systems. Interviewees described radically different experiences of pursuing innovation within their organisations, with some receiving encouragement and timely support while others were told to focus on the 'day job'. There also appeared to be significant differences in the ability of staff to access skills and resources to support innovation within organisations and the mechanisms for supporting sharing of learning.

At Leicestershire Partnership NHS Trust, for example, the leaders of the trust had a reputation for actively supporting innovation and a track record of harnessing technology to improve services. School nurses were able to gain support from members of the trust's communications team to develop their initial thinking on a web-based portal to manage messaging with schoolchildren. They were able to draw on this support to develop a business case and followed simple processes to secure time and funding for the project. The chief executive was supportive and the director of the trust's families, young people and children's services chaired the board overseeing the project.

By contrast, Kate Dale hit a brick wall when she initially sought support for her work to establish physical health checks for patients with severe mental illness. She describes pursuing the project with at best the acquiescence of the trust leadership and line managers, and at worst active discouragement from colleagues who would have preferred her to focus on what they saw as the day job. For almost a decade, Kate carried out physical health checks and ran lifestyle clinics for patients across the 150 miles of the Yorkshire Dales without any additional resources, while continuing to manage a psychiatric nurse's full caseload. It was only when the national bodies started to take an interest that Kate could establish physical health checks in the trust on a sustainable basis.

There was some evidence from the case studies of the importance of effective mechanisms within provider organisations to facilitate sharing of ideas and learning and to benchmark performance. In some cases, there appeared to be good communication across operational units, making it much easier to spread innovation. In other examples, the operational units within hospitals appeared to operate as separate silos. In some cases, innovators had successfully spread their innovations across a number of organisations but had failed to transfer them from one hospital ward to another.

Institutional silos

Finally, interviewees highlighted the challenges they faced in ensuring rapid adoption and spread of innovations given the fragmentation of health and care services. Local leaders were often unwilling to pursue innovations that they perceived to be outside their organisations' core responsibilities. It was also difficult to ensure rapid transmission of innovations given the current institutional architecture of the NHS, with services organised as small silos rather than integrated local systems or chains and few formal mechanisms for sharing learning across sites.

Interviewees highlighted a 'that's not our job' mentality that hampered the adoption of useful innovations to improve care. Nick Hamilton explained that clinical commissioning groups were sometimes unwilling to make investments to improve public health and prevention, which they saw as a local authority responsibility. Kate Dale initially struggled to persuade leaders of her mental health trust to adopt physical health checks for patients with severe mental illness, since they saw this as a responsibility for primary care and other services focused on physical health care.

Many interviewees highlighted challenges in supporting rapid adoption of innovation given the fragmentation of NHS services. Innovators needed to convince the leaders of dozens of small-scale services and help them individually to implement their innovations. As Jimmy Endicott explained, 'We aren't able to have a single conversation with school nurses across the country about adopting [ChatHealth]. Instead, we have to knock on doors one at a time.'

Many of the case studies highlighted the importance of learning collaboratives to support exchange of ideas and learning across sites. Julia Reynolds explained that she had made faster progress in spreading improvements in the treatment of atrial fibrillation in more integrated local health systems,

where there were established forums for bringing together commissioners and providers across the region and sharing learning. Phil O'Connell noted the differences between working with the NHS and presenting the Florence telehealth application to the leaders of large hospital chains or integrated health systems in Australia and New Zealand or the Veterans Health Administration in the United States. In these systems, organisations could draw on established systems to share learning and support implementation.

3 Case studies

Florence: telehealth for long-term conditions

In the late 2000s, Phil O’Connell, a chartered IT professional with a background in telecoms and financial services IT systems, took an interest in the early NHS telehealth pilots. Phil’s take was that NHS commissioners were being sold a pup – complex and costly IT solutions, often without much thought for how they would actually be used, which were unlikely to deliver substantial benefits. The emerging evidence was that a number of the original pilots were having few positive impacts, which contributed to loss of confidence in telehealth across the NHS.

The development of Florence started with a speculative email from Phil to a sympathetic programme director in Stoke Primary Care Trust. The message was that Phil could help NHS services use existing technology to support patients with long-term conditions, without the need for investment in new systems. The PCT provided a small amount of funding for Phil to develop the application and connected him with a local GP, Dr Ruth Chambers, to provide clinical input on design of the service.

A decade or so later, the result is a social enterprise, Simple Shared Healthcare, and an uncomplicated mobile phone application, Florence, which allows clinicians to communicate securely with patients, prompts patients regarding monitoring and treatment of their conditions, provides automatic advice based on disease management protocols, and gets in touch quickly if patients’ conditions deteriorate. Clinicians log on to Florence to get a simple overview of their cohort of patients and individuals’ conditions.

The team have developed a number of standard protocols, for example medication reminders or smoking cessation messages. For patients with hypertension, the application provides reminders to take blood pressure readings at home using a portable monitor, avoiding the need to come into a surgery and ensuring more accurate readings. It provides automatic responses based on the data, telling patients if their blood pressure is fine, or telling them to contact the surgery if there is a deterioration in their condition. For chronic obstructive pulmonary disease (COPD), it prompts patients to check their sputum, asks about breathlessness, prompts patients to provide a temperature reading, directs patients to take rescue medication where needed, or alerts patients and clinicians if they need medical support.

According to interviewees, however, Florence is an enabler rather than a solution for clinicians and their patients. Its greatest strength is offering a simple, adaptable framework for clinicians to work more effectively with

patients and for patients to take a greater role in managing their conditions, without the need for costly investments in bespoke services. In one case, clinicians used Florence to help an individual with Asperger's syndrome who struggled to sleep at night because of anxiety that he may have forgotten to lock the doors. Florence asks him to confirm that he has locked the doors every evening and reminds him that all's well whenever he wakes up.

This means that the benefits Florence can deliver are wide ranging, depending on how clinicians use the application. It has allowed Dr Parijat De, an endocrinologist at Sandwell and West Birmingham Hospitals NHS Trust, to substantially improve glucose monitoring and adherence to medication among his adolescent patients. This has led to more effective use of resources, for example, reducing the amount of time spent giving routine advice and the number of unnecessary appointments for patients whose conditions are stable, leaving more time to focus on those who are struggling to manage their conditions. Half an hour each Friday afternoon is enough for Parijat to review his list and identify where to focus his attention.

