Physical and mental health

Health and Wellbeing Innovation Commission Inquiry

Health and care
Carers
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Social care
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This report outlines key findings from a Health and Wellbeing Commission Enquiry, conducted by ILC, supported by EY and Audley. This report is one of four reports drawing together findings from evidence sessions held by the Commission during 2018.

In our mental and physical health session we examined the potential for innovations which directly impact mental and physical health. We found there are significant gains to be made by increasing the rate of development, incubation and spread of innovation in this area.

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Executive summary

The benefits of innovation include improved quality of care, enhanced patient outcomes, and cost efficiencies. However, there are challenges to realising the potential of innovation in this area – and particularly in relation to moving from development to roll out and scaling.

We identified innovations right across the care pathway. In the area of **prevention and early diagnosis** we found examples of simple and effective innovations that could deliver positive outcomes at relatively low cost. For example, falls account for a significant proportion of avoidable hospital admissions, but sensor technologies offer the potential for delivering low-cost and easy to implement falls risk assessments.

Innovation can also play a role in nudging individuals towards positive health behaviours and in identifying at-risk cohorts early on so that resources can efficiently be directed on ensuring that these groups receive the best possible early interventions and care.

For those already living with long-term conditions, there is also huge potential or innovation to support **self-management**. There were 15 million people in England living with long-term conditions in 2012 and this number is going to continue to increase. Innovative approaches include developing the role of pharmacies to take some of the strains away from GPs, or creating tools through which individuals can access advice and support to enable them to manage their conditions themselves. The Commission heard about Ask NHS – an app designed to allow individuals to check their symptoms, book appointments and find services.

The Commission also identified potential for innovation in **primary care** to reduce currently unsustainable demands on GPs. One potential area for development is in bringing together primary care professionals such as dentists and opticians alongside general practitioners nurses and others to reduce inefficiencies in the system. For example the Commission heard from Nailsea District Leg Club, which brings together a wide range of stakeholders and partners to support people living with leg conditions to manage

their conditions and reduce social isolation. Initial assessment is provided by a nursing team, which is followed by weekly support.

There is also a need for new ways of working in **secondary care** where current systems are under significant strain. Emergency care services often reflect the stresses on the system and in the last 5 years attendances at major A&E departments have increased by 7.9%, with an extra 3,000 people attending each day.[1]

Innovations are desperately needed across all elements of secondary care from delivery of urgent and emergency care to elective treatment to commissioning. One example where this has happened is the partnership between DeepMind Health, Moorfields Hospital, UCL, and Institute of Ophthalmology which has announced a five-year partnership to explore the use of an AI system which can make referral decisions for over 50 eye diseases. Innovation can also support the management of patient flows through hospitals, and improved interactions between all elements of the health and care systems.

While there are significant opportunities for innovation to drive improvements in the everyday lives of patients, and cost savings for the health system, there are a number of barriers to their development, incubation and adoption:

Barriers

- While the health and care systems have got better at stimulating innovation, **roll-out, scaling and diffusion** remain more challenging due to the dispersed nature of commissioning across the health system and the lack of a defined mechanism for replication

- The localised commissioning of health care, via CCGs, can result in the **inconsistent** acceptance of new innovations at local levels, and thus can be challenging for innovators.

1 Carl Baker (2018) House of Commons Briefing Paper, NHS Key Statistics: England, May 2018. Accessed at: http://researchbriefings.files.parliament.uk/documents/CBP-7281/CBP-7281.pdf

- The health sector is generally **risk-averse** and is not culturally attuned to supporting innovation, and learning from failures

- The NHS's **procurement procedures** are complex and can be highly challenging to navigate for anyone new to the sector.

- Proving the safety, effectiveness and cost-effectiveness of a new innovation in health can be both difficult and costly, and **burden of proof** is often excessive, with commissioners often rejecting innovations which are not backed by randomised control trials (RCTs), even when interventions are ill-suited to this kind of evaluation

- The **lack of interoperability** between NHS systems is a significant challenge for innovators. Different parts of the health and care system continue to work in silos without speaking to one another, and this creates challenges for innovation

- Despite a significant policy-drive towards innovation, little progress has been made. Policy-makers need to focus on creating clear and actionable **policy frameworks** and guidance, and supporting local areas and commissioners through longer-term funding and commitments.

- The NHS has created culture in which piloted innovations must prove their worth in increasingly short **timeframes** in order to be adopted. Funding through programmes such as Vanguards often require programmes to generate results on unreasonable timescales and, as a result, promising innovations are stifled before they have time to flourish.

- The uncertainty created by **Brexit** about the UK's ability to attract and retain promising innovators, as well as high-performing clinical staff, may present challenges.

Nevertheless, there are opportunities:

- There is significant and growing **engagement** with the need for innovation across policy makers, clinicians and wider commentators.

- Similarly, mechanisms such as the STP process are driving increasing **collaboration** which has the potential to smooth the pathway for innovation

- There are many **opportunity areas** for innovation, with real opportunities to generate cost-efficiencies and to promote more effective working styles.

- The 15 Academic Health Science Networks (**AHSNs**) are growing in strength and are already playing an important role in pioneering the spread and adoption of healthcare innovation.

- There are opportunities for the UK to learn from experiences and developments in **other countries**, such as the FDA's Pre-Cert Pilot Program in the US which is intended to support more rapid adoption of developments in digital technology.

- There is huge potential to drawing **patient advocates and professional membership bodies** in to the innovation process – to ensure that innovation is informed by lived experience.

- The **Industrial Strategy** promises increased GDP funding for R&D and sets out a strategy for developing homegrown innovations.

- Algorithmic decision-making and **big data** are creating new opportunities for rapid innovation across the health and care system

- The gradual development of **national IT infrastructure** offers a supportive environment for the wider roll-out of technology.

Recommendations:

- It is vital that the health system develops mechanisms to celebrate and reward scale up and diffusion, not just innovation

- The health system needs to develop better mechanisms for weighing up and managing risk to more effectively support innovation and experimentation

- We need to break down the real and perceived barriers (e.g. around data protection) to the development of consortia across the statutory, third and private sectors to support innovation

- We need to change the conversation around innovation and innovators – so that increased demand on the NHS is seen as an opportunity not a burden, and start ups and SMEs feel welcome to become part of the solution

- We need to provide further support for start-ups and SMEs innovating in health, in particular with regard to supporting them develop appropriate evidence of impact

- It is important that the health system considers not just the clinical effectiveness but also the usability of interventions. Patient voice will be vital in this regard

- The health system needs to do more to implement the learning from previous policy initiatives and to drive policy into action

- The Government must make a long term commitment to innovation – avoiding short term initiatives

- We need to align digital platforms across the health and care systems to facilitate better communication and data sharing

- We need greater honesty about the fact that innovation and change will have implications across the system – including for structures and staffing – we need to plan for these.

- The Government must ensure that it invests appropriately in innovations to support back office functions, structures and systems. It is important to recognise that some of the most effective innovations are the least 'glamorous'

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1. Introduction

ILC's Health and Wellbeing Innovation Commission Inquiry, supported by Audley Group and EY, has been built around four evidence sessions, designed to reflect the range of settings for health and wellbeing innovation: retirement communities and care homes, the built environment, physical and mental health, and social connections.

Our third Commission Inquiry session focussed on physical and mental health. Plans to ensure the sustainability of our health and care systems over the coming years focus frequently on the potential for innovation to improve quality of care, enhance patient outcomes and create cost-efficiencies. Expectations are high about the gains that can be made from physical and mental health innovations, and there is considerable pressure for this work to be adopted and embedded at pace and scale.

This paper discusses the policy context framing these expectations, the different entry points for innovation to the health system, examples of new ideas, and the barriers and opportunities for further embedding a culture of effective innovation into our health and care systems. The paper concludes with a set of actionable recommendations designed to support improved delivery.

Throughout the session, three primary questions formed the basis of the line of inquiry:

- What does 'good' innovation look like in physical and mental health, where do we find it, and how is it characterised?
- How do we stimulate innovation in health and wellbeing within these sectors where there are limited or early stages of innovation?
- What resources underpin the development and diffusion of innovation, considering individual, state and industry responsibility?

Evidence for this report is drawn primarily from the Commission Inquiry session and a review of the relevant literature.

2. Setting the scene

Innovations and emerging technologies can be utilised to improve physical and mental health across the life course, with the potential to offer a range of opportunities, valuable both to the individual and to the health system more broadly. These opportunities include:

- Offering new therapies and treatments, both to improve current provision and to make possible the treatment of previously untreatable conditions
- Decreasing unit costs of treatments
- Improving patient lifespan and quality of life
- Improving patient independence
- Creating system efficiencies and improving workload balances
- Creating high-skilled jobs and improving productivity

Part of the challenge of realising the potential of innovations is in streamlining the process from the idea's inception to embedding it into the system. Ensuring that effective pilots are adopted at both pace and scale has proven challenging for the NHS in recent years.

Government policy has focussed on providing adequate structure and funding for innovation in the health sphere, with a range of programmes and initiatives designed to promote innovation, support innovators and enable the embedding, monitoring and evaluation of new innovations in the NHS. For example, NHS England's (NHSE) Innovation Roadmap (2015) was designed to support individuals and organisations in understanding how to navigate the often-complex layers of affiliated organisations, processes and funding sources. Other key publications and their implications are outlined in further detail below.

Increasingly, innovations aim to support individuals to manage, as appropriate, their own health conditions and to prevent the emergence of preventable conditions. This will be crucial to sustaining the health and care systems over the coming years, in order to keep demand on the system in check and manage expectations of provision. Innovations are required across the system, to generate changes in workforce, clinical practice and commissioning. Without a step-change in ways of working, and making fuller use of technology as a means to augment healthcare provision, the health system will struggle to meet the challenges posed by our ageing population.

Policy context

The policy environment has called for innovation in physical and mental health over many years, yet the sector is in many ways defined by inaction. Despite a series of well-written and heavyweight policy papers on innovation, delivery has not been as forthcoming as anticipated.

As will be discussed in this paper, the relative inertia in implementing policies of the past decade is the reasons behind the relative inertia in implementing policies of the past decade are complex, but suggests a sector held back by the practical realities of delivery, the challenges inherent in designing practical and flexible policy, and the struggle of successive governments to maintain commitments, backed with adequate funding, in this space.

It will be crucial for future policy to focus above all on being actionable. Recommendations should be constructive and workable, building consensus with what has gone before, promoting consistency in approach and rewarding that which has been proven to work in practice. As argued in the Commission session, the focus should not be on 'reinventing the wheel' but on delivering the fundamentals required to further welcome and embed innovation in this sector. The below provides a brief overview of some of the key policies in this space over the last decade.

NHS Next Stage Review (2008)

The 2008 NHS Next Stage Review announced the development of the NHS's first constitution, designed to help achieve the objectives of improving health through preventative care, enhancing choice and control, improving quality, and promoting innovation through partnership-development (including with industry) and proactive horizon-scanning.

