

Briefing: Outpatient service redesign

The Health Foundation, Insight & Analysis Unit

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Overview

Redesigning outpatient services to meet growing patient demand and increase efficiency has been a dominant policy focus over the past decade. This is no surprise, given that outpatient activity in the English NHS has nearly doubled over the past ten years, accounting for nearly 85% of all hospital-based activity and £8 billion in expenditure each year.^{1,2} Most recently, the NHS *Long Term Plan* renewed the focus on outpatient care transformation, setting further ambitions for how care can be shifted closer to home and technology optimised to improve patient access and streamline services. Across the rest of the UK, the scene is similar though recent work has taken some steps forward in this regard. In Wales, 1000 Lives have brought together a compendium of cases and a guide to good practice that focuses on person-centred care, discusses some useful tools and concepts essential to improved process change in the management of outpatient services and provides some insights into the opportunities for transforming outpatient services such as moving care into community services, enhancing the referral process and using one-stop shop models where appropriate.³ The approach in Scotland has been similar and the government released a report in 2016, [The Modern Outpatient: A Collaborative Approach 2017-2020](#), for an approach to outpatient redesign and setting core principles to spread best practice, reduce 'did not attends', release outpatient appointments, and importantly, promote collaboration across healthcare sectors. In all the approaches and visions for outpatient care across the UK, making use of fast growing digital technology and the opportunities it presents is seen as a vital component to redesign and combatting some of the issues currently faced.

¹ <https://www.longtermplan.nhs.uk/wp-content/uploads/2019/01/nhs-long-term-plan.pdf>

² Rethinking outpatient services: Learning from an interactive workshop
<https://www.nuffieldtrust.org.uk/files/2018-08/outpatients-briefing-final.pdf>

³ <http://www.1000livesplus.wales.nhs.uk/outpatients>

The main functions of outpatient care appointments are to provide diagnosis and advice to support the management of conditions, follow-up reviews after hospital procedures, and ongoing specialist input for long-term conditions. Outpatient care pathways can therefore be broadly broken into three stages: referral, initial investigation and management, and monitoring and future care planning. As services struggle to cope with increased demand, a number of persistent quality and efficiency challenges have surfaced that create significant opportunities for redesign at each of these stages. These include (but are not limited to):

- **Cancellations and failed attendances:** 20% of outpatient appointments in England (and 25% in Wales) are cancelled or missed, which disrupts the flow of clinics and wastes resources. A common response to high numbers of missed appointments is to overbook clinics, which can create long waiting times and lead to clinics running late or backlogs in services.
- **Planning inefficiencies:** Patient appointment slots often do not reflect the level of complexity of patient's needs, which can leave inadequate time for patient questions and discussion, or to review notes and complete relevant documentation. This can result in frequent unsatisfactory visits for patients, and the need to schedule follow-up appointments that could have been avoided.
- **Lack of information and collaboration:** There are often lacking systems to support data sharing and collaboration between GPs and consultants, which can often lead to unnecessary referrals when a patient could more appropriately be managed in primary care, or lead to follow-up visits that increase patient anxiety and waste time.

This briefing provides information on 23 improvement projects that the Health Foundation has funded that involve outpatient redesign, the vast majority of which have been funded through our small-scale innovation programmes, *Shine* and *Innovating for Improvement*. Two projects were supported through our *Scaling Up Improvement* programme, one through the *Safer Clinical Systems* programme and another through *Innovation to Improve Outpatient Clinic Efficiency*.

The projects are grouped broadly into three categories related to the part of the outpatient pathway that is most fundamentally impacted by the project:

1. **Referral:** projects where the key intervention is related to how patients enter the pathway, though may also include some aspect of investigation/management
2. **Initial investigation and management:** projects that have transformed the outpatient appointment, either by a) shifting the setting where patients receive care from the acute sector into community or virtual settings; or b) redesigning how outpatient appointments are delivered within the hospital setting
3. **Monitoring and future care planning:** projects that have transformed how ongoing care is delivered, either by a) shifting follow-up services remotely through home monitoring and other digitally enabled services, or b) supporting ongoing self-management for long-term conditions.