Meanwhile, Florence can contribute to a dramatic improvement in quality of life for patients with long-term conditions. Simple prompts make it much easier to adhere to medication plans and keep things under control. Self-monitoring at home can remove the need for seemingly endless trips to surgery for testing or routine check-ups. For many patients, the greatest impact is on their self-confidence. Florence provides regular reassurance to patients that things are OK and they can get on with their lives, along with simple mechanisms for seeking help if things get worse. Over time, patients develop greater skill, understanding and confidence that they can manage their conditions.

Florence is a low-cost, low-risk innovation with a strong track record. Providers simply need to purchase an initial bundle of text messages rather than making costly investments. It fits within and can be adapted for existing work processes rather than requiring substantial redesign. It doesn't require staff to develop new skills or very different ways of working. Its effectiveness has been publicised by the National Institute of Health and Care Excellence (NICE), and the BMJ and a dozen or so other peer-reviewed journals.

Even with these enablers, the process of spread appears to have been difficult and, until the establishment of AHSNs, reliant on good fortune more than established systems. The initial development of the application depended on forward-thinking commissioners, connecting a talented innovator with clinicians, and small amounts of funding for commissioning staff to put 'boots on the ground', promoting the application to GPs, community nursing teams and hospital-based clinics. A common reaction was that people had more than enough on their plate with the day job.

Respected doctors played a central role in persuading or cajoling colleagues into taking an interest in the application and exploring its possibilities, a role

that could not be delivered by non-clinicians without established local networks. Nevertheless, the impression is of painstaking, incremental effort by these leaders to spread the innovation from one department in a provider to another, and then to neighbouring providers. In some cases, providers rejected the application because of the impact on their Payment by Results revenues, even though they could see the benefits.

When the West Midlands AHSN decided to support Florence in 2014, it was the first time that Phil and his team had been able to access any form of regional infrastructure to enable adoption and spread. From working primarily with a single commissioner they were able to market Florence to all 22 CCGs in the West Midlands and had a route into a much larger number of providers.

The AHSN supported the development of free CCG intelligence packs bringing together the evidence base for the programme, new off-the-shelf applications so that providers could start using Florence for people with asthma, diabetes or COPD straight away, and toolkits to help providers make best use of the system. They also provided a lifeline of funding for doctors such as Parijat to continue promoting the service to peers alongside their day jobs. This has led to an acceleration in adoption of the application in comparison with working with a single local commissioner. Within the first nine months of the AHSN programme, an additional 1,000 patients were using the system. The East Midlands AHSN is also now supporting adoption of Florence in its region.

Nevertheless, it is clear that, seven years in, the project team is still at an early stage in the adoption and spread of Florence within large numbers of primary care, community and hospital services. Interviewees highlighted the ongoing need for clinical champions to support the programme and persuade individual organisations to adopt the service.

Phil O'Connell noted the differences between working with the NHS and presenting Florence to the leaders of hospital chains or integrated health systems in Australia and New Zealand, or the Veterans Health Administration (VHA) in the United States, where leaders decided immediately to deploy a version of Florence – 'Annie' – in dozens of hospitals in the VHA system, drawing on accumulated experience and established systems to support implementation. The AHSNs offered the closest alternative in the English NHS, with technical skills and a route in to multiple organisations, although the resources that could be brought to bear were far from comparable.

Early diagnosis of chronic liver disease

Approximately 15,000 people die from liver disease in England and Wales every year. Liver disease is now the third leading cause of premature death in the UK, and numbers are continuing to rise by around 5 per cent each year. Almost all of these deaths could be avoided through earlier diagnosis and lifestyle change. The problem is that around 50 per cent of patients with liver disease receive their first diagnosis when they arrive in accident and emergency, typically in their 40s or 50s, with jaundice or gastrointestinal bleeding. By this point it is often too late.

In 2011, Neil Guha and Guru Aithal, two hepatologists at Nottingham University Hospitals and the National Institute for Health Research's Nottingham Digestive Diseases Research Unit, saw an opportunity to reverse this trend. Sitting in the hospital was a new piece of equipment, a fibroscanner, which held the key to faster diagnosis and earlier intervention. An adapted ultrasound scanner, it sends a sheer wave across the liver, and the speed at which the wave comes back indicates the liver's stiffness and how much scarring is present. It provides a more accurate diagnosis of liver disease than blood tests, and a quicker, less invasive test than a surgical biopsy. But it was being used in the hospital primarily to monitor patients with advanced cirrhosis rather than to identify early signs of liver disease at a time when the damage could still be reversed.

In 2011, Neil and Guru led a pilot to assess the benefits of more proactive testing for liver disease, working with a single GP practice in Nottingham. They screened the entire practice list for risk factors such as excessive alcohol consumption and type 2 diabetes and offered all patients with significant risk factors a fibroscan in the community. The results were dramatic: a 100 per cent increase in the number of patients diagnosed with cirrhosis and a substantial increase in detection of liver disease at an early stage, where lifestyle changes could still be effective.

From 2013, the East Midlands AHSN joined forces with the Digestive Diseases Research Unit to support further testing and implementation of the model. They ran three more pilots with GP practices at selected sites in Nottingham and Leicester. Over two and a half years, they screened approximately 25,000 patients on GPs' lists, carried out almost 3,000 fibroscans, and identified 300 new patients with significant liver disease, along with 40 new patients with cirrhosis.

At the same time, the AHSN and the Digestive Diseases Research Unit were building the evidence base for commissioners and providers on the costs and benefits of the new pathway. One recently published article in the *British Medical Journal* summarises the effectiveness of the new pathway, including the assessment of risk factors and use of fibroscans, in identifying new patients with liver disease and cirrhosis. A second paper estimates the costs per quality-adjusted life-year (QALY) of the new intervention at £2,138 for

patients with non-alcohol fatty liver disease and £6,537 for patients with alcoholic liver disease. The National Institute for Health and Care Excellence (NICE) recommends that the NHS should invest in treatments that cost up to £20,000 to £30,000 per QALY.