Strengthening the role of the clinician and empowering frontline staff were key to this. Major NHS initiatives and innovations of the past decade were announced, including the piloting of personal health budgets and integrated care organisations. Data transparency and a focus on improving quality and outcomes monitoring were also priorities.

Life Sciences Blueprints 1 (2009) and 2 (2010)

There were a number of ambitious aims within both Blueprints (the former setting out aims and the latter focussed on key deliverables). Fundamentally, both Blueprints outlined a more active role for the NHS in cultivating innovation. For instance, this included the NHS working more closely with NICE and innovators to allow selected medicines to be available on the NHS more quickly.

In addition, the Blueprints called for cooperative working patterns and enhanced research and development, so that early innovations could be supported, and thus adopted at a much faster rate. This was coupled with a significant level of investment through investment schemes. Ultimately, the Blueprints saw the NHS as a body that should be an active player in innovation, and should be at the heart of education.

NHSE's Vanguard programmes (launched 2015)

Fifty Vanguard sites were selected between January and September 2015 to lead on the development of new care models designed to act as a blueprint for the NHS's development. The 50 vanguards were allocated total funding of almost £133 million in 2015/16, £112 million in 2016/17 and £101 million in 2017/18.

There are five Vanguard types:
1) integrated primary and acute care systems,
2) multispecialty community providers,
3) enhanced health in care homes,
4) urgent and emergency care, and
5) acute care collaborations.
Each model is designed to test innovative new ways of delivering care effectively and sustainably.

Accelerated Access Review (2016)

The Accelerated Access Review concluded that there should be a clearer route to innovation adoption. The outlined pathway consisted of: horizon scanning, data collection, regulatory decision, clinical and cost effectiveness assessment, commercial discussion and then finally uptake support.

The Review concluded that the process by which innovations can be adopted needed to be simplified, with more cooperation between various bodies, which would thereby create a single point of access for innovators. Furthermore, the pathways to uptake innovations need to be future-proofed, with a particular focus on improving the means of assessment. Importantly, there needs to be transparent data availability on the uptake of innovations to reduce duplication.

NHSE's Test Bed Programme (launched 2016)

Five health and care Test Beds and two Internet of Things Test Beds were funded in Wave 1. The second wave was launched in February 2018. Examples have included the Long-Term Conditions Early Intervention Programme, with 214,700 participants, and the Technology Integrated Health Management programme, covering 1,400 participants.

The latter provides people with dementia and their carers with wearables, monitors and other devices which will combine into an 'Internet of Things' to monitor their health at home.

BEIS's Science and Innovation Audits (2016 and 2017)

Wave One (reports published 2016) and Wave Two (reports published 2017). Multiple Science and Innovation (SIA) audits have been published which specifically discuss healthcare innovation.

Examples include: Health Innovation Manchester: Biomedical Research Centre (£28.5m, Sept 2016), Academic Health Science Centre, Manchester Cancer Research Centre, Alderley Park Science Park, Medicines Discovery Catapult hub, Antimicrobial Resistance Research Centre, Citylabs, and Precision Medicine Catapult spoke..

NHSE's Innovation programmes

Innovation Accelerator: Supports the delivery of the Five Year Forward View by accelerating uptake of high-impact innovations for patient, population and NHS staff benefit. It collects data to provide insights on the spread of innovation. The Innovation Accelerator is delivered in partnership with the 15 Academic Health Science Networks across England

Innovation Scorecard: Monitors the uptake of NICE Technology Appraisals

Innovation Compass: A diagnostic tool to track current NHS innovations and how they can be supported to improve, develop a clearer understanding of organisational and system to accelerate innovation, provide patients and the public with access to information about how NHS organisations are using innovation

Innovation Connect: Provides a fast-track for emerging healthcare innovations and helps innovators to overcome barriers

Innovation Challenge Prizes: Encourage, recognise and reward frontline innovation and drive spread and adoption of these innovations across the NHS. This year's focus is on diabetes, infection control, use of technology, rehabilitation, and digital patient and clinician engagement.

The Industrial Strategy (2017)

The Industrial Strategy identified 'Harness the power of innovation to help meet the needs of an ageing society' as one of the strategy's four Grand Challenges. Also announced were:

- *A 'Healthy Ageing' programme*
- *The development of regional Digital Innovation Hubs*
- *A 'Data to early diagnostics and precision medicine' programme*

The ambition is also to support the care sector through the Industrial Strategy Challenge Fund and by encouraging care businesses to access the opportunities provided by the strengthened Growth Hub network.

Innovate UK's Leading-Edge Healthcare Challenge (launched April 2018)

As a part of the Industrial Strategy Challenge Fund, the Challenge was launched with £181 million to be invested in speeding up access to new medicines and drugs and improving healthcare. The funding will be allocated to:

- *Advanced therapies treatment centres (£21 million for three treatment centres)*
- *Digital health technology catalyst (£35 million fund over four years)*
- *Medicines manufacturing projects*
- *Viral vector production projects*

3. Innovations in prevention and early diagnosis

Prevention

The Commission session returned frequently to the topic of health promotion and disease prevention. Promoting healthy behaviours and lifestyles is a key element in public health strategies. Modifiable health behaviours refer to changeable behaviours which are known risk factors for certain diseases; disease prevention therefore focuses on curbing risky behaviours. Four of the major causes of death in England are cancer, dementia, heart disease and stroke; the burden of each of these diseases could be reduced with an effective public health strategy and a receptive public.

For example, nearly 40% of cancer cases in 2015 in the UK were attributable to known risk factors, including smoking, alcohol consumption, overweight/obesity and diet. The proportion was slightly higher amongst men than women, and tobacco smoking contributed by far the largest proportion of attributable cancer cases. Overweight/obesity was the second most influential.[2]

Heart disease and stroke share several similar modifiable risk factors to cancer, especially smoking, overweight/obesity, and diet and exercise. Moreover, diseases interrelate. For example, overweight/obesity is a risk factor for some types of diabetes, and in turn diabetes is a risk factor for stroke.[3] Meanwhile, smoking is a risk factor for many types of cancer, and also for heart disease; is estimated that 22,000 heart disease deaths annually it is estimated are attributable to smoking.[4]

When looking at dementia, modifiable risk factors can include physical inactivity, low cognitive activity, mid-life obesity, high

2 Brown et al. (2018), 'The fraction of cancer attributable to modifiable risk factors in England, Wales, Scotland, Northern Ireland, and the United Kingdom in 2015', British Journal of Cancer. Accessed at: https://www.nature.com/articles/s41416-018-0029-6

3 Stroke Association, (2017), State of the Nation. Accessed at: https://www.stroke.org.uk/sites/default/files/state_of_the_nation_2017_final_1.pdf

4 Accessed at: https://www.hriuk.org/about-heart-disease/facts-about-heart-disease

blood pressure, and high cholesterol, among others.[5] It has proven challenging to define the proportion of dementia which could be considered 'preventable' if behaviour changes had been adopted. However, the authors of The Lancet Commission on dementia prevention, intervention and care has recently estimated that around 35% of dementia may be attributable to a combination of nine key modifiable risk factors.[6]

Prevention is also an important strategy in improving mental health and reducing inequalities, as outlined by the Prevention concordat for better mental health, signed by many public bodies and endorsed by the wider sector in 2017.[7] Prevention is important throughout the life course, from childhood through to older age, as highlighted by a 2016 report by the Mental Health Foundation.[8]

Mental health prevention strategies fall into three main categories, and can be tailored by other factors such as age or disability:

- Universal: interventions which are designed for everyone.
- Selective: interventions for use in settings and communities which typically have a higher prevalence of mental health issues.
- Indicated: interventions designed for people with early, detectable signs of mental health stress or distress, and are used to target those as the greatest risk of developing a mental health problem.

An example opportunity area in addressing and preventing mental health issues are chatbots, which utilise algorithmic decision making. One such example is Stanford University's Woebot, which

5 O'Donnell et al. (2015), 'Promoting modifiable risk factors for dementia: is there a role for general practice?' British Journal of General Practice. Accessed at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4617245/

6 Livingston et al. (2017), 'Dementia Prevention, Intervention and Care', The Lancet.

Accessed at: https://www.thelancet.com/pdfs/journals/lancet/PIIS0140-6736(17)31363-6.pdf

7 Accessed at: https://www.gov.uk/government/publications/prevention-concordat-for-better-mental-health-consensus-statement/prevention-concordat-for-better-mental-health

8 Mental Health Foundation (2016), Mental health and prevention: Taking local action for better mental health

offers cognitive-behavioural therapy (CBT) through an app offering a companion to help people with their mental health. An Randomised Control Trial (RCT) of the intervention demonstrated the effectiveness of Woebot when used with young adults to address self-reported symptoms of anxiety and depression.[9]

As another example, preventing falls is hugely important in addressing unnecessary hospital admissions and in improving the health, wellbeing and quality of life of older adults. Identifying those individuals at risk of falling is crucial to this, and sensing technology offers exciting opportunities to achieve this. These types of technology can offer objective, low-cost and easy-to-implement options for falls risk assessments. A recent systematic review of different sensing technology options found that four types of technology offered effective falls risk assessments. These were inertial sensors, video/depth cameras, pressure sensing platforms and laser sensing.

However, the review did find a wide variation in effectiveness of different interventions, highlighting the need to prove efficacy. The authors also conclude that user experience and evaluation are both important elements and neither one should be overlooked. Additional case study examples in prevention are discussed below.

Early diagnosis

Where prevention has not been possible, achieving an early diagnosis is a key aim in the management of many long-term conditions, and in the curing of those for which we have available treatment options. This is because interventions and clinical decisions can be planned more effectively, the earlier a disease is diagnosed.