1. Referral

NHS Darlington CCG: North of England back pain pathway

Scaling Up Improvement Round 1 (July 2015 – May 2018)
North East, England

Low back pain is the largest single cause of disability adjusted life years and of years lived with disability in the UK. There is variation in back pain management across professional groups in the NHS and private sector, often resulting in expensive investigations and ineffective care, leading to poor outcomes and low patient satisfaction. The North of England back pain pathway aimed to improve the management of patients with low back pain and radicular pain (sciatica) in the North East of England and Cumbria, building on an earlier pilot in South Tees funded by the local Academic Health Science Network. The pathway begins in primary care, where the person with lower back pain is assessed. They are then either discharged with self-management advice, referred to secondary care, or referred to a Triage and Treat Practitioner (TTP). The TTP then decides the next step of the pathway, which can include education, manual therapy and exercise. There is also the option to refer to a Combined Physical and Psychological Programme (CPPP), a residential programme that includes intensive exercise, education and help with long-term self-management.

Clinical measures were taken at baseline and discharge such as the STarT Back screening tool, pain intensity scale and Patient Health Questionnaire (PHQ-9). Analysis of this data after at two early implementer sites found statistically significant clinical improvements for patients on the pathway in pain, disability, quality of life, anxiety and depression, in both the TTP and CPPP groups. 53% of patients felt completely/ a lot better at discharge compared to baseline and 82% were extremely likely/ likely to recommend the pathway to friends or family. These improvements were maintained at six and 12 month follow-ups.

The team came across several setbacks and delays in implementation of the pathway with CCGs not being 'system ready' despite broad consensus of the idea and data collection being more time-consuming than anticipated. Other barriers to implementation were also identified; primarily, not attaining the buy-in of stakeholders, particularly GPs, and CCGs not considering the change to a back-pain pathway as a commissioning priority.

Cowgill Medical Practice, Bradford: Direct patient access to investigation for suspected upper gastrointestinal malignancy

Innovating for Improvement Round 3 (March 2016 – August 2017)
Yorkshire and the Humber, England

Survival rates for stomach and oesophageal cancer are low: only one in five people with stomach cancer and 15% of people with oesophageal cancer survive for five years or more. Early diagnosis is critical to preventing premature death due to these cancers. However, there are issues in patients being able to access appointments with their GP, and the current referral times are frequently 4–5 weeks, and appointments for testing and diagnosis a further 3–6 weeks. In June 2015, NICE published guidance recommending that patients presenting to GPs with symptoms and signs of possible malignancy are referred promptly for appropriate investigation. In this project Cowgill Medical Practice worked with five partner

practices in the Westcliffe Group in Bradford to implement and evaluate an intervention to improve diagnostic waiting times through direct patient access to investigations.

After completing a secure online triage questionnaire, patients presenting with upper gastrointestinal symptoms are referred either to an endoscopy clinic; an urgent outpatient gastroenterologist clinic; or their GP. During the project 69 patients with upper GI symptoms completed the questionnaire. Early results from a small sample of these patients show that those needing an urgent referral were seen within seven days. Furthermore, all referrals have been within NICE recommended time and in <50% of cases, faster than NICE recommended criteria. The intervention is now standard practice across the participating GP practices.

Hull and East Yorkshire Hospitals NHS Trust: Reducing inequalities in care for people with non-alcoholic fatty liver disease

*Innovating for Improvement Round 1 (May 2015 – August 2016)
Yorkshire and the Humber, England*

Liver disease is the only major cause of mortality that is increasing in prevalence in the UK. Non-alcoholic fatty liver disease (NAFLD) is the most common type, affecting 25% of adults, 70% of people with diabetes and 90% of those who are morbidly obese. Despite its prevalence, there are few defined management pathways for NAFLD patients. Most patients are diagnosed in primary care, but current community-based management is poorly defined with significant gaps in expertise. While many patients have 'simple' NAFLD, some patients progress to more severe forms, including cirrhosis or liver cancer. Deciding when to refer patients to a liver specialist is a challenge for GPs.

This project brought together GPs and liver specialists through an e-consult clinic, as part of an IT-based integrated care pathway for NAFLD. The e-consult pathway aims to standardise and improve care by detailing necessary investigations to determine the cause and severity of liver disease, and will promote early and accurate diagnosis. Patients presenting in primary care with abnormal liver function tests are entered onto the e-consult pathway. GPs then make a referral decision: to manage them in primary care or refer them to a specialist. In complex cases, GPs also have the option of referring the patient virtually for an e-consultation with a specialist. The specialist then reviews the patient data and provides appropriate management and follow-up advice. Early results indicated that the integrated care pathway has the potential to improve practice, as fewer patient referrals had missing liver assessment results and the time from first presentation to referral was quicker.