With such compelling evidence, the priority for the project team was to ensure sustainable implementation of the new pathway across Nottinghamshire. The team persuaded four CCGs in central and southern Nottinghamshire to commission the pathway on an ongoing basis. However, this raised substantial new challenges. The project team did not have the resources for risk stratification of patients from hundreds of GP practices across Nottinghamshire. The small team of hepatologists at Nottingham University Hospitals NHS Trust would struggle to cope with an exponential increase in the number of patients requiring treatment for liver disease.

The response to these challenges was to make substantial further changes to the roles of hospital consultants and general practitioners in delivering the pathway. Neil and Guru are spending an increasing proportion of their time attending meetings with GP practices to win their support for the new model and to train GPs to administer parts of the pathway. GPs now make the initial assessment of which patients on their lists are at risk of liver disease and send these patients to hospital for fibroscans when particular conditions are met, including patients' willingness to consider lifestyle changes. The GPs receive the results of the tests, make their own diagnosis on the basis of them, and decide which patients to refer to the hospital team and which patients to treat in the community.

The need for continual adaptation has been a consistent theme throughout the project. When fibroscanners first arrived, hospital consultants used them as an adjunct to existing diagnostics and treatment pathways. As they started to use fibroscanners for early detection, they needed to develop new diagnostic pathways. As this increased the number of diagnosed patients, they needed to make further changes to the roles of hospital and primary care teams.

This process of adaptation is far from over. The team are currently considering how they can implement the new pathway in areas supported by smaller hospitals without their own liver specialists. They are developing rapid behavioural interventions to encourage patients to make lifestyle changes. And they are working with drug and alcohol teams on the use of fibroscanners in longer term programmes for people with alcohol dependency. One consequence of this constant adaptation is that the evidence base needs to evolve too. Rather than simply providing proof of concept, the team need to continually test the impact of small-scale refinements of the model. They are currently evaluating the implementation process and the impact of giving patients advice on lifestyle changes after the scans.

Another consistent theme is the need for boots on the ground to support the adoption of new care pathways. These are not 'plug-and-play' technologies but complex programmes to win over colleagues and to train and support staff in new treatments. Interviewees highlighted the critical importance of funding for senior hospital consultants to act as clinical champions for the innovation, and for these to work in close partnership with GP opinion leaders to gain traction in primary care.

This process is far from over. Even in Nottinghamshire, there are clinical commissioning groups that have not adopted the new pathway, typically because they have limited capacity to manage service change, other priorities for their communities, and such severe funding constraints that they are focused exclusively on short-term cost reduction rather than longer term improvements in population health. According to Nick Hamilton, a project manager in the East Midlands AHSN, 'We push on open doors. But we don't try to force the pathway on commissioners who have other priorities.'

Ensuring adoption across the whole of England, something which would save thousands of lives at a low cost, would be a major endeavour. Success so far has depended on leapfrogging from one small pot of innovation funding to the next. At present, it is unclear whether the team will continue to receive funding beyond the end of 2017. It is working on web-based resources so that commissioners and providers can learn about and adopt the tool on their own in future.

Physical health checks for people with severe mental illness

People with a severe mental illness die 15 to 20 years earlier than the general population, mainly from natural causes such as cardiovascular disease, endocrine disorder and respiratory failure. In the vast majority of cases, these early deaths could be avoided through timely diagnosis and treatment.

In the early 2000s, Kate Dale, a community psychiatric nurse at Bradford District Care Trust, became increasingly concerned about the physical health of her patients. When she joined the NHS in the late 1970s, she remembered regular physical health checks being carried out for patients in mental health hospitals. But mental health teams now showed limited interest in their patients' physical health, with a prevailing view that this was the responsibility of other services.

Over the 2000s, Kate retrained so that she could take blood, carry out physical health assessments, monitor diabetes, and advise on smoking cessation, weight loss and other lifestyle changes. In two years, she carried out regular health checks for 150 patients on anti-psychotic medication. The initial outcomes were astonishing: large numbers of patients with high-risk cardiovascular scores or undetected diabetes, many of whom had received no previous treatment or support.

For most of the 2000s, Kate pursued a personal mission to improve physical health care for patients with mental health problems. She carried out physical health checks and gave smoking cessation and lifestyle advice across 500 square miles of the Yorkshire Dales – all of this with, at best, the acquiescence of her line managers, and at worst discouragement from those who would have preferred her to stick to the day job. There were no changes to her responsibilities as a community psychiatric nurse and she continued to manage a full caseload.

In 2008, Kate took a secondment to assess the support GPs were offering to patients with severe mental illness in primary care. With support from Dr Angela Moulson, the lead GP for mental health and learning disabilities in Bradford and Kate Beedle, a data quality specialist, she started reviewing the records of 105 patients with severe mental illness in 12 local practices. The results were far from encouraging: none of the 105 patients had received a QRisk2 score for risk of cardiovascular disease or a prolactin test. Only a minority had received cholesterol, triglyceride, glucose or thyroid function tests, all standard and essential tests for people on anti-psychotic drugs and at greater risk of high cholesterol, diabetes and sexual dysfunction.

Over the next few years, Kate worked with a consultant psychiatrist, Dr David Yeoman, along with Angela Moulson and Kate Beedle, to develop a user-friendly template within SystemOne (and later EMIS and RIO) to make it easier to carry out high-quality health checks for patients with severe mental illness.

Practitioners are led through a simple, two-page questionnaire, consistent with NICE guidance and the 'Lester Tool', which prompts them to order the right blood tests; check blood pressure, pulse and respiration; carry out an electrocardiogram and measure body mass index and other interventions. Once this is done, the tool highlights particular health risks, for example calculating a QRisk2 score for risk for cardiovascular disease, and prompting appropriate action such as prescribing statins or providing support for smoking cessation, weight loss or other changes. GPs automatically collect data for their Quality and Outcomes Framework returns.

Having developed the tool, Kate delivered half-hour sessions at 48 of Bradford and Airedale's 80 GP practices in 2011 and 2012 to explain the importance of the tool and how GPs and practice nurses could use it. Uptake was rapid, with 60 of the 80 GP practices using the tool in the following 12 months. There was also evidence of improvement in the quality of GPs' health checks, in particular a 100 per cent increase in patients diagnosed with significant cardiovascular risk. One patient struggling with severe anxiety and depression received a standard thyroid test for the first time, revealing hyperthyroidism. Two years later, she was free of depression and living a happy life.