Diagnosing cancer at earlier stages, for example, drastically improves the patient's prognosis and survival rate for many forms of cancer.[10] Whilst diagnosing dementia at an early stage cannot

9 Fitzpatrick et al. (2017) 'Delivering Cognitive Behavior Therapy to Young Adults with Symptoms of Depression and Anxiety Using a Fully Automated Conversational Agent (Woebot): A Randomized Controlled Trial', JMIR Ment Health. Accessed at: https://mental.jmir.org/2017/2/e19/

10 Accessed at: https://www.cancerresearchuk.org/about-cancer/cancer-symptoms/why-is-early-diagnosis-important

result in a cure, it can help improve quality of life and may support the individual to maintain their cognitive abilities for longer.[11] Meanwhile, recognising diabetes type 2 as early as possible can help to minimise the risks of developing subsequent problems such as cardiovascular risk factors.[12]

Not only can an early diagnosis help to improve patient outcomes, but it is also beneficial in terms of generating cost-savings for the health and care systems. For example, Cancer Research UK's study into the cost savings associated with an early diagnosis for colorectal, lung and ovarian cancers showed that there is a considerable variation in early diagnosis rates between Randomised Control Trial (RCT). If all CCGs achieved the rates of the best performers, it is estimated that £24 million could be saved from colon cancer, nearly £10 million from rectal cancer, over £16 million for ovarian cancer, but a cost of £6.4 million for lung cancer due to high recurrence rates.[13]

Meanwhile, some research suggests that programmes for early diagnosis and intervention in dementia could create cost savings. One paper created a model to examine the public and private savings associated with delayed admissions to care homes in England resulting from the commissioning of memory services and found that only a small reduction in admissions would need to be achieved in order to make cost-efficiencies.[14]

One current area of research and exploration is using big data and social media posts as a way to prevent and/or ensure an early

11 Alzheimer's Research UK, (2018), Thinking Differently Preparing today to implement future dementia treatments. Accessed at: https://www.alzheimersresearchuk.org/wp-content/uploads/2018/04/thinking_differently_report-180328-single.pdf

12 Herman et al. (2015) 'Early detection and treatment of type 2 diabetes reduces cardiovascular morbidity and mortality: A simulation of the results of the Anglo-Danish-Dutch Study of Intensive Treatment in People with Screen-Detected Diabetes in Primary Care (ADDITION-Europe)'. Diabetes Care

13 Incisive Health and Cancer Research UK, (2014), Saving lives, averting costs. Accessed at: https://www.cancerresearchuk.org/sites/default/files/saving_lives_averting_costs.pdf

14 Banerjee and Wittenberg, (2009), 'Clinical and cost effectiveness of services for early diagnosis and intervention in dementia', International Journal of Geriatric Psychiatry. Accessed at: https://onlinelibrary.wiley.com/doi/epdf/10.1002/gps.2191

diagnosis of post-partum depression (PPD). In two separate studies, utilising Twitter and Facebook data respectively, researchers were able to model the likelihood of a woman developing PPD by observing her social media engagement. In a 2013 study using Facebook data from 376 mothers, researchers created models which predicted those mothers who would change significantly following childbirth with an accuracy of 71% when looking at their prenatal data, and 80-83% when also including two to three weeks of postnatal data.[15]

In a 2014 study using Twitter data, the authors created similar predictive models and verified the validity of their conclusions through qualitative interviews.[16] The pay-off for piloting and trialling this type of approach could be significant for the NHS, because preventing and diagnosing PPD at an early stage could create significant cost-savings for the system and improve outcomes for both mother and baby. Pilots should explore how this use of data should best be integrated with other tools such as in-person peer-to-peer mother and baby groups, and how to triage different therapeutic options for expectant/new mothers.

The role of innovation in prevention and early diagnosis

Given the huge importance of health behaviours and environment to overall health outcomes, there has been a wave of innovation emerging to address this crucial piece of the puzzle. Some innovations seek to nudge individuals towards positive health behaviours, some seek to inform individuals and others seek to empower. Early diagnosis innovations aim to find new ways of identifying health concerns with methods that are time- and resource-efficient. Identifying at-risk cohorts and diagnosing conditions early means that resources can be allocated efficiently and ensures that individuals receive the best care possible.

15 De Choudhury et al. (2013) 'Predicting Postpartum Changes in Emotion and Behavior via Social Media' In Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Paris, France. Accessed at: https://www.microsoft.com/en-us/research/publication/predicting-postpartum-changes-emotion-behavior-via-social-media/

16 De Choudhury et al. (2014) 'Characterizing and Predicting Postpartum Depression from Shared Facebook Data' CSCW. Accessed at: https://www.microsoft.com/en-us/research/wp-content/uploads/2016/11/FB-cscw2014.pdf

CASE STUDY: Headspace, app (prevention)

Issue being addressed

Mild anxiety, depression, sleep problems and other common mental health problems are experienced by a large proportion of the population. There are techniques that can be used to help prevent the development of these conditions, but busy individuals need to have easily accessible and simple techniques to deploy in their lives.

Description of intervention

Headspace is an app which teaches the user how to deploy techniques such as meditation and mindfulness in order to help prevent the emergence of common mild mental health issues, as well as to decrease stress and promote concentration.

Outcomes / findings

There has been debate in the literature about the effectiveness of apps designed to promote good mental health and wellbeing, despite the fact that there are more than 2,000 such apps currently available.[17]

The Headspace app has been shown to:

- *Reduce stress by 14% after 10 days of use*[18]
- *Increase compassion by 23% in 3 weeks*[19]
- *Reduce aggression by 57% in 3 weeks*[20]
- *Reduce irritability by 27% in 10 days*[21]

17 Accessed at: https://www.headspace.com/science

18 Accessed at: https://www.headspace.com/science/meditation-research

19 Lim et al. (2015), 'Mindfulness and Compassion: An Examination of Mechanism and Scalability', PLoS One. Accessed at: http://journals.plos.org/plosone/article?id=10.1371/journal.pone.0118221

20 DeSteno et al. (2017), 'Meditation Inhibits Aggressive Responses to Provocations', Mindfulness. Accessed at: https://mijn.bsl.nl/meditation-inhibits-aggressive-responses-to-provocations/15184918

21 Economides et al. (2018), 'Improvements in Stress, Affect, and Irritability Following Brief Use of a Mindfulness-based Smartphone App: A Randomized Controlled Trial', Mindfulness. Accessed at: https://link.springer.com/article/10.1007/s12671-018-0905-4

- *Improve focus by 14%*[22]

- *Improve wellbeing and increase positivity*[23]

It was not possible to find quantified outcomes in terms of cost-savings for the wider health and social care systems, but the assumption would be that preventative activity which is proven to improve positivity and wellbeing, whilst reducing stress, aggression and irritability would help to reduce incidence of anxiety and depression, alongside other mild mental health issues. This is crucial in minimising demand on already over-stretched services such as GP practices and community mental health teams.

A feasibility study is exploring the potential use of Headspace as a guided, self-help mindfulness course for depression, as a part of the NHS's Improving Access to Psychological Therapies initiative.[24]

CASE STUDY: Cancer Champion Programme, Greater Manchester (prevention and early diagnosis)

Issue being addressed

Cancer prevention is a major public health issue across the world, and a key focus for the devolved Greater Manchester Health and Social Care Partnership. In particular, the Cancer Vanguard in Greater Manchester is exploring the use of citizen-led social movements to help further public health agendas.

22 Bennike et al. (2017), 'Online-based Mindfulness Training Reduces Behavioral Markers of Mind Wandering', Journal of Cognitive Enhancement. Accessed at: https://link.springer.com/content/pdf/10.1007%2Fs41465-017-0020-9.pdf

23 Howells et al. (2016), 'Putting the 'app' in Happiness: A Randomised Controlled Trial of a Smartphone-Based Mindfulness Intervention to Enhance Wellbeing', Journal of Happiness Studies. Accessed at: https://link.springer.com/article/10.1007/s10902-014-9589-1

24 Accessed at: https://ukctg.nihr.ac.uk/trials/trial-details/trial-details?trialNumber=ISRCTN13895659

Description of intervention

Interested members of the public, with a passion for preventing cancer, sign up to the Cancer Champions programme, and then receive training and resources to help them utilise their unique abilities and networks to discuss cancer prevention, symptoms and early diagnosis in their communities. The ambition is to reach 20,000 Cancer Champions by 2021.[25]

The training helps individuals to feel confident in spreading accurate messages about cancer and how it can be prevented to the rest of the general public. Cancer Champions then make pledges to undertake certain types of activity such as raising awareness about risk factors, or specific pledges to focus on reaching, for example, children and young people.

The idea is that Cancer Champions have conversations with friends, family and their community and help to raise awareness about risk factors, screening, symptoms, encouraging those with concerns to adapt their behaviours and also to seek medical assistance where appropriate.

Outcomes / findings

There has not yet been an evaluation of the effectiveness of this programme, but the ambition is for the programme to promote health behaviour changes and earlier diagnosis, thereby improving patient outcomes. Given the successful precedent of similar peer-to-peer programmes in educating and supporting under-represented groups, it may be that this programme could have a particularly valuable impact here, in particular where low awareness of treatment options, or distrust/fear of the medical establishment is influencing outcomes.[26] *Moreover, by promoting patient engagement and activation, it can be possible to improve overall outcomes.*[27]

25 Greater Manchester Combined Authority, (2017), Achieving World Class Cancer Outcomes: Taking Charge in Greater Manchester 2017-2021. Accessed at: https://www.gmhsc.org.uk/wp-content/uploads/2018/05/GM-Cancer-Plan-Summary.pdf

26 For example, see Mind (2013) Mental health peer support in England: Piecing together the jigsaw. Accessed at: https://www.mind.org.uk/media/5910954/piecing-together-the-jigsaw-full-version.pdf

27 See: https://www.england.nhs.uk/ourwork/patient-participation/self-care/patient-activation/

CASE STUDY: Obesity, diet and lifestyle. Oxford Biomedical Research Centre (early diagnosis)

Issue being addressed

Although many people are overweight, not everyone who is overweight will develop obesity-related diseases. It would therefore be valuable to be able to identify those at higher risk at an early stage, so that these individuals can be prioritised for weight management programmes.

Description of intervention

The Oxford Biomedical Research Centre is using data collected from the UK Biobank, the Oxford Biobank and other large population cohort datasets. The biobanks contain biological data such as blood samples, DNA, and other specific measures including detailed measures of fat deposition collected using MRI scanning, and in-depth metabolic phenotyping. This data collection and research will form the basis for new experimental studies which will test the pathways which link overweight to disease.

Outcomes / findings

This work is at an early stage and outcomes are not yet available, but the intention is to better predict who will develop specific diseases as a result of being overweight, and thereby individualise weight management and other health interventions. The aim will be to develop risk stratification tools which will be used in routine clinical care in order to identify those individuals at greatest risk.

This will better serve the patient and improve health outcomes, but it will also alleviate pressure on the health and care systems by prioritising patients with the highest needs, thereby streamlining demand.

CASE STUDY: Cognitive impairment screening tool (early diagnosis)

Issue being addressed

Early diagnosis of dementia is an important factor in improving outcomes. Mild Cognitive Impairment (MCI) can develop into Alzheimer's disease in 30-50% of people and therefore provides an opportunity for early diagnosis and intervention. However, there are currently no diagnostic blood tests that can diagnose MCI. Instead, the existing diagnosis involves lengthy neuropsychological assessments, testing of cognition and memory, and other questions about activities and mood. Not only can this take time, but it can also be costly because each diagnostic tool is sold and copyrighted; the tools require input from trained clinicians to be administered and scored. A simple and cost-effective alternative tool for diagnosing MCI would therefore be hugely valuable.

Description of intervention

Multisensory perception tasks offer a valuable opportunity for screening for MCI. These tasks incorporate several positive offerings, including giving a quantitative score, yet can be used in a home-setting, i.e. they do not require clinical/specialist supervision. They can even be used by the individual on their own, thereby cutting resource and time costs.