Betsi Cadwaladar University Health Board: Implementation of a virtual cardiology clinic

*Shine 2010 – 2011
Wales*

The aim of the Betsi Cadwaladar University Health Board project was to support demand management and enhance the speed and quality of care for new patient referrals, as part of

an integrated modern outpatient service. The team introduced a flexible 'virtual clinic' system, based in the cardiology service at Wrexham Maelor Hospital, to replace traditional outpatient clinic visits for new referrals. All GP queries went through a single-entry point regardless of mode (telephone, email, letter) to a nurse-led triage system, which signposted towards a one-stop clinic, virtual diagnosis by a consultant cardiologist or to a specialist cardiology clinic. This more efficiently linked primary and secondary care and empowered GPs to request and review of diagnostic test results and make decisions to discharge or undertake additional tests without the patient being present. The virtual clinic also included an email advice service which gave GPs direct access to a cardiologist. The new referral mechanisms and processes were received positively by GPs and seen as delivering considerable benefits. Compared to before the introduction of the virtual clinic, there was a reduced number of hospital visits booked for patients who were not appropriate for the cardiology outpatient clinic and more rapid access for patients needing urgent appointments. Equally, patients were able to get rapid resolution of problems, within days rather than weeks.

2. Initial investigation and management

Shifting the setting and delivery of services out of acute care into community/ or virtual settings

Shifting outpatient care into the community

South Eastern Health and Social Care Trust (SEHSCT): Development of a multidisciplinary cow's milk allergy management clinic in a community setting

*Innovating for Improvement Round 2 (November 2015 – February 2017)
Northern Ireland*

Cow's milk allergy (CMA) presents within the first year of life and affects an estimated 2–6% of the population. Treatment with strict avoidance of cow's milk is required for babies and breast-feeding mothers, with an appropriate substitute infant formula. Inadequate or delayed treatment increases psychological stresses within the family and can increase the likelihood of persistence of CMA and/or development of further food allergy.

In 2013, a new infant feeding pathway for CMA was launched in Northern Ireland to improve the awareness, diagnosis and management of CMA. This led to increased referrals to the dietetic service and an increase in waiting times. The allergy team at SEHSCT aimed to transform the referral pathway for CMA infants in order to provide more timely advice and assessment, and reduce possible secondary problems. A clinic model involving group parental education material on the management of CMA was developed alongside 1:1 assessment tool to screen for more serious allergic conditions. The clinics were based outside the hospital in community/primary care settings, and both GPs and health visitors could make referrals directly to the service. The model also provided telephone follow-up by a nurse at 6 weeks and a dietitian for weaning advice.

During the project, the clinic model was continually evaluated, (using PDSA cycles) to improve on triage/selection criteria, assessment sheet development, and follow-up protocols,

along with patient satisfaction regarding accommodation and educational content. Waiting times were dramatically shortened from a hospital clinic waiting time of 28 weeks, and a community paediatric dietetic wait of 52 weeks, to a median waiting time for a clinic of 11.4 weeks. 90% of the babies achieved 100% of the clinical dietetic outcomes including being established on appropriate milk free formula/breastfeeding, achieving timely and appropriate milk free weaning and a resolution of symptoms. Carers and team members had overwhelmingly positive responses.

South Tees Hospitals NHS Trust: Parkinson's Advanced Symptom Unit (PASU)

Innovating for Improvement Round 1 (May 2015 – August 2016)
North East, England

This project aimed to improve care for Parkinson's Disease patients and introduced a novel outpatient service, the Parkinson's Advanced Symptoms Unit (PASU), to aid hospital outpatient clinics for Parkinson's disease who often struggle with the complex needs for these patients. PASU is a rapid-access, community based, self-referral service for patients with advanced Parkinson's disease and addresses both physical and mental wellbeing. Flexible scheduling of patient slots is offered and detailed assessments can be taken without the time pressures of a normal clinic environment. Improvements were seen in patient quality of life (as measured by the EQ-5D questionnaire) and patient engagement (LTC-6 tool) as assessed at follow-up. Over 6 months, there was a 16% reduction in unscheduled admissions to hospital for patients with Parkinson's disease compared to pre-PASU, which is significantly more than the overall trend of 6% reduction in all emergency admissions over this same time period, demonstrating the efficacy of the project.