Following these successes in primary care, Kate returned to Bradford District Care Trust where she supported the establishment of physical health and wellbeing clinics in Bradford's community mental health teams and use of the

physical health checks template for inpatients. In line with NICE guidance, all patients who start anti-psychotic treatment are referred for physical health checks and monitoring until they return to primary care. This has led to substantially higher levels of attendance at health checks than was the case when patients were routinely referred back to their GPs. The trust needed to train mental health nurses to oversee the service and new associate practitioners to run the physical health and wellbeing clinics, perform blood tests and electrocardiograms, give advice on lifestyle and smoking cessation and make appropriate referrals.

In 2015, the Yorkshire and Humber AHSN put in place a project team and provided funding for further development of the template and more extensive implementation in West Yorkshire. For example, it funded Kate to support initial implementation at new sites such as South West Yorkshire Partnership NHS Foundation Trust, where she has supported adoption within one major clinic and trained trainers who are now supporting adoption on ten more sites. The AHSN has also developed an e-learning module to support adoption.

At the same time, the AHSN has been building the evidence base on the effectiveness of the tool. Overall, organisations that use the tool are more likely to carry out health checks for patients with serious mental illness, more likely to carry out effective health checks with the right tests, and more likely to take appropriate action, for example prescribing statins or advising on lifestyle choices. One pilot site saw a fourfold increase in the number of health checks completed after introduction of the template.

At the same time, this tool, like others, is only as good as the system using it. Overall improvements in health and wellbeing clearly depend not just on initial diagnosis but on the effectiveness of multiple, interrelated services and interventions to respond to patients' needs. Like other innovations in this study, the introduction of effective health checks is having a domino effect, requiring changes to staff roles, new services to respond to previously neglected patient needs, and continued testing and experimentation as refinements are made. There is unlikely to be the same type of evidence as for a new drug since the product is ill-defined and constantly adapting.

As for Kate, she describes herself as a dog with a bone for close to two decades. Even now, she depends on securing small funding allocations from clinical commissioning groups to take the template to new sites. Allocations of funding have been promised and then withdrawn. However, the North East and North Cumbria AHSN has recently committed to funding implementation in its region, with other AHSNs actively considering funding the scheme.

ESCAPE-pain programme for hip and knee pain

More than 8.5 million people in the UK suffer from chronic joint pain. In many cases, patients are diagnosed with osteoarthritis in early old age, when they are particularly vulnerable to rapid deterioration in health and loss of

independence. Without adequate support, many enter a vicious cycle of severe pain, leading to prolonged rest, which contributes to further muscle weakness, physical instability and fatigue. Inactivity increases the risk of co-morbidities such as diabetes and cardiovascular disease. Meanwhile, pain and disability can contribute to social isolation, feelings of helplessness and anxiety, and depression. In the worst cases, people are losing their independence and suffering dramatic deterioration in their quality of life decades earlier than necessary.

In the early 2000s, Mike Hurley, a professor and physiotherapist at King's College London, and later at St George's University of London, became increasingly concerned about the care of these patients. Many were managed in primary care, with high reliance on painkillers, typically non-steroidal anti-inflammatory drugs, despite their limited long-term effectiveness and the risk of side effects. Only a small proportion received short, one-to-one physiotherapy courses with the focus on exercises to improve muscle strength and endurance. However, even these patients received little practical support to help them learn to manage their conditions on their own.

With a research grant and funding from Arthritis Research UK, Mike spent most of the 2000s developing an alternative approach. His aim was to develop a programme that challenged patients' common belief that arthritis was an inevitable and untreatable consequence of ageing, convince them of the key role of exercise in improving their symptoms (despite the counterintuitive experience that exercise makes things worse, at least in the short term) and empower them to manage their conditions, while at the same time providing a tailored exercise regime.

The result was the ESCAPE-pain programme, with ESCAPE standing for enabling self-management and coping with arthritic pain through exercise. The course is run by physiotherapists for eight to ten patients who meet twice a week for ten to twelve sessions. The programme includes a combination of education, self-management and coping advice with physical exercises. During the sessions, patients share experiences and take stock on changes in their conditions since the previous session; set and review goals and action plans; engage in themed discussions on topics such as managing pain, healthy eating, and pacing activity and rest; carry out supervised exercises, and agree exercises to do at home. Unlike traditional treatments, the programme focuses on developing people's appraisal and coping skills as much as on their physical function. It does this through allowing them to experience and document improvements and helping them to connect with others as well as through formal education and instruction.

In the mid-2000s, Mike piloted the programme at a small number of sites in South London and North Kent. A series of evaluations demonstrated that the programme is safe and delivers substantial improvements in patients' physical health including their levels of pain and ability to complete physical tasks.

Patients also reported greater confidence in their ability to manage their pain and other symptoms and lower levels of anxiety and depression. It also reduces other health care costs through reduced use of A&E services, referrals, diagnostic tests, analgesics and other medications.

These assessments do not, of course, capture the full benefits of the programme. One patient described suffering with constant pain, being reliant on painkillers and being hardly able to walk before the programme. After the course, she was happier and more self-confident. Simply knowing that she could take practical steps to improve her condition made it easier to cope. She was spending more time out with friends and was able to play with her grandchildren.

By the late 2000s, Mike had demonstrated the impact of the programme through a series of clinical trials. An independent assessment showed that the programme delivered comparable outcomes to one-to-one physiotherapy at half the cost. Nevertheless, Mike hit a 'brick wall' when the funding for the initial pilots ended in 2008. Only one centre in North Kent decided to retain the service. He continued to raise awareness of the new model at conferences and in academic journals, but with little effect. By this point, he was seriously considering a change of career. In his own words, 'What was the point in dedicating a decade to research if it was just going to sit on a shelf?'

Mike is convinced that the programme would have folded if it hadn't been for a call from the chief executive of the newly created Health Innovation Network, the AHSN for South London, in 2013. The Network had selected musculoskeletal care as one of its initial priorities and saw ESCAPE-pain as a potential 'quick win', a proven, low-cost innovation that could be adopted quickly at scale.