There is a growing base of literature which evidences the difference in multisensory processing between different cohorts, providing a good rationale and benchmarks for such tasks.

In a recent study reported in Nature, 123 participants were asked to press a button whenever they saw a flash of light or heard a sound, using a laptop or phone. Flashes and sounds would sometimes occur alone and sometimes in conjunction with others. The participants included 51 healthy young adults, 49 healthy older adults and 23 older MCI adults.[28]

28 Murray et al. (2018) Sensory dominance and multisensory integration as screening tools in aging. Nature. Accessed at: https://www.silvereco.fr/wp-content/uploads/2018/07/étude-démence-téléphone.pdf

Outcomes / findings

The study found that the multisensory detection task can be used as a time- and resource-efficient MCI screening tool; a diagnosis could successfully be made based on measurements of multisensory integration and sensory dominance. These findings improve our understanding of the relationship between multisensory and memory functions in ageing, and offer an exciting new opportunity to create cost-effective screening tools which could help secure earlier dementia diagnoses.

4. Innovations in self-management

Long-term conditions

A long-term, or chronic, condition is one for which there is no known cure. Instead, the condition is managed through the use of drugs and/or other treatments. As people get older, they are increasingly likely to develop long-term conditions and live with more than one health condition (multi-morbidity). It is important to recognise that the NHS was originally set up primarily with the goal of managing acute conditions. This change in healthcare needs over time has considerable cost implications and poses organisational challenges. Innovations are therefore welcomed in this area to help the health system to adjust.

Overall, the number of people living with one or more long-term condition(s) is increasing. In 2012, it was estimated that 15 million people in England were living with such a condition.[29] This has considerable implications on costs to the healthcare system, given that those living with a long-term condition account for 50% of all GP appointments and 70% of all bed days, whilst their treatment and care absorbs 70% of acute and primary care budgets in England.[30]

As a result, innovations designed to promote effective self-management of long-term conditions by the individual are very important, not only for patient outcomes but also for the system. These innovations seek to help improve patients' outcomes, independence and 'activation' in their own healthcare, whilst also minimising the strain on the system by managing demand.[31] There are opportunities for digital interventions to support the scaling of patient activation. For example, virtual assistants such as Google Assistant and Amazon Alexa offer a multitude of options which do not require interaction with a smartphone. This could be very helpful

29 Department of Health, (2012), Long Term Conditions Compendium of Information Third Edition. Accessed at: https://www.gov.uk/government/publications/long-term-conditions-compendium-of-information-third-edition

30 Accessed at: https://www.england.nhs.uk/ourwork/ltc-op-eolc/ltc-eolc/house-of-care/

31 For a definition of patient activation: https://www.england.nhs.uk/ourwork/patient-participation/self-care/patient-activation/pa-faqs/#1

in increasing activation for people who are unable to easily use smartphones (e.g. those lacking fine motor skills, or those who are blind or partially sighted). This could extend the reach and scope of apps currently designed to help those with long-term conditions to self-manage their health.

Connected devices which combine coaching services also offer chances for individuals to self-manage their conditions. These types of services are being developed and offered by several new digital platforms, such as WellDoc, Livongo, Glooka and others. As an example, WellDoc is discussed in further detail in the case study section (pages 31-34).

Triage and basic healthcare

Demand on acute services is too high, as is demand on GP practices. There are under-utilised resources such as pharmacies which are often well-placed to cater to simple healthcare queries, and services which have been set up specifically for the purpose of prioritising health needs, such as NHS 111.

Innovations have also emerged to fill this area, in particular by supporting individuals to check their symptoms, access advice & guidance, and understand what their options are for their health needs. The idea is to minimise the burden on the system by helping individuals to understand when they may be able to address their health needs themselves via a trip to a pharmacy or some at-home solutions, rather than by using their GP practice (or, as can be the case, A&E) as a first port of call in all instances.

Innovation in this domain will help to streamline the triage process, and thereby alleviate pressure on frontline staff in healthcare settings. The ambition is also for patients to feel confident in managing their healthcare, thereby promoting resilience. This means knowing when a condition can be managed effectively at home, but also the signs and symptoms which indicate that a health need is urgent and must be addressed immediately and by a professional.

CASE STUDY: Ask NHS, app

Issue being addressed

Demand for NHS 111, along with other services, has been growing in England to unsustainable levels.[32] A new, cost-efficient, patient-facing option is required to alleviate pressure on the system and to give individuals a wider range of appropriate options depending on their healthcare need.

Description of intervention

Ask NHS is an innovative new app designed for use by the individual to check symptoms, book appointments, find services and learn about self-care. The app offers a 'virtual assistant' in the form of a virtual nurse named Olivia, who supports the user with their query.

Ask NHS aims to provide a first port-of-call before an individual might call NHS 111, book a GP appointment, present at A&E or otherwise engage with the health or care systems. It is available on both the Apple Store and Google Play.

The app is designed so that it is fully technically interoperable with other NHS services, including the West Midlands NHS 111 Clinical Assessment Service, the NHS National Directory of Services (DoS), EMIS Web and NHS Choices. Importantly, this means that, if the individual presents with symptoms which need further attention, the app is able to navigate them through to the local 111 service.

Outcomes / evidence

Whilst there has not yet been a cost-effectiveness analysis of the pilot, each use of the Ask NHS app carries a cost burden that is a fraction of that incurred by a call to NHS 111. Of the accessible pilot population of 3.5 million (aged 18 and over), over 60,000 are currently using the app.[33]

32 There were 1,676,254 calls offered to the NHS 111 service in England in December 2017 (54.1 thousand per day), an increase of 13.5% on the 1,476,826 calls offered in December 2016 (47.6 thousand per day). This is the largest number of calls recorded since data collection began in August 2010.

33 The Health Foundation. (2017). Innovating for Improvement: Addressing urgent care demand: facilitating self-assessment, self care advice and signposting to healthcare services using an avatar-based virtual nurse. Accessed at: https://www.health.org.uk/sites/health/files/IfI%20R4%20Final%20Report_%20Vocare%20%28website%29.pdf

At the West Midlands Academic Health Science Network's second annual Celebration of Innovation Awards (2017), the Industry Collaboration Award was given for the successful introduction of the Ask NHS App and its integration with the West Midlands NHS 111 Service.[34]

CASE STUDY: Echo, app

Issue being addressed

Medication management is an important element in the self-management of long-term conditions. It can be made more challenging due to the often complex, awkward or time-consuming process of requesting repeat prescriptions and arranging to collect medications. This can be particularly challenging for those with disabilities, including mobility issues. Any difficulty with ordering and/or collecting medication can affect adherence rates, which in turn can lead to further health complications and greater pressure on the health and care systems, as well as worsened patient outcomes. According to the Echo website, almost half of all adults take a repeat prescription, but 40% of medication isn't taken as directed.[35] *This represents a big opportunity area for innovation.*

Description of intervention

The Echo app is designed to help individuals manage their repeat prescriptions, as well as their condition(s). It is an easy-to-use and free service. The user records the details of their medication and their GP in the app. The app liaises with the GP surgery and requests a prescription approval. Once received, Echo posts the prescription to the individual, free of charge.

The app prompts the user about taking their medication. It also lets them know when they will need to order their medication again, and when they need to make check-up appointments with their GP.

34 Accessed at: https://thecareforum.co.uk/ask-nhs-mobile-app-wins-healthcare-innovation-award/

35 Accessed at: https://www.echo.co.uk/gp

Outcomes / evidence

A major positive outcome for users of the Echo app is improved medication adherence. Whilst 40% of medication is not taken as directed, this falls to 14% among the app's users.[36]

The Echo app has won multiple innovation awards, including: Mayor of London Outstanding Achievement award 2018, KPMG Best British Mobile Start-Up 2018, HealthTech 27 2018, Pfizer Healthcare Hub Winner 2017, Marketing Week 100 Disruptive Brands 2017, Upscale Class of 2017, Healthcare Start-ups App of the Year 2016, Tech City News Start-up of the Year 2016, and Tech City News HealthTech Start-up of the Year 2016. Echo is also included on the NHS App Library.

Echo is part of Digital Health. London, a collaborative programme delivered by MedCity, and London's three Academic Health Science Networks – UCLPartners, Imperial College Health Partners, and the Health Innovation Network.

Prescription charge fraud is a major issue for the NHS, with those falsely claiming exemption from prescription charges costing the taxpayer £200 million every year. Meanwhile, following-up fraud is costly and only recoups £23 million in fines each year. [37] *Echo anticipates that its service will help to minimise prescription fraud, because 'pharmacists will have to record data such as whether a prescription charge was levied, type of prescription exemption claimed by a patient, and whether evidence of exemption was seen by the pharmacist'.*[38] *A machine-assisted checking algorithm is used to confirm that uploaded exemption documentation is valid. Making this process digital also avoids awkward conversations between pharmacists and individuals, which rely on pharmacists essentially actively having to ask the individual for proof of their income.*

36 Accessed at: https://www.telegraph.co.uk/business/2017/10/25/uk-startup-echo-raises-7m-repeat-prescriptions-app/

37 Accessed at: https://www.thetimes.co.uk/article/crackdown-on-fraud-that-costs-nhs-in-england-1-25bn-a-year-w2sn06wp6

38 Accessed at: https://blogs.bmj.com/technology/2017/11/06/how-tech-can-combat-nhs-prescription-fraud/

CASE STUDY: BlueStar® by WellDoc®

Issue being addressed

Type 2 diabetes can be a challenging condition to manage. Many patients benefit from regular coaching and support. Real-time coaching is particularly valuable and can help prevent crises.

Description of intervention

BlueStar® is an algorithm-driven, real-time coaching app for people with Type 2 diabetes. It can be used on a smartphone or computer. The individual uses the app to record data and information about their condition, such as their blood glucose trends or their diet. The more data inputted, the smarter the app becomes, improving the messaging sent by the app to the user. For example, by understanding patterns in an individual's normal pre- and post-breakfast blood glucose readings, the app provides messages, coaching and advice to the user to help them make decisions about carbohydrate intake and exercise.

BlueStar® also provides educational tools to help users better understand their condition and offers a SMART report summary for clinicians. The app also offers access to expert advice for user queries.

Outcomes / evidence

A 2011 cluster-randomised clinical trial found BlueStar® substantially reduced glycated haemoglobin levels over one year, whilst a 2015 pilot study showed an increase in self-efficacy among older adults using the app (although this was not statistically significant, likely due to the small pilot sample size).[39] Moreover, support from healthcare professionals appears to improve the outcomes.[40] In the US, the FDA has allowed WellDoc® to offer the mainstay BlueStar® app without a prescription, which should help expand the product market and reach.