Central London Community Service: Community-based, consultant-led one-stop-shop for carpal tunnel syndrome patients

Shine 2014 – 2015
London, England

The traditional care pathway for carpal tunnel syndrome (CTS) involves multiple appointments with several professionals over an extended period. It is costly and time consuming for patients and health providers.

A project team from the Central London Community Service looked at how care can be delivered more effectively. They implemented a community-based, multidisciplinary one-stop-shop model at Edgware Community Hospital for CTS patients.

Patients who were treated in the one-stop-shop were reviewed against 40 patients treated in the conventional multi-visit secondary care pathway, looking at cost effectiveness, waiting times, patient satisfaction and patient experience. A more streamlined model of care reduces costs, and is quicker and easier for the patient. As the clinic is run on a Saturday and is in a community setting, it is more accessible and convenient, and patients only require one appointment, and as the day hospital is not in use on a Saturday, it better

utilises expensive facilities too. Using a dual theatre approach also means that a patient is only in theatre for 15 minutes, rather than 30-60 minutes, improving efficiency.

Supporting digitally-enabled outpatient appointments

Barts Health: Scaling up virtual consultations across the NHS

Scaling Up Improvement Round 3 (November 2018 – November 2020)
London, England

Traditional models of outpatient care are not always aligned to the needs of patients and can be difficult to access, leading to high rates of non-attendance at appointments and poor patient engagement. Missed appointments can result in poor health outcomes and greater use of emergency care, while increasing costs. Research has shown that using remote video outpatient consultations rather than face-to-face review with patients in hospital has the potential to address some of these issues.

Through this Scaling Up Improvement project, the team at Barts Health created a virtual consultation unit to facilitate local spread and national roll-out of virtual consultations by supporting sites who are interested in using this type of consultation. The unit provides: clinical, technical, management and administrative expertise; resources for sites to support implementation; demonstration clinics for teams to observe the virtual clinics in real time; workshops for clinicians; and an online forum connecting sites.

The team is now working with two external sites to spread virtual consultations to Oxford University Hospitals NHS Foundation Trust and Northumbria Healthcare NHS Foundation Trust. A project website has also been established that provides resources to further support spread, with the ultimate aim of creating a national network of sites who can learn from each other's experiences.

Newham University Hospital NHS Trust: Web-based outpatient consultations in diabetes

Shine 2011 – 2012
London, England

The Newham University Hospital NHS Trust team implemented web-based consultations for diabetes patients attending an outpatient clinic. Their aim was to explore whether online consultations could provide more accessible and cost-effective care in the diabetes department, using readily-available, affordable technology. The team offered online consultations via webcam to patients under the care of one consultant and one specialist nurse, where clinically appropriate and where physical examination was not required.

Over a period of ten months, 89 patients signed up for web-based consultations - a patient uptake rate of 62% - and 174 webcam appointments were scheduled.

The overall 'did not attend' (DNA) rate for webcam appointments was 27%, compared to 33-50% (depending on age) for standard clinic appointments. As patients got used to the new system and the technology was fine-tuned, the DNA rate fell to 16%. The project evaluation also indicated that web-based consultations can reduce A&E attendance over time.

Patients reported that they preferred webcam consultations to face-to-face appointments, saying that they saved time, offered greater convenience, and that they felt more likely to attend the web consultations. Staff and patients reported that the quality of care over webcam was at least as good as that provided face-to-face.

Redesigning outpatient services within a hospital setting

University Hospital of South Manchester NHS Foundation Trust: Rapid Access to complex Pulmonary Investigation Days: the RAPID programme in early stage lung cancer

*Innovating for Improvement Round 3 (March 2016 – August 2017)
North West, England*

The RAPID programme is a patient-focused approach to early diagnosis of lung cancer, aiming to ensure that all patients have a clear diagnosis within seven days of referral. Any patient with suspected lung cancer is eligible.

The programme, which is now an established service within UHSM, sought to improve patient experience reduce variation and standardise diagnostic evaluation; eliminate medically unjustifiable delay; and offer a co-ordinated programme of multiple investigations on a single day.