From 2013, Mike joined the AHSN as a part-time clinical director with a small team to support him in marketing and implementing the scheme. Mike and Andrea Carter, the Director of the Network's musculoskeletal programme, focused on persuading senior clinicians to trial the scheme, relying largely on personal contacts. Meanwhile, the team synthesised the research evidence and developed materials to explain the programme to commissioners and managers.

Mike and the team established ESCAPE-pain on a permanent basis within King's College Hospital and Lewisham Hospital, with these becoming early champions and showcase sites. Over the next four years, they persuaded 10 of the 12 CCGs in South London to adopt the programme, as well as establishing it in Kent, Mid Sussex and individual clinical centres across the UK. It is also being established through collaborations with the North West AHSN and the North East and North Cumbria AHSN, an example of how the AHSNs are working collaboratively to spread innovations.

One of the main benefits of ESCAPE-pain is that it can be put in place quickly at low cost using existing staff and facilities. Organisations pay a small fee to send their staff on a half-day training course. The Network requires providers to adhere to a number of minimum standards on the content and duration of the programme (there were battles with commissioners who wanted to shorten the programme to reduce costs) and to collect and share data on outcomes.

Nevertheless, Mike explained that one of the greatest challenges was persuading commissioners and providers to make small upfront investments to secure longer term benefits. It was particularly difficult to persuade a fragmented commissioning system to contract for the new service, particularly where commissioners were disconnected with providers. It was easier to make progress in areas where providers were funded through block grants and had greater flexibility to adapt services, without the need for changes to funding arrangements or the details of contracts.

Similarly, the team encountered difficulties in persuading commissioners and providers to invest in the service since benefits would be felt by other organisations, for example taking the pressure off primary care. Some providers operating under payment by activity were concerned that investments in prevention would reduce demand for remunerated services. According to Mike, 'Sometimes they could hear the madness as they articulated these concerns'.

The team's current focus is on introducing ESCAPE-pain in new environments, so that people can access services more easily and patients are able to continue group-based activities after their NHS treatment ends. In particular, the team has developed a new training course, accredited by the Royal Society of Public Health, which allows exercise professionals to lead the programme in leisure and community centres. They have introduced the programme at leisure centres in Camberwell, Peckham and Brixton. The Health Innovation Network team has recently secured a large grant from Sport England to spread the programme in leisure and community settings.

Secure text messaging with school nursing teams

Children and young people are at high risk of suffering a broad range of health and social challenges including sexual health problems, drug and alcohol problems, stress, anxiety, bullying and abuse, with a doubling in numbers of children self-harming or with depression in the past 10 years. At the same time, they are less likely than others to seek help from health and care services when needed, often because of lack of awareness of services, concerns about trust and confidentiality, or shame or embarrassment about their conditions.

In 2012, a group of school nurses in Leicestershire Partnership NHS Trust approached Jimmy Endicott, a manager in the trust's communications team,

for help to improve access to their services. All of the children and young people in their schools had mobile phones, which they used to manage almost every aspect of their lives. But when it came to the NHS, the only available option was to schedule a face-to-face meeting. They wanted to allow children to access help quickly and easily on their phones, but they needed to do this safely, ensuring that all calls were answered, taking swift action for children with severe challenges, keeping an audit trail and protecting confidentiality.

Jimmy put a business case to the trust's senior management team and secured agreement to work with the school nurses as a full-time project lead, as well as initial funding for the project. The director of the trust's families, young people and children's services chaired a project board to oversee the work. Over 2013, Jimmy worked with the school nursing team and a software developer to design a simple text messaging service for the children.

The result, 'ChatHealth', is a web-based application that supports safe and secure messaging between health care staff and service users. Children use a single hotline number or smartphone app to send messages. Staff log onto a secure online portal to view, forward, share or respond to messages. The system sends automatic responses to confirm that messages have been received, signposts alternative help out of hours, notifies staff when action is needed, keeps a track of messages that have been answered or remain unanswered and retains a record of conversations. It provides a mechanism for staff to manage their availability and their caseload and to share cases within teams.

From 2014 to 2015, Jimmy piloted ChatHealth at the trust's school nursing services, which cover 65,000 children and young people in Leicestershire and Rutland. It was implemented easily and delivered immediate benefits. In particular, school nurses started to receive around 100 additional requests for support each month. This included a substantial increase in first-time users and contacts from adolescent boys, who were previously less likely to access face-to-face school nursing services than girls. ChatHealth also provided a simple mechanism for children to contact school nurses during school holidays. Children explained that they were much more likely to send text messages than to ask for face-to-face meetings for advice on sensitive issues such as anxiety, relationships or sexual health problems.

Having successfully established ChatHealth across the trust's services, Jimmy and his team secured funding from NHS England and the East Midlands Academic Health Science Network in 2015 so that they could establish ChatHealth across the country. This meant that they could continue to maintain a small team to market and implement the service. It also meant that they could access advice from the AHSN on issues such as intellectual property, marketing and commercial development of the service.

Over the past two years, the team has supported adoption of ChatHealth within community nursing teams in 27 trusts across the country serving more

than one million children and young people. They have achieved this through showcasing ChatHealth at testbed events and conferences, actively approaching large numbers of community service providers to persuade them of the benefits, providing hands-on support for implementation and attractive pricing. Organisations pay a licence fee to cover the costs of maintaining the service, but the trust does not seek to generate a profit.

School nurses have explained that introducing ChatHealth has led to other beneficial changes in how they deliver their services. In the past, individual school nurses responded to small numbers of ad hoc queries from children while managing their face-to-face appointments. With ChatHealth, the nurses typically take turns in responding to the team's messages, making it easier to respond quickly and making good use of staff time. The teams can manage greater numbers of inquiries with existing resources, while making it easier to offer timely face-to-face discussions for those who would most benefit.

Some teams are now using ChatHealth as a route for helping children access other services and as a mechanism for linking together health, social care, police and others with an important role in protecting children. Others are using ChatHealth to share information with children on sexual and mental health. Meanwhile, the ChatHealth team is extending the service so that it can be used by health visitors, mental health teams and social services.