39 Quinn et al. (2011), 'Cluster-Randomized Trial of a Mobile Phone Personalized Behavioral Intervention for Blood Glucose Control' Diabetes Care. Accessed at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3161305/ and Quinn et al. (2015) 'Older Adult Self-Efficacy Study of Mobile Phone Diabetes Management', Diabetes Technology and Therapeutics. Accessed at: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4808269/

40 https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5541938/

5. Innovations in primary care

Primary care is often thought to refer solely to GP surgeries, but this fails to recognise community pharmacists, dentists, and opticians who are also part of primary care. GP surgeries operate as a first-port-of-call for most people but the pressure facing surgeries is unsustainable. In 2016, the King's Fund explored the pressures on general practice.[41] The report highlights increasing GP workloads, which have gone unmatched by increased funding and by workforce growth. Their analysis of 30 million patient contacts from 177 practices showed a growth of over 15% in consultations (2010/11 to 2014/15) yet just a 4.75% increase in GP workforce and 2.85% in practice nurse workforce over the same period. Meanwhile, funding for primary care fell consistently as a share of NHS overall budget in each year (from 8.3% to 7.9%).

The challenges are well-known and include the ageing of the general population and the increasing complexity of healthcare needs, particularly due to long-term conditions and increases in multi-morbidity. Workforce issues are also at play, including challenges in recruiting and retaining GPs as well as the early retirement of GPs. It is also difficult to recruit and retain other members of the primary care team, particularly practice nurses and managers. Increasing patient expectations add to the pressure.

Meanwhile, in dentistry, there is also a need to improve preventative care and further join-up oral healthcare with other health teams, as well as education and social services. Overall, oral health has improved greatly in recent years, yet there remain pockets of poor oral health among deprived communities, and health inequalities as a result.[42] Dentists therefore have an important role to play in whole-team approaches to improving population health. Likewise, opticians

41 The King's Fund (2016), Understanding Pressures in General Practice. Accessed at: https://www.kingsfund.org.uk/sites/default/files/field/field_publication_file/Understanding-GP-pressures-Kings-Fund-May-2016.pdf

42 Health Education England (2018), Advancing Dental Care: Education and Training Review Final report. Accessed at: https://www.hee.nhs.uk/sites/default/files/documents/advancing_dental_care_final.pdf

play a valuable part in primary care. For example, optometry is important in managing dementia; blurred vision can worsen the symptoms of dementia and those with a diagnosis of dementia are more likely to be living with an undiagnosed visual impairment.[43] Moreover, some forms of dementia can impact upon eyesight.[44] Therefore, ensuring good eye care is important and will become increasingly so as the number of individuals living with dementia is set to increase. Community pharmacists also have a pivotal role to play, as discussed in the below case studies.

It is recognised that, in order to meet increasing demand, all primary services will have to integrate, communicate and support one another. This means ensuring that the diversity of skills offered by different staff and specialists are fully utilised, and creating efficiencies through system integration and sharing learning. Much of this will demand innovation in infrastructure and systems; it will often be 'back-office' innovation which may never been seen or recognised by the patient. However, this type of innovation will be of fundamental importance if we are to continue to drive up primary care quality, promote continuity of care, improve patient outcomes and create positive experiences.

Innovation will also be crucial to 'future-proofing' the primary care system so that it is resilient to future shocks. Ultimately, it is vital that we get primary care right, as failures at this link in the overall health and care chain can have serious repercussions for other parts of the system, notably secondary care and social care.

43 Bowen et al. (2016), 'The Prevalence of Visual Impairment in People with Dementia (the PrOVIDe study)', Health Services and Delivery Research. Accessed at: https://www.ncbi.nlm.nih.gov/books/NBK374272/pdf/Bookshelf_NBK374272.pdf

44 Accessed at: https://www.scie.org.uk/dementia/living-with-dementia/sensory-loss/sight-loss.asp

CASE STUDY: Nailsea District Leg Club

Issue being addressed

Individuals living with ulcerous and other leg conditions need routine support to manage their conditions, and have a higher risk of being socially isolated. A Leg Club is designed to address both of these identified needs via a single, effective intervention.

Description of intervention

A range of stakeholders and partners grouped together in order to set up a Leg Club in the Nailsea region. Alongside Nailsea Family Practice, and Backwell and Nailsea Medical Group, the following were involved:

- *North Somerset's Community Partnership, which provides multi-disciplinary community health teams, children's services, learning disabilities services and community hospital services*
- *The Nailsea Tithe Barn Trust*
- *Curo, the not-for-profit housing and support organisation*
- *The Ellie Lindsey Leg Club Foundation (national)*
- *Patient Group members*
- *The local Rotary Club*
- *North Somerset Community Partnership*

The Nailsea District Leg Club was founded in June 2015 and provides a weekly service. Attendees receive an initial assessment by a nursing team and then weekly support. The service is open-plan to help reduce stigma and to promote peer support. Nursing staff are able to advise on self-management and also on GP appointments as necessary.

The Leg Club also supports socially isolated individuals, with befriending support and refreshments so that attendees can spend time with one another and develop connections which they may otherwise have lost due to their leg condition. Transport is available to and from the service for those who require it.

Outcomes / evidence

The Nailsea District Leg Club is just one case study from the broader national Ellie Lindsey Leg Club Foundation model. The Foundation has evidence of the effectiveness of their model in supporting those with leg conditions. Key evidence includes:

- *leg ulcers are half as likely to recur in leg club members as in others with leg ulcers in the UK*
- *the majority of healed ulcers within the leg club network achieve healing within two months*
- *widespread adoption of the leg club model can generate considerable savings in district nursing time*
- *if leg clubs were to be introduced across the UK, the total potential savings to the NHS has been estimated at £152 million per year*
- *leg clubs provide care in a non-medical setting which improves satisfaction.*[45]

45 Full references can be accessed at: https://www.legclub.org/download/documents/351

CASE STUDY: Debrisoft® monofilament debridement pads

Issue being addressed

Cost-efficiencies could be achieved in the treatment of acute and chronic wounds.

Description of intervention

The Debrisoft® monofilament debridement pad is a sterile, single-use pad for the treatment of acute and chronic wounds, one of six innovative medical technologies monitored via the NHS Innovation Scorecard. The pad removes devitalised tissue, debris, and hyperkeratotic skin around acute or chronic wounds.

Evidence suggests that the pads will debride an acute or chronic wound more quickly, requiring fewer nurse visits and thereby creating cost savings. It can be used by healthcare workers treating wounds in either adults or children in community clinics or at home. The Debrisoft pad has also proven to be convenient, easy to use and well tolerated by patients.

Outcomes / evidence

From October 2016 to September 2017, NHS usage of Debrisoft® monofilament debridement pads increased by 20%. The innovation is estimated to be cost saving for complete debridement compared with other debridement methods. When compared with hydrogel, gauze and bagged larvae, cost savings per patient (per complete debridement) are estimated to be £99, £152 and £484 respectively in a community clinic and £222, £347 and £469 respectively in the home. Meanwhile, NICE has integrated the Debrisoft® pad into guidance on managing pressure ulcers and diabetes.

CASE STUDY: Pharmacy in General Practice – The Old School Surgery, Bristol

Issue being addressed

The way in which GP surgeries and pharmacies need to work together is changing. Simple medical issues can often be addressed via a Pharmacy First approach, and the implementation of this agenda requires innovative and collaborative working between multiple primary care services. Some of the issues to be addressed include the co-location of GP surgeries and community pharmacies, polypharmacy reviews and post-discharge reconciliation.

A 2015 joint statement from the Royal College of General Practitioners and Royal Pharmaceutical Society emphasised their mutual support for practice-based pharmacists within the primary healthcare team and promoted the uptake of this model.[46]

Description of intervention

The Old School Surgery in Bristol had a practice-based prescribing pharmacist in place for a decade, supporting around 50 to 60 individuals a week. From 2011, there was an increased ambition to realise the full potential of pharmacists' skills, to monitor patients more carefully, improve medication reviews, and ultimately to improve patient outcomes and experience.

The local pharmacy and surgery together worked to identify a cohort of 400 vulnerable individuals with long term conditions who would benefit from an enhanced service. Vulnerable individuals could be those diagnosed with dementia, those with a chronic condition, a history of poor medications compliance, or a chaotic lifestyle.

This identified cohort are then proactively invited to an annual Medicines Use Review to optimise and align their medication.

46 Accessed at: https://www.rpharms.com/Portals/0/RPS%20document%20library/Open%20access/Policy%20statements/rcgp-joint-statement-for-pharmacists-in-gp-surgeries.pdf

In addition, each month the pharmacist calls all vulnerable patients/carers to identify any issues that may have arisen and to check medication adherence. The dispensing of the next month of medication is dependent on the pharmacist being satisfied with this call and that any issues are being worked through adequately. Where issues have arisen, the pharmacy team can counsel the patient/ carer and adjust dispensing accordingly until they are satisfied with adherence. The pharmacy team are also able to liaise with the surgery about any concerns and flag issues on the GP and Pharmacy systems.

The next step in the project's agenda is to explore whether or not there is any correlation between this new service and hospital admissions. There are also plans to explore the potential for a community pharmacy-based "Urgent Care Service".

Outcomes / evidence

Enhanced use of pharmacy services has reduced reliance on secondary care services.

There has been a reduced reliance on face-to-face GP consultations.

Medication wastage is minimised by checking in with the individual every month.

There has been a positive impact on medications adherence.[47]

Learnings have included the importance of the embedded clinical pharmacist role (in the GP surgery), the importance of the community pharmacist having access to the full patient record and the value of early intervention and practice support for vulnerable individuals.

47 Accessed at: https://www.england.nhs.uk/south/wp-content/uploads/sites/6/2015/12/examples-innovation-gp.pdf

6. Innovations in secondary care

Data on the performance of hospitals and of specialists is often the first to hit the headlines. In times of strain on the NHS, urgent and emergency care services often reflect stresses on the system, as exemplified by A&E attendances, waiting times and emergency admissions data.