The programme has evaluated over 1,000 referrals since March 2016 and has embedded:

- next day access to CT scanning for GP two-week wait referrals
- daily triage of referrals with a CT scan and same day confirmation of no cancer
- integrated nursing and navigation support for patients requiring investigation
- a clear investigation plan on first clinic attendance with all appointments pre-booked
- a RAPID hub, with dedicated patient and physician contact details

The key successes of the programme include:

- elimination of two week waits and 31 day breaches
- increased number of CT scans performed by day seven (92% of GP referrals)
- increased MDT discussions by day 14 from GP referral by 42%, and by day 21 by 77%
- absence of cancer confirmed on the day of the CT scan (previously an average 6 day wait)
- improved patient experience and satisfaction

University Hospital Southampton: Improving cancer patient experience with a multidisciplinary palliative assessment and radiotherapy clinic

*Innovating for Improvement Round 2 (November 2015 – February 2017)
South East, England*

Patients with cancer-induced bone pain often wait weeks to receive palliative radiotherapy treatment and assessment by specialist palliative care services or other allied health professionals (physiotherapy, occupational therapy, dietetics). While waiting, they continue to have psychological distress and potentially debilitating physical problems. Experience and research have demonstrated the feasibility of combining assessments from a number of different specialists with the entire radiotherapy pathway in one hospital visit. However, few of these services have also incorporated specialist palliative care assessment.

This project involved the development of a rapid access, multidisciplinary palliative assessment and radiotherapy treatment clinic at University Hospital Southampton. The clinic model allows processes that usually take up to 3 weeks, and involve at least 3 separate appointments, to be carried out in a single half-day visit. The clinic combines assessment by specialist professionals from palliative care and clinical oncology with the planning and delivery of palliative radiotherapy.

Between March 2016 and February 2017, 54 patients were seen in 31 separate clinic days. These patients came from 6 separate regional hospital Trusts, from 9 different referring specialties/ healthcare professional groups and had 9 separate primary cancer sites (most commonly lung cancer in 40% of patients). The clinic model reduced the median time from referral to radiotherapy from 22 days in the comparator cohort to 8 days in the RAMPART cohort. Pain and quality of life were improved in the small group of patients assessed at follow-up. Feedback from patients, carers and referrers on the multi-disciplinary approach has also been positive.

NHS Lothian: Provide the right information, at the right time for the right patient, every time

*Safer Clinical Systems 2008-2013
Scotland*

NHS Lothian aimed to create safe and reliable systems for managing the flow of information about patients so that all relevant and necessary clinical information was available to staff working in outpatient clinics. Results were impressive, with errors in records reduced by over 90%.

The team identified that many patients had multiple sets of case notes, plus there was an issue with duplicate registrations on the patient administration system. This contributed to a lack of information in outpatient clinics, which negatively impacted on patient safety.

The team used various techniques to analyse systems and diagnose issues, including using data, error and task analysis. The priority area was defined as reduction of duplicate patient registrations. The team developed a core data set and reduced duplicate entries to an acceptable level. They also introduced monitoring to minimise new duplicates.

Registration errors fell significantly, with duplicate registrations reaching their lowest level and correct registrations rising from 74% in April 2008 to a consistent 95% since May 2010.

University Hospital of North Staffordshire NHS Trust: Heart failure admission prevention

*Shine 2011 – 2012
West Midlands, England*

The team at University Hospital of North Staffordshire established a day clinic for heart failure patients to provide specialist clinical care on an outpatient basis. Their aim was to reduce demand for inpatient beds for heart failure patients, while also maintaining and improving quality of care.

It was hoped that the new day clinic would increase patient choice, reduce inpatient bed demand, provide care in line with national quality benchmarks, and be clinically and cost effective. The day clinic received excellent patient feedback but enabled the acute trust to remove nine beds, generating a cost saving of £980,000. There was also a financial saving of £365,000 for the health economy based on reduction in admissions and payments of a local tariff for the clinic.

Royal Bolton Hospital: Innovation to Improve Outpatient Clinic Efficiency

*Innovation to Improve Outpatient Clinic Efficiency (April 2010- March 2011)
North West, England*

The team at Royal Bolton Hospital aimed to improve workload capacity of outpatient clinics. After completing an initial audit, they identified a number of priority areas contributing to disrupted patient flow, including:

- Long patient wait times for new appointments
- Poorly managed clinic lists and appointment bookings, with appointments being both underutilised and overbooked.
- Inadequate scheduling systems that led to double booked appointments and failure to release unwanted appointments, leaving service gaps and the perception that patients were not attending.
- Variable ways of managing case notes, which led to delays, duplicated information gathering and dissatisfaction for patients and staff.