One particularly striking feature of the project is the relative speed of progress from identifying the problem through to developing a new project and implementing it across multiple sites. It is possible to point to a number of unusual features of the project which might explain this: the chief executive and senior management of the trust had an interest in and prior experience of supporting innovation; staff at the trust were able to access someone, in Jimmy, with specific commercial and project management skills for support; staff were able to access quickly the small amounts of funding needed to put in place a dedicated project team, rather than attempting to set up the project in their lunch breaks; NHS England and the AHSN stepped in quickly to support wider implementation, without the delays encountered in other projects.

Jimmy suggests that the initiation of the project by frontline staff and the development of ChatHealth within an NHS provider had advantages. Staff worked with external parties to develop a simple, low-cost system that fits seamlessly with existing services to meet a defined need. It is possible that NHS organisations find it easier than private firms to access senior decision-makers in other NHS organisations and to convince them of the benefits of new services. Conversely, NHS organisations were less well placed than private firms to market new services actively and to scale up to support implementation.

Nevertheless, Jimmy emphasises the time and effort needed to support widespread adoption, even for relatively simple, proven services that fit

smoothly with existing systems: 'We aren't able to have a single conversation with school nurses across the country about adopting an effective model. Instead we have to knock on doors one at a time. We spend a lot of time out on the road, meeting people, convincing them of the benefits of the system and then training them to use it.'

Improving diagnosis and treatment for atrial fibrillation

Around a million people in the UK suffer from atrial fibrillation, an irregular heartbeat associated with coronary heart disease, which causes dizziness, tiredness and shortness of breath. Without appropriate treatment, people with atrial fibrillation are up to five times more likely to suffer strokes, with the risk of severe disability and early death. In 2014, NICE estimated that around 250,000 people in the UK have undiagnosed atrial fibrillation. Meanwhile a huge proportion of those who have been diagnosed are not receiving the correct anti-coagulation medicine to prevent stroke. Based on these numbers, better diagnosis and treatment could prevent around 7,000 strokes, avoid more than 2,000 people suffering severe disability, and prevent 2,000 premature deaths each year.

In 2014, the Innovation Agency (the AHSN for the North West Coast) launched a major programme to improve diagnosis and treatment for people with atrial fibrillation, with the aim of cutting the region's higher than average number of strokes each year. This has included a particularly wide range of projects including awareness-raising campaigns, support for the introduction of new mobile technology, the implementation of a more effective stroke prevention pathway, and rigorous benchmarking of local systems' performance in improving outcomes.

As Julia Reynolds, Head of Programmes, explained, the initial challenges were to raise awareness of the problem and support more effective early diagnosis of atrial fibrillation. The team ran public-facing campaigns with charities and other partners and events for clinical staff to raise awareness of the importance of checking for abnormal heart rate. It also invested in introducing new, relatively low-cost diagnostic tools, MyDiagnostick and the Kardia AliveCor, into 150 GP practices and community services so that they could rapidly and accurately identify irregular heart rhythm in the community. In a single year, this potentially enables 180,000 new screenings that may have prevented 70 or more strokes per year, with savings of £1,680,000 in NHS and social care costs.

Since then, the team has pursued opportunities for a broader range of services to check people's heart rate in different settings, including pharmacies and adult social services. In one area, the clinical commissioning group is training the fire and rescue service to carry out heart-rhythm checks as part of their 'safe and well' visits, which focus on helping older people prevent domestic fires. So far, more than 1,000 screens have been carried

out with 29 people identified with irregular pulses, potentially avoiding one to two strokes this year. In total it is estimated that the Innovation Agency has prevented around 256 atrial fibrillation-related strokes since it started its work in 2014.

As part of the programme, the Agency has worked closely with more than 25 external partners including pharmaceutical firms, charities and clinical bodies. For example, it has secured more than £250,000 in match funding from pharmaceutical firms and device manufacturers that have an interest in effective diagnosis and adoption of good treatment practice. As Julia explained, some NHS organisations in the region were nervous of partnership working with private providers, in particular for fear of creating conflicts of interest. The AHSN played an important role brokering and overseeing these alliances between private providers and NHS organisations so that the NHS could benefit from financial support and expertise from the private sector while managing perceived risks.

With increasing numbers of patients diagnosed with atrial fibrillation, a second major challenge was to improve treatment and address variations between services, in particular ensuring that people were taking the right doses of anti-coagulation drugs and that their blood clotting times remained within an appropriate range. While warfarin is a cheap and effective anti-coagulant, patients respond differently to the drug, in part because of adherence to their medication plan, lifestyle choices and genetic make-up. Part of the AHSN's approach has been to support a new commissioning toolkit and pathway for treatment of atrial fibrillation, with the focus on using available technology and making better initial routine assessment of patients with atrial fibrillation, better approaches to calibrating warfarin doses, use of alternative drugs for some patients, and more effective support for patients to manage their conditions on their own. It has also shared with GPs the North East and North Cumbria AHSN's Atrial Fibrillation Card Deck, a user-friendly guide to effective management of atrial fibrillation in primary care.

For Julia, there is an important role for awareness-raising activities and investment in materials that synthesise the evidence and explain good practice. However, there also needs to be active engagement with clinicians to persuade them of the need for change and win them over to new approaches, and practical support for providers to make purposeful changes to systems and processes, 'Otherwise, there is a risk that only the most "sticky" innovations get adopted or only the most enthusiastic individuals are able to introduce them effectively and sustainably.' (As Julia notes, the publication of NICE guidance in 2014 was not, in itself, sufficient to drive rapid changes in how services are delivered.)

As the programme has developed, the Innovation Agency has therefore provided hands-on support to make it easier for providers to improve care pathways. For example, it is working with a collaborative of clinical

commissioning groups and more than 100 GP practices in Cheshire and Lancashire to implement changes to preventive services for people with atrial fibrillation. In doing so, it is drawing on the West of England's quality improvement programme, 'Don't wait to anti-coagulate', which includes tools for assessing performance and testing changes to anti-coagulation services. Alongside this, the Agency has adopted the Greater Manchester AHSN's Atrial Fibrillation Data Landscape Tool, which brings together existing data on service performance and provides a basis for comparing services and identifying opportunities for improvement.