- A&E attendance at major, 24-hour departments increased by 0.8% in 2017/18. Attendance at major A&E departments has risen 7.9% in the last five years, which amounts to an extra 3,000 people attending each day.[48]

- Four-hour wait performance has fallen in recent years. 2017/18 had the lowest annual performance in the current data series, with 11.6% of patients spending over 4 hours in A&E compared with 10.9% a year earlier and 4.1% five years ago. Even waiting times in summer months (which are typically lower) were higher in 2016 and 2017 than those in any winter prior to 2014/15. March 2018's performance was the worst on record. In major A&E departments, 17.6% of patients waited longer than 4 hours in 2017/18, compared with 16.3% in 2016/17 and 6.2% in 2012/13.[49]

- Over five years since 2012/13, emergency admissions via A&E have risen by 18%, while total emergency admissions have risen by 15.7%. This amounts to an average of 2,200 more emergency admissions per day across England in 2017/18 than in 2012/13.[50]

Meanwhile capacity in the secondary care system is also a concern when looking at admitted patients. This is demonstrated in part by consultant-led treatment waiting times, bed occupancy and delayed transfers of care data. There are of course other measures which also add to this picture, but these three are discussed in more detail below:

48 Carl Baker (2018) House of Commons Briefing Paper, NHS Key Statistics: England, May 2018. Accessed at: http://researchbriefings.files.parliament.uk/documents/CBP-7281/CBP-7281.pdf

49 ibid

50 ibid

- NHS standards state that those individuals referred by their GP to a consultant should begin treatment within 18 weeks. At any one time, the target is that 92% of those on waiting lists will have waited for 18 weeks or fewer. Between June 2012 and June 2017, the waiting list for consultant-led treatment grew 47% faster than population increases. Planned elective treatment was also affected by winter pressures in 2017/18, with some treatments halted in order to free up capacity for urgent and emergency care.[51]

- The number of beds available has been falling in recent years, whilst the proportion of beds occupied has been rising consistently. Since 2011, the number of beds available overnight has fallen by 9,550 (a fall of 6.9%). Meanwhile, general & acute occupancy has risen from 86.9% in Oct-Dec 2011 to 90.7% in Oct-Dec 2017. There is substantial variation between different NHS hospitals, however, meaning that there are some concerning pinch points which needs addressing quickly and effectively.[52]

- A delayed transfer of care refers to when a patient is in the wrong setting for their current level of care need. This is most often used to refer to when a patient is ready to be discharged from hospital into the community, but there is a delay to this process. Delayed transfers rose substantially between 2013 and late 2016, but have fallen since early 2017. In 2017/18 there were 1.98 million 'delayed days' due to delayed transfers of care – an average of 5,420 each day. This compares with 1.38 million in 2012/13 (3,782 per day) – an increase of 43%. However, delayed discharges have fallen in recent months. In March 2018, there were 23% fewer delayed days than in March 2017, but 34% more than in March 2013.[53]

Clearly, the picture painted in secondary care is troubling, and unsustainable. Innovations are sorely needed across all elements of secondary care, from the delivery of urgent and emergency

51 ibid

52 ibid

53 ibid

care, to elective treatment, and from back-office operations to commissioning. Innovations are needed to help manage flows through hospitals, as well as to support improved interactions between all elements of the health and care systems in order to ensure that pressures elsewhere do not result in acute-setting strain (which, afterall, carries a typically much higher cost burden). Moreover, the use of connected devices, the internet of things, artificial intelligence (AI) and machine learning will all be crucial in patient triage and hospital flows, in particular in an age of ever-growing volumes of data. A few select examples of innovations in this sector are outlined below.

CASE STUDY: DeepMind Health (Moorfields Eye Hospital NHS Foundation Trust, and University College London (UCL) Institute of Ophthalmology - Artificial Intelligence)

Issue being addressed

Medical imaging as a practice has taken off globally in recent years, leading to a huge wealth of data which must be analysed. Historically, this data has always required analysis by human expertise, yet artificial intelligence (AI) offers a promising option to make this task less laborious. For many eye diseases, early treatment can help to halt or reverse the disease progression.

In some settings, the large volume of scans (e.g. 1,000 per day at Moorfields) combined with the time taken for analysis can lead to long delays between scan and treatment. Urgent care is often therefore not prioritised and is delayed.[54] Speeding this process up would help to improve outcomes.

54 Ocular Coherence Tomography is an advanced eye scan for people of all ages. Similar to ultrasound, OCT uses light rather than sound waves to illustrate the different layers that make up the back of the eye.

Description of intervention

In 2016, DeepMind Health, Moorfields Eye Hospital and UCL Institute of Ophthalmology announced a five-year partnership to explore the use of an AI system which can make the correct referral decision for over 50 eye diseases.

Using two types of neural networks, the AI system quickly learnt to identify ten features of eye disease from optical coherence tomography (OCT) eye scans, thereby recommending a referral decision. To check the validity of the referral, clinicians reviewed the same OCT scans.

Outcomes / evidence

The system can make the correct referral with 94% accuracy, matching the accuracy of world leading eye experts.[55] It is hoped that this new method will revolutionise the way clinicians undertake eye tests, helping to prioritise patient needs and detect conditions earlier. This should all result in improved outcomes for patient eyesight, and streamline the diagnosis process, thereby alleviating the pressure on clinicians. Future work in this space could also address a wider range of medical imaging techniques.[56]

55 See: https://www.moorfields.nhs.uk/sites/default/files/uploads/documents/Final%20Press%20Release%20-%20Artificial%20intelligence%20as%20good%20as%20top%20experts%20at%20detecting%20eye%20diseases%20-%20Tues%207%20August.pdf

56 Fauw et al. (2018) 'Clinically applicable deep learning for diagnosis and referral in retinal disease', Nature Medicine. Accessed at: https://www.nature.com/articles/s41591-018-0107-6.epdf?author_access_token=PAbvHEuvYmrPVbG5HqKdRgN0jAjWel9jnR3ZoTv0P43NEH20hFuvBoJk6cvlCihn8kmL6tmejFlnuPlbT_0KmJgK6N07SPh_ZLy0Nxb0-LAGIDBaH1fjJTkD9ahUEQpRlEudtlG9E1v3ca9xNQcQ%3D%3D

CASE STUDY: North Kensington care bundles in in-patient mental health service

Issue being addressed

The average life expectancy of an individual with a long-term mental health condition is 15 to 20 years lower than for the general population.

Description of intervention

A project was run in a North Kensington inpatient mental health ward with the aim of creating care bundles to jointly assess mental and physical health needs.[57] The ambition was to improve the routine assessment of inpatients' physical health and lifestyle risks, as well as supporting patients to better understand their options. By making these assessments part of a care bundle, the idea is to make the assessment of physical health routine in the mental health service.

Key to this was the integration of two previously parallel systems for collecting information on mental and physical health within the setting, as well as adequately defining the parameters of physical health that should be routinely monitored.

A patient-held plan was developed, reflecting the physical healthcare assessment, showing key interventions and signposting to appropriate services. Assessments were fully co-produced with the patient and patient-held plans were designed with the input of service users. The plans were then given to patients upon discharge, with tailored help designed specifically for mental health patients.

Outcomes / evidence

By creating a care bundle, assessments were streamlined and staff burden was reduced by bringing multiple processes into one, thereby avoiding duplication. Moreover, resetting the parameters of physical health measurement ensured important health data was collected.

57 Accessed at: https://www.health.org.uk/programmes/shine-2014/projects/care-bundles-improve-physical-health-care-services-people-long-term

CASE STUDY: Whiteboard patient journey project, St Vincent's University Hospital, Dublin, Ireland

Issue being addressed

Patient flow through hospitals is crucially important to get right. This is because any delays in transfers of care can reap considerable problems for the system, including a lack of beds and worsened patient outcomes due to prolonged hospital stays. Innovations to help support the appropriate flow of patients are welcomed by the sector.

Description of intervention

Servelec and the team at St Vincent's University Hospital in Dublin developed a bed management and 'productive ward' system. This was designed to replace the existing whiteboards system for logging patient information and journeys with an intelligent touch screen technology. This technology allows staff to update patient information quickly and easily using clinical icons. Staff are then able to determine a patient's status at a glance. The system is especially effective because it has been designed to integrate with the hospital's Emergency Department clinical system, as well as patient administration systems. The result is a streamlined process which supports a safe and efficient patient journey.

Outcomes / evidence

The new system enables effective use of the hospital's beds by understanding which beds are becoming available and can be used for incoming emergency admissions. Staff no longer need to operate via a paper-based system and it means that colleagues in different departments have access to intelligent, real-time data about patient flows and bed availability.

Evidence from a case study, undertaken by Servelec, shows that:

> *"Comparison reports between the first two quarters show higher discharge rates in 2017 and it clearly illustrates that the combination of the hospital's initiatives and Servelec's Flow solution has enabled*

SVUH [St Vincent's University Hospital] to achieve the improved figures. The recording of PDD [Predicted Discharge Dates] has reached an unprecedented rate of 98% of wards compared to the previous manual methods on the dry wipe board which had a poor completion rate. All delayed discharges have a reason fed into the system which makes it easier to accelerate referrals or rehabilitation beds." [58]

Other positive outcomes recorded as a part of the case study include reduced emergency department waiting time, minimised risk of spreading infections due to infection status protocols, and improved communication and patient safety.[59]

The project team was awarded IT Professional Team of the Year at the national Tech Excellence Awards in 2017.

CASE STUDY: da Vinci® surgical system, Intuitive Surgical

Issue being addressed

Despite decades of progress, variability and cost-effectiveness in surgery are still major challenges. The skill and experience of the individual surgeon impacts the rate of complications and re-admissions following surgical procedures. The use of robotic-assisted minimally invasive surgery (RAS) can reduce the impact of these challenges and contribute to patient outcomes, as well as offering a range of benefits to surgeons and hospitals.

Description of intervention

Intuitive Surgical pioneered the field of RAS and is the global technology leader with the creation and launch of its da Vinci Surgical System in 1999. The da Vinci Surgical System enables surgeons to perform complex operations through a few small incisions. In robotic-assisted surgery, the surgeon operates seated at the ergonomic console, controlling fully-wristed instruments using specialised hand controllers, whilst viewing an enhanced 3D-high definition view

58 Accessed at: https://www.servelechsc.com/media/3849/st-vincents-and-servelec-flow-case-study-final.pdf

59 Ibid

inside the patient's body. By enhancing the surgeon's vision and enabling their hand movements to be sharpened and translated into precise, tremor-free movements inside the patient's body, significant improvements in precision, control, and flexibility are accomplished. This can reduce variability that can be dependent on the experience and expertise of the individual surgeon.

Surgeons throughout the UK have been at the forefront of driving innovation using RAS following the introduction of the da Vinci surgical system in the UK 10 years ago. RAS is well-established in the UK, and nationally commissioned for use for prostate and kidney cancer, and its use is growing in other areas, such as cystectomy, gynaecological cancer, colorectal cancer and being introduced in newer areas such as cardiothoracic surgery and head & neck cancer.

Outcomes / evidence

The benefits of da Vinci robotic-assisted, minimally invasive surgery have been explored in more than 15,000 peer-reviewed publications. They demonstrate RAS enables surgeons to offer their patients a minimally invasive surgical option, which can result in fewer complications, shorter hospital stays, less blood loss, fewer readmissions, and quicker recovery, when compared to open surgery.[60,61,62,63,64,65] These benefits not only impact the patient, but also the costs and value for the hospital. Purchasing a RAS system is an

60 Tewari, A, et al. 2012. Positive Surgical Margin and Perioperative Complication Rates of Primary Surgical Treatments for Prostate Cancer: A Systematic Review and Meta-Analysis Comparing Retropubic, Laparoscopic, and Robotic Prostatectomy. European Urology, 62, 1-15.