By addressing these issues, the team aimed to eliminate waste within the system and improve productivity to safely see more patients sooner.

Some highlights from their work are:

- Better outpatient bookings based on flow principles: Changes to how staff handled cancellations reduced rework from 1,004 hours per month to 141 hours per month.
- Improving the use of appointment slots: Use of general surgery slots improved by 45%, well above the initial target of 15%.
- Centralising outpatient case notes: A new process for storing and preparing notes centrally released the equivalent of 90 hours per week of band 2 time.

Imperial College Healthcare NHS Trust: Transformation of urology outpatients

*Shine 2010 – 2011
London, England*

The Imperial College Healthcare NHS Trust team implemented an improved care pathway to support short-notice access to urology outpatient services for new patients. By introducing daily clinics of up to eight patients, the team maintained the same weekly patient capacity but spread it throughout the week.

Each clinic offered a 'one stop' service, with diagnostics and clinical consultation undertaken on a single visit. Nurses were responsible for arranging blood tests, imaging and cystoscopies, with all test results ready in time for the patient to see the consultant.

The programme was led by consultants and involved multidisciplinary working across the urology department and other teams within the hospital, such as radiology and pathology.

The new to follow up ratio (number of follow up outpatient appointments taking place compared to the number of first outpatient appointments) for the Urology service was reduced from 2.7 to 1.6 over a period of eight months and this improvement has been sustained. The number of patient visits from referral to diagnosis fell by at least 50%. Patients were able to take less time off work for appointments, while the rapid turnaround of diagnostic tests minimised the 'uncertainty' time which often causes unnecessary anxiety for patients and their families. The new clinic model made better use of consultants' time and reinforced the nursing team's critical involvement in the service.

3. Monitoring and future care planning

Home monitoring/ remote care and improved self-management

University Hospitals Plymouth NHS Trust: Developing home-based Parkinson's care

*Innovating for Improvement Round 7 (February 2019 – March 2020)
South West, England*

People with Parkinson's disease (PD) are more likely to be admitted to hospital, have a prolonged length of stay, and have increased mortality during admission. Most admissions are related to falls, chest infections and urinary infections. Guidelines suggest that people with PD should have a specialist review at least every six months. However, the caseload is

often too high to provide this, and in geographically large rural areas, such as in Plymouth, where access to district nurses can be more difficult for patients, adds to the pressure. This project will introduce technology to enable the delivery of home-based assessment and care for people with PD in the Trust's outpatient services. The device – Parkinson's Kinetigraph (PKG) – is a wrist-worn device and measures a patient's movement will continuously for six days. Patients will also be given a non-motor symptom questionnaire to help monitor broader symptoms. Data from the assessments will then be evaluated by the remote care team at the Trust, who will then liaise with either the patient directly, or via the community nurse specialist, to implement any required changes to therapy. An education package will also be produced to support patient, carer and staff education, and incorporates information on triggering contact with patients, self-management strategies for non-motor symptoms, the importance of maintaining activity levels, and how remote monitoring works.

Great Ormond Street Hospital NHS Foundation Trust: A mobile phone app to improve self-management in young people with arthritis

Innovating for Improvement Round 3 (March 2016 – August 2017)
London, England

Arthritis starting in childhood causes joint pain, swelling and stiffness. Suboptimal treatment leads to physical disability and poor school attendance, even permanent damage to joints and longer-term problems and the inability to work. Effective treatment exists but is dependent on adolescents effectively engaging with health care and self-management. This innovation made use of a smartphone app for patients and a web portal for clinicians, enabling patients to record information related to their physical and psychological wellbeing, access information, receive important medication and blood test reminders and communicate with their health care professional. The intervention enabled finer-grained monitoring of arthritis in a way that is impossible to obtain with occasional clinic visits and therefore improved clinic consultations. It also achieved a user-friendly and personalised way to capture reports of clinical symptoms and medication adherence in natural settings that are time- and date-stamped.

St George's University Hospitals NHS Trust: Home monitoring of hypertension in pregnancy via an innovative app

Innovating for Improvement Round 2 (November 2015 – February 2017)
London, England

Women with high blood pressure in pregnancy are advised to attend hospital frequently to monitor for the development of pre-eclampsia. This project involved the development of a smartphone app that allows women to monitor their health at home and alerts them if they need to attend hospital for further assessment. Results were also uploaded to the hospital computer system so that clinicians were also able to log in and see their patients' blood