One notable feature of the project has been the degree of joint working across the large numbers of AHSNs that are focusing on atrial fibrillation as a priority. Julia highlighted the opportunities to share learning and adopt tools and approaches developed by other AHSNs, while individual AHSNs remained responsible for supporting implementation in their regions, drawing on strong links with local organisations and their understanding of the local context.

Like other interviewees, Julia emphasised the challenges of supporting adoption and spread of innovation in highly fragmented local systems. It was particularly difficult to make rapid progress when she needed to engage with individual clinical commissioning groups and providers. Conversely, it was possible to work much faster when there were established forums bringing together commissioners and the providers of specific services across the region, particularly if there was a degree of shared governance and administrative infrastructure to set shared objectives and monitor progress. The partnerships responsible for delivering the two sustainability and transformation plans for the North West Coast might provide a basis for making progress across the whole region in future.

Like other projects we looked at, the Innovation Agency's atrial fibrillation programme is fast moving and continuing to evolve. Current projects include genotype-guided dosing for patients using warfarin in anti-coagulation clinics so that they can be prescribed the right dose of warfarin or consider alternative drugs faster if a sensitivity is identified. The AHSN is also exploring scope for patients to play a more active role in monitoring their conditions. (There is evidence that supporting patients to monitor their own blood-clotting times helps to improve management of the condition and their time in therapeutic range). This means that the evidence base needs to evolve too, and much more quickly than it is currently. The Innovation Agency is evaluating the impact of introducing new diagnostic tools, genotype-guided dosing, and self-monitoring as well as other digital innovations.

Age UK care co-ordinator roles

Older people with long-term conditions often face a bewildering array of disconnected services rather than joined-up, holistic care. In many cases, older people with a broad range of physical health, mental health and social care needs receive unco-ordinated, sometimes conflicting care, with substantial gaps, rather than personalised support. In the worst cases, and there are many of these, older people shuttle repeatedly in and out of hospital, with no sustainable plan to keep them fit and well, leading to rapid deterioration and a loss of independence many years earlier than necessary.

In 2012, Age UK decided to use its skills and resources to support the health and care system in addressing these problems. The idea was to use Age UK staff to co-ordinate disparate health and care services for vulnerable older people, with a focus on providing holistic packages of care and joining up the support available from health and care services, charities and volunteers.

The first phase of the project was a pilot care 'personalised integrated care programme' for older people in Cornwall. Age UK worked in partnership with general practitioners, community teams and social services to stratify risk in the population and to identify a group of older people with multiple long-term conditions who were at particular risk of unplanned hospital admission. A trained Age UK care co-ordinator held a series of structured conversations with older people on the programme to understand their personal goals, the challenges they were facing, and the type of support they most needed, before working with other services (GPs, practice nurses, social services and others) to develop tailored care plans. Participants received three months of intensive support to help them regain independence, often including some health and care services, support from volunteers, connecting with other older people facing similar challenges and joining community groups. When the programme ends, they are able to keep in touch with care co-ordinators and are encouraged to maintain links with volunteers and the services they have been introduced to when the programme ends.

The results from the Cornwall pilot were dramatic. There was a 26 per cent reduction in emergency hospital admissions for participants, a 5 per cent reduction in elective hospital admissions and, despite the focus on identifying and addressing unmet needs, an 8 per cent reduction in social care costs. Participants reported an average 20 per cent improvement in their wellbeing, with 20 per cent going on to become volunteers themselves. The programme also provided a catalyst for health care, social care and voluntary sector services to work together in effective partnerships.

With such positive evidence from the initial pilot, Age UK was eager to extend the programme to a larger number of sites. The financial offer was extremely generous. Age UK was offering to make a substantial investment, asking only for match funding from health and social services. Nevertheless, it struggled

to make contact with commissioners and identify localities that were well placed to adopt the programme.

In 2015, Kent Surrey and Sussex AHSN joined forces with Age UK to help address these barriers. It saw an opportunity to help in raising awareness of a successful programme, identifying clinical commissioning groups and localities that would be interested and have the capability to test the programme and establish local partnerships, and developing commissioning cases for the programme.

Over the next two years, Age UK recruited 14 more sites. It put in place a number of processes to ensure that commissioners and providers were committed to and ready to make a success of the programme, including requirements to establish a partnership across health and social care, to sign an agreement on how the partnership will work together and to provide some match funding. A key commitment is for each of the partners to participate in a monthly board meeting to co-design the service and monitor performance.

During the initial stage of the projects, the Age UK team works with commissioners and providers to adapt the scheme to the local system. There are a small number of essential components that need to be retained across all sites, for example risk stratification, the structured conversation that care co-ordinators hold with participants, regular multidisciplinary team meetings, and a common performance management and outcomes framework. Beyond this, there is considerable scope to flex the programme to fit with existing services. As the programme has expanded, an important development has been the establishment of a learning forum that brings together the care co-ordinators and partners from all of the sites to compare performance, discuss the challenges they are facing and share ideas about how to make improvements.

As the pilots have expanded, Age UK and the Kent Surrey and Sussex AHSN have continued to measure the impact of the programme. The new pilots in Kent, Surrey and Sussex have demonstrated improvements in participants' wellbeing and reductions in use of hospital services comparable to the original pilot in Cornwall. There is evidence that the programme achieves a 600 to 700 cost reduction per participant for the NHS, in addition to the reduction in social care costs. Research by the London School of Economics suggests that £1 invested in the programme delivers £4 in benefits. The Nuffield Trust is completing a large study tracking the impact of the programme for patients over several years.

Care co-ordinators and multidisciplinary teams are now becoming more common in health and social care, with a range of alternative approaches. One of the challenges the team faces is persuading commissioners and providers to adopt their programme rather than alternative models. Perhaps the most striking features of the programme, in comparison with others, are the use of people outside the health and care system for the care co-

ordination role, the greater focus on individuals' overall wellbeing than typical in health and care services, the primary role of non-medical support, and the use of a wide range of low-cost, but hugely beneficial, services to help people regain independence.