61 Martino, MA, et al. 2014. A Comparison of Quality Outcome Measures in Patients Having a Hysterectomy for Benign Disease: Robotic vs. Non-robotic Approaches. Journal of Minimally Invasive Gynecology, 21, 389-393.

62 ElSahwi, KS, et al. 2012. Comparison between 155 cases of robotic vs. 150 cases of open surgical staging for endometrial cancer. Gynecologic Oncology, 124, 260-264.

63 Lau, S, et al. 2012. Outcomes and cost comparisons after introducing a robotics program for endometrial cancer surgery. Obstetrics and Gynecology, 119, 717-724.

64 Paley, PJ, et al. 2011. Surgical outcomes in gynecologic oncology in the era of robotics: Analysis of first 1000 cases. American Journal of Obstetrics and Gynecology, 204, 551.

65 Kang, J, et al. 2013. The impact of robotic surgery for mid and low rectal cancer: A case-matched analysis of 3-arm comparison--open, laparoscopic, and robotic surgery. Annals of Surgery, 257, 95-101.

up-front cost. However, the value accrues over time. This means short-term analyses could mistakenly conclude the costs of the technology outweigh the benefits.[66] The cost and value of RAS therefore should be assessed throughout the complete patient care pathway.

The continual innovation and evolving technologies in minimally invasive, robotic-assisted surgery offer great potential for the future. The advances in augmented reality, imaging, optimised learning and less invasive approaches are an exciting prospect for patient-centred outcomes and addressing the capacity and resource challenges of our healthcare system.

Additional statistics:

- *More than five million robotic-assisted da Vinci procedures performed globally, to date*
- *875,000 da Vinci procedures performed in 2017*
- *Every 36 seconds, somewhere in the world, a surgeon begins a da Vinci robotic-assisted surgical procedure*

66 Chandra, A., et al. 2015. Robot-Assisted Surgery for Kidney Cancer Increased Access to a Procedure that Can Reduce Mortality and Renal Failure. Health Affairs, 34(2):220-8

7. Barriers and opportunities

Barriers

Roll-out, scaling and diffusion

Ensuring that effective innovations are scaled up, diffused and embedded across the whole of the NHS is very challenging, particularly given the fragmented nature of the commissioning process. Policy in funding in recent years has created a successful network of incubators, in many senses. However, scaling up this work, ensuring that learning is shared and supporting adopter sites to flex existing innovations to fit their local requirements and address specific challenges is very difficult. Replicating successful outcomes and impacts from pilot sites has also proven problematic and frustrating for the sector.

Yet some innovations have diffused very successfully, including some telehealth initiatives and care bundles. It is crucial that the sector places a greater emphasis on the importance of spread and diffusion, not just celebrating innovation itself. It is also of fundamental importance that innovators, pilot sites and adopters alike focus on replicating effective diffusion techniques. Specific recommendations are outlined to this end in the Recommendations section below.

Consistency

The localised commissioning of health care, via CCGs, can result in the inconsistent acceptance of new innovations at local levels. For example, adjacent CCGs might have entirely divergent views about adopting a specific innovation. This can be very challenging for many innovators. Think, for example, about innovations relating to ambulance services which frequently cross CCG boundaries and relay patients to hospitals in multiple CCG footprints. Not only can this create significant practical challenges, but it can also lead to a postcode lottery in innovative offers.

Culture and risk

The health sector is, generally speaking, recognised as being risk-averse. This is of course a valid stance in many respects, given the relatively high risks in a medical setting versus other professional

environments. During the Commission session, we heard that there is not enough of an acceptance in the NHS of managed risk, or an acknowledgement that accepting a degree of failure is a necessary part of the innovation cycle. Risk-management procedures are common practice in other industries, but risk-avoidance seems to be closer to the norm in the NHS. Innovators argue that new ways of working cannot thrive under these conditions and culture.

Good decisions which lead to good outcomes of course should be rejoiced, but there are also valuable opportunities to learn from good decisions (made strategically and with the necessary evidence to hand) which do not lead to anticipated 'good' outcomes. Where innovations fail to perform, or cannot be replicated, the sector can generate useful learning and these experiences should be amplified, not ignored.

Professional pushback is also cited as a barrier to the uptake of innovations in the NHS. New ways of working and deviations from normal routines disrupt traditional value chains, often provoking resistance from some health colleagues who are more averse to change. Moreover, the way in which different teams, departments and organisations talk about innovation has resulted in a complex lexicon. This can be unhelpful when looking to commission and deliver new workstreams as differing language can confuse or alienate colleagues, rather than uniting them behind a new agenda.

Procurement

The NHS's procurement procedures are complex and can be highly challenging to navigate for anyone new to the sector. Contributors to the Commission session noted that silo-working makes procurement procedures more difficult, and that the wider NHS structure often acts to dissuade CCGs from adopting new innovations. This is because, to a certain degree, CCGs are forced to 'go out on a limb' to adopt new technologies, particularly before the evidence base is well-established or ahead of full NHS-endorsement. For most CCGs, this is not a tempting proposition, especially in a testing financial climate.

Burden of proof

Proving the safety, effectiveness and cost-effectiveness of a new innovation in health can be both difficult and costly. For example, the NHS Apps Library offers three tiers of accreditations: NHS approved (fully available evidence base, using a NICE assessment), NHS connected ("tested and approved for connection to NHS systems", with the user able to download information from NHS England into the app) and Health apps (other health apps that may be useful). For the fuller 'NHS Approved' accreditation, there is pressure for apps to evidence their efficacy, with just one app (MyCOPD) currently fully approved by the NHS. Moreover, in the wider private market some consumers also look for evidence of efficacy before, for example, paying to download an app. However, the fast-changing nature of apps make RCTs often an unsuitable method of evaluating effectiveness, and the low barriers to market entry mean that there is a multitude of available apps, with very few being robustly evaluated.

New strategies for evaluation must balance the needs of innovation and the requisite evidence base. For example, particularly for digital innovations it will be necessary to develop agile approaches which ensure safety is established as a first priority and which allow real-world data to be collected and to gradually advise the development and adjustment of the app. The question of health apps, their evaluation and accreditation are discussed in more detail in a separate paper published as a part of this Commission.[67]

The challenge is not just felt by app developers, however. As highlighted during the Commission session the often-assumed requirement of an RCT for new health interventions is largely a carry-over from the pharmaceutical industry and the trialling of new drugs, and this affects innovations all along the health pathway (from prevention through to specialist clinical interventions). RCTs typically take 3 to 5 years to complete and are hugely expensive, neither of which are qualities which typically lend themselves to digital or technological innovation.

67 Holley-Moore and Hochlaf, (2018), Cutting through the App: How can mobile health apps meet their true potential?

We heard that flexibility is required in evidence synthesis and review. One contributor argued that real-world evidence gathering is a valuable and under-utilised source of data. This could include a greater use of patient-report outcome measures (PROMs), as well as discharge times and length of stay (LOS) data. In the evaluation of interventions, a wider range of data should be considered valid, including survey, qualitative and usage data. In a positive sense, there has been recent movement on this issue. For example, a new Clinical Digital Council has been introduced to ensure that NHSE, NICE and Public Health England (PHE) are keeping up to date with the fast-developing market of digital health. One of the ambitions of the group is to create a consensus on what 'good evidence' is in terms of digital health.

Not only is proving efficacy burdensome for many smaller companies, but so too are compliance procedures which we heard can make delivery, roll-out and scaling-up unnecessarily arduous for new companies, even for relatively simple interventions.

Interoperability

Often-mentioned in many different contexts, the lack of interoperability between NHS systems is a significant challenge for innovators. The technology systems operating in different parts of the NHS and social care do not 'speak' to one another and this prohibits a lot of data sharing, which makes the development and implementation of new digital innovations more challenging. Take GP surgeries alone, the vast majority of which use either SystmOne or EMIS Web software. Efforts to ensure interoperability between just these two primary care systems alone are slow-moving, with a landmark pilot achieving some recent progress in May 2017.[68] However, enabling full compatibility will be crucial to the effective roll-out of many emerging innovations and this barrier is substantial in halting progress.

68 Accessed at: https://www.emishealth.com/news-events/news/systmone-and-emis-web-direct-interoperability-pilot-now-live/

Delivering on policy

As aforementioned, physical and mental health innovation is a well-discussed topic in policy circles, yet delivery has not kept pace with policy publications. Contributors to the Commission session argued that it is important to make policy adaptable and flexible, rather than focussing on perfecting wording at the development stage. By its very nature, policy morphs upon implementation and within real-world settings. Policy-makers need to focus on creating clear and actionable policy frameworks and guidance, and then supporting local areas and commissioners through longer-term funding and commitments which create consensus between governments rather than contradict or arbitrarily undo what has gone before. Expert speakers also argued that delivery is under-appreciated in the sector and that this needs to change.

Financial context

Belt-tightening and an agenda for rapid change have in some ways created an NHS culture in which piloted innovations must prove their worth in increasingly short timeframes in order to be adopted at scale. Funding from central government sources, such as through the Vanguard programme, is welcomed by innovators, but the short-term nature of these grants may run the risk of stifling innovation before it is able to flourish. The NHS has long rewarded output (such as an acceptable proportion of patients being seen within a defined waiting time) over outcome (such as improved patient-reported quality of life). This is an approach that does not always reward the outcome of innovation, which is often demonstrated in improved quality.

Brexit

Brexit and the future uncertainty about the UK's ability to attract and retain promising innovators, as well as high-performing clinical staff, may present challenges. The Industrial Strategy has made steps to address this, but there remain many 'unknowns' regarding the final Brexit deal, leaving a good degree of uncertainty.

Opportunities

Engagement

The proliferation of policy on the topic of health innovation and a wealth of studies, inquiries, events, conferences and publications demonstrates exactly how engaged the sector and other interested parties (including think tanks, universities, and the private sector) are in this topic. The audience is nothing if not engaged, and keen to turn words into action. This enthusiasm is a fantastic resource. Now is the time to implement appropriate structures and funding to turn this interest into action and the delivery of commitments. There is strong NHS leadership supported by policy commitments to promoting and fostering innovation. It is stated clearly by the Government that innovation will be crucial to addressing the existing and imminent challenges to health. This was made clear in the Five Year Forward View and has been since reiterated in multiple policy papers, as outlined previously in this paper.

Collaboration

Innovations in this sector look set to promote collaboration which will undoubtedly help the health sector. Experts witnesses at the Commission session highlight the uses of technology in supporting other colleagues across the world, for example through tele-proctoring for robotic-assisted surgical procedures. Health is certainly a field in which collaboration is a crucial enabler in improving outcomes, alongside the sharing of best practice. Collaboration is not only forthcoming in the clinical domain. NHSE's and NHS Improvement's (NHSI) joint management in seven localities will help to bring colleagues closer together in their thinking and practices, thereby likely supporting implementation of innovation. Moreover, the UK's universities offer world-leading teaching and research capabilities and attract top quality international students, thereby providing a fertile ground for collaboration and innovation.

Opportunity areas

There are many opportunity areas for innovation which are little discussed in the media, but which provide genuine chances at cost-efficiencies and more effective working styles. Back-office innovation was cited during the Commission session as a crucial piece in the puzzle. Commissioners need to be confident in shaking-

up practice in administrative and support services as well as in front-line delivery or research & development. Moreover, risk-benefit decisions about treatment options and pathways can be very difficult for clinicians to make, in particular in certain circumstances, for example where a patient's co-morbidities include a diagnosis of dementia. Innovations to support this decision-making piece in the treatment pathway would be hugely valuable for clinicians, and expert witnesses cited this as a crucial opportunity area.

Academic health science networks

The 15 Academic Health Science Networks (AHSNs) play a crucial role in pioneering new ways of spreading and adopting healthcare innovation. For example, seven regional programmes have recently been selected by the AHSNs for national roll-out between 2018 and 2020, with ambitious targets set for outcomes and impacts.[69] Set up in 2013, initially for a period of five years, the AHSNs have formally been approved a new five-year licence by NHS England, as part of its 10-year vision to drive health innovation and stimulate economic growth. This will enable the AHSNs to continue supporting opportunities for spread and diffusion.

Supporting digital innovations to market

There are opportunities for the UK to learn from experiences and developments in other countries. For example, in achieving a more rapid endorsement of effective digital interventions. In the US, the FDA has been taking steps to address this issue, through its Digital Health Innovation Action Plan, and in particular the Pre-Cert Pilot Program launched in July 2018. The latter has seen the selection of nine participants, with the programme intending to enable a more tailored approach toward digital health technology.

The FDA will be able to pre-certify companies that meet expectations for software design, validation, maintenance and quality standards. The pilot programme is designed to help define the metrics required for pre-certification, as well as explore how companies could potentially submit less information to the FDA

69 The AHSN Network (2018) Guide to the AHSN Network 2018 Our collective impact and future plans. Accessed at: http://www.ahsnnetwork.com/wp-content/uploads/2014/12/A4-Impact-Report-Web.pdf

than is currently required. It is hoped that this approach will reduce the burden on digital innovators and help get products from effective and high-quality innovative companies to market with pre-certification more quickly.

Patient and clinician advocacy and membership bodies

Enveloping the expertise and experience of patient advocates and professional membership bodies is an important opportunity area for the sector, in terms of identifying unmet need and in understanding implementation processes. We benefit from hearing from individuals and clinicians about where innovation does and does not work. Embedding coproduction methods into innovation processes is a valuable opportunity area for learning and development.

Industrial strategy

The Industrial Strategy promises increased GDP funding for R&D and sets out a strategy for developing homegrown innovations, even in the uncertain climate of Brexit. The Strategy promises to 'Work with industry to boost spending on R&D to 2.4 per cent of GDP by 2027, which could increase public and private R&D investment by as much as £80 billion over the next 10 years. We will start by making an extra investment of £2.3 billion in 2021/22, raising total public investment in R&D to £12.5 billion that year alone'.[70]

Algorithmic decision-making

Algorithmic decision-making is becoming increasingly prevalent in many settings, including in healthcare. Algorithms and big data offer a range of opportunities such as support in easing workflows, ensuring treatment adherence, improving diagnostic accuracy and motioning diseases. Algorithms rely on data access and transparency to work effectively, and therefore as the Government continues to make health data available, the opportunities for algorithmic decision-making will increase.

70 Department for Business, Energy and Industrial Strategy, (2018), Industrial Strategy: building a Britain fit for the future. Accessed at: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/664563/industrial-strategy-white-paper-web-ready-version.pdf

National infrastructure

The gradual development of IT infrastructure offers a supportive environment for the wider roll-out of technology.

For example, improving the reach of superfast broadband across the country will offer more people the opportunity to utilise technology effectively in their home as well as in clinical settings.

8. Recommendations

Celebrate and reward scale up and diffusion, not just innovation

We support the recommendations outlined in a recent report by the Innovation Unit and The Health Foundation.[71] In particular, we argue that:

- Effective scale-up, diffusion and adoption should be rewarded, not just innovation. We need to see more funding opportunities for spread and scale-up, as well as rewards and recognition for effective adoption.

- The spread of innovation should not be an afterthought, and funding distribution must reflect this. Adequate funding and time should also be built into roll-out programmes, to enable adopters to access expert support to inform the embedding of innovations, and how to adapt them for local requirements.

- Innovators, pilot sites and funders should seek to build working partnerships with adopter sites and, by identifying the core elements crucial to success, programmes can ensure the requisite flexibility to help adopters to make the innovation work for them.

- Weight must be given to qualitative, as well as quantitative, evidence in the evaluation of innovations and their implementation, as this can provide rich learning for future adopters.

Manage risks effectively

- The NHS must improve risk-assessment practices in order to change the dialogue around risk and to instil a sense of confidence in integrating risk-assessment in day-to-day workloads.

71 Innovation Unit and The Health Foundation, (2018) AGAINST THE ODDS: Successfully scaling innovation in the NHS.

Accessed at: https://www.innovationunit.org/wp-content/uploads/Against-the-Odds-Innovation-Unit-Health-Foundation.pdf

- Experienced and senior frontline staff should lead by example, to promote a changed culture around risk. This should lead to a celebration of those who push ahead in the pursuit of effective innovation.

- Commissioners must also be encouraged to take managed risks when commissioning services.

    - The Government could look to develop national reimbursement commitments so that CCGs can feel confident in adopting new innovations and processes.

    - Reimbursement should protect and reward CCGs which embrace innovation.

- No innovation is 'risk free', from drugs to digital technology. It is important to accept that all change comes with risk (as does maintenance of the status quo), and instead focus on defining appropriate approval processes for different types of intervention.

Develop effective consortia

- In a complex market place, and given the increasing move to integrate health and social care services, it is crucial to foster a pluralistic mode of delivery.

- The third sector and industry both have important roles to play in catering to health consumer needs, but effective structures need to be put in place to better enable, not hinder, collaborations.

- Systematic barriers, such as data protection, whilst valid, make partnerships between the private sector and the NHS challenging. The NHS needs to lead the way in bringing together a range of actors with different expertise, be those clinical, behavioural, technological, analytical or other, and in streamlining processes to make collaboration simpler.

Change the conversation

- The NHS must openly acknowledge and celebrate the opportunities that come with increased demand on services (as stated in the Commission session, the private sector would never be heard complaining about an increase in demand!)

- A changed rhetoric is required, and the public sector must vocally support start-ups, SMEs and major industry players which are innovating in this market. Some innovators may be alienated by the negative reputation the private sector is often assigned in the NHS, and this frequently outdated and unhelpful viewpoint must be overcome.

Provide further support for start-ups and SMEs

- Start-ups and SMEs in this field rarely have the capital required to commission RCTs or other expensive research methodologies. There has been movement across the sector and by regulators on this, and other forms of evidence (real-world scenarios and qualitative data) are receiving new weighting, depending on what is appropriate and according to the type of intervention. We support continued change in this direction, so that innovations are not unnecessarily held back.

- DHSC and NHS should develop funding streams for evaluation and research methods to support start-ups and SMEs to evidence the efficacy of their innovations.

- Weighty compliance procedures hold back many smaller companies from delivering and rolling-out products and services at pace. These procedures should be reviewed in this light, so as to be commensurate with requirements.

Think about use-ability, as well as effectiveness

- User experience of innovations is crucial to their success, be that for clinicians or for the public. Those innovating in the health sphere should look to learn from consumer technology to create products that work, are evidenced, but are also simple to use.

- It is crucial that the NHS effectively prioritises when selecting innovations to pilot and scale-up. It must stand by those decisions to ensure useful learning is shared, no matter the outcome.

- The NHS and NICE must listen to patient advocacy groups and clinical experts about what works in practice and why, so that research and evidence are contextualised and brought to life. Commissioners need this fuller picture in order to make decisions.

Recognise and utilise the rich, existing policy base

- The Government must make use of the well-developed policy context that already exists.

- The Department of Health and Social Care (DHSC), the Department for Business, Energy and Industrial Strategy (BEIS), NHSE and other relevant government and arms-length organisations must commit to making fuller use and developing learning from the wealth of policy initiatives and reviews of recent years. This includes taking learning from policies that have been less successful than anticipated.

- This learning can be used to bolster some of the more effective initiatives, such as the Accelerated Access Review and the Academic Health Sciences Networks.

Show firm and lasting commitment

- The Government must make long-term funding commitments and create continuity of policy across governments in order to implement real and lasting change in this space.

- Setting up an APPG on Health Innovation would be a valuable first step in achieving consistency and consensus between parties.

Align digital platforms

- DHSC, along with all relevant bodies, must work to align NHS and social care digital platforms and functions so that all systems can communicate. Community, primary and secondary health care settings need to be able to share information, and this must also cover social care services.

- We strongly support the new Digital Innovation Hubs launched via the Industrial Strategy, as well as the recent announcement of the Local Health and Care Record Exemplars designed to support the Hubs. Just five areas have been selected at the time of publishing, and we urge a rapid roll-out of this programme, recognising the fundamental importance of data integration in avoiding a postcode lottery distribution of innovation.

- Data alignment is a frequent recommendation across multiple policy domains and topics, and one which would require significant commitment, time and investment. It is, however, long overdue and necessary to promote more effective innovation and efficiencies in this field.

Acknowledge the likely disruptions in order to plan effectively

- Effective innovations will lead to disrupted value chains, including the role of doctors and nurses, as well as the roles of support staff. This may lead to redundancies and altered working patterns.

- Commissioners must acknowledge these changes, for example implications on staffing numbers, and make the necessary adjustments early and with confidence.

- Commissioners must feel free to cull practices and technologies which are not working or are outdated, in particular where superior or newer innovations are emerging. NICE should provide guidance for this.

Recognise that innovations are not always 'glamorous'

- Back-office and structural innovations serve to benefit the health sector enormously over the coming years. DHSC and NHSE must focus on investing in (and publicising) these kinds of innovations, alongside those aimed at delivery, in order to reap the biggest rewards for the system and, ultimately, for the patient.

- Effectively integrate algorithmic decision-making

- We second a recommendation made by the House of Commons Science and Technology Committee in its report from the Algorithms in decision-making Inquiry. We agree with the recommendation that the Crown Commercial Service should commission an expert review of algorithms developed with private sector partners, which can fully realise the value of their use for the public sector. We argue that this should include a focus on the health sector.[72]

72 House of Commons Science and Technology Committee, (2018), Algorithms in decision making Fourth Report of Session 2017–19.

Accessed at: https://publications.parliament.uk/pa/cm201719/cmselect/cmsctech/351/351.pdf

ilc...

International
Longevity Centre UK

By 2037, we will
need 750,000
more care workers

ilcuk.org.uk

What happens next