For many participants, the most important benefits of the programme were getting help to walk the dog, regaining confidence to go shopping, being taken out to tea, making friends, and reconnecting with their communities. A key feature of the programme appears to be addressing isolation and disconnection as an underlying cause of health and social care challenges, rather than simply addressing the physical and mental health consequences. One GP mentioned a couple who had not left the house for six months before the programme. It was these issues that, as he saw it, the statutory health and social care services were failing to pick up.

As the pilots are ending, commissioners are considering whether to commission Age UK's care co-ordinators on an ongoing basis. One site in Kent has done so, a small number of sites have decided to incorporate principles from the programme into alternative services and other decisions are pending. Despite the convincing evidence of effectiveness, securing small amounts of funding for a low-cost new service remains a substantial challenge.

Emergency department checklists

Across the English NHS, emergency departments are coping with increasing demand, an ageing population with increasingly complex needs and a shortage of inpatient beds. Facing a national workforce shortage, they are increasingly reliant on locums and non-specialist staff. The pressures on emergency departments reach a peak during winter, with overcrowding, patients being managed in makeshift overflow areas, and insufficient staff numbers for the volume of patients being seen. During these periods, there is an increased risk that staff fail to monitor and treat patients appropriately. As a result, patients have been allowed to deteriorate, leading to more severe illness, prolonged hospital stays and, in some cases, avoidable deaths.

In 2014, Emma Redfern, a consultant in emergency medicine at University Hospitals Bristol NHS Foundation Trust set about finding a solution to these challenges. She started with a review of serious untoward incidents in the trust's emergency department from 2011 to 2014, which revealed basic failings in the provision of care in periods of overcrowding. Patients with chest pain had not received regular electrocardiograms to ensure treatment for heart attacks; patients with Parkinson's disease had not received appropriate drugs rapidly, leading to lengthy, unnecessary hospital stays; patients with sepsis had been allowed to deteriorate significantly before action was taken.

Emma's response was to develop a simple checklist of tasks that had to be completed for every patient who presented to the emergency department,

whether the department was experiencing overcrowding or not. The purpose was to provide guidance for staff who were not used to working in the emergency department and to ensure that no essential tasks were missed, even during busy periods. For example, it included checking that vital signs are measured on admission to the department, completing an early warning score to identify high-risk patients, taking blood tests, carrying out an electrocardiogram, and continuing to monitor vital signs hourly. It also included specific requirements for stroke, fractured neck of femur, sepsis and other conditions.

The next stage was to implement the checklist within the trust's emergency department. The team ran engagement and teaching sessions with nurses and doctors to explain the process, seek feedback and address their concerns. Experienced nurses were initially offended that they were being asked to confirm that they were carrying out basic tasks. It was important for the team to spend time discussing the trust's performance data and recent incidents to convince nursing staff of the case for change. Nurses were also concerned that the checklist would create more paperwork, leading the team to replace traditional handwritten notes with the checklist.

In a subsequent phase, the team secured funding from the Health Foundation's Shine programme to measure impact and improve the model. They used the grant to recruit a research nurse who would compile baseline data on performance in carrying out the tasks in the checklist and monitor its impact. Over the first six months, this led to refinements such as ensuring that patients received food and drink and that next of kin were informed that they were in hospital.

Following adoption, the trust delivered 5 to 25 per cent improvements in compliance with the different activities on the checklist. For example, there was a 5 per cent increase in patients with suspected strokes receiving a CT scan within an hour; an 11 per cent increase in stroke patients being treated within the appropriate pathway; and a 25 per cent increase in completion of early warning scores and hourly vital signs monitoring. Since introduction of the checklist at the trust, there have been no clinical incidents related to failure or delay in recognising that a patient is deteriorating. However, there was also evidence that compliance rates began to drop once the enthusiasm associated with the new project had died down. As well as instituting the checklist, the team found that they needed to put in place a routine process for senior nurses to review a sample of notes from the day and feedback problems to colleagues.

Since 2015, Emma has been working with a team from the West of England AHSN to ensure adoption of the checklist across the region. As Emma explained, organisations need to invest between £15,000 and £18,000 to implement the checklist effectively. The main cost involved is allocating staff to collect baseline data on the emergency department's performance, collect

new data as the checklist is introduced and provide feedback on the impact to staff every six weeks. The West of England AHSN has provided this funding for adoption of the checklist in the region's seven emergency departments and within the ambulance service. The national bodies have also played a useful role in raising awareness of the toolkit, including through a case study on NHS Improvement's website.

As Emma explained, some of the adopting sites made rapid progress in developing the checklist. Others needed more active encouragement and support; at these sites, it was particularly important to collect data and for senior staff to make the case for change to their colleagues. One unit was unconvinced of the need for the checklist and only engaged actively after a series of serious incidents highlighted the need for improvement. The team had also helped sites to adapt the checklist to local challenges, for example, introducing new requirements and key performance indicators to address specific problems highlighted by complaints or incidents.

In addition to supporting adoption, the AHSN has created a network for the seven sites and the ambulance service to benchmark progress and share learning. The consultant leads, nursing leads and data collectors for each of the sites meet annually and join a conference call every six weeks to share information on challenges they are facing, approaches they are testing and performance data. In the past, there had been a high degree of rivalry and unwillingness to learn from neighbouring sites. The collaborative is helping to develop a more collegiate relationship, with each of the sites recognising that they can support and learn from others.

Where AHSN support was not available, it was very difficult for sites to find the funding needed to deliver the project. This was despite the fact that the actual amount of funding was extremely small, the benefits for the adopting organisation were significant, and the impact was seen almost immediately. There were few emergency departments in a position to release staff from operational duties to support the project. From October, it was usual for trusts to cancel study leave, cancel meetings and pull any staff working on other issues back into service delivery. A number of consultants at trusts outside the West of England had planned to implement the checklist but were unable to secure funding to do so.

In addition to supporting the seven sites, the West of England AHSN has supported the development of a toolkit that other emergency departments can use to adopt the checklist. This should help sites with access to resources and improvement capability to apply the toolkit in a systematic way. However, Emma was sceptical about how many sites would be able to do so on their own, even with publicity on the need for improvement and the benefits of the model. 'The problem is that emergency departments are fire-fighting all of the time and unless somebody goes to help them, it is unlikely that they are going to pick this up.' She was in discussion with three other

AHSNs that were considering whether they could support adoption in their regions.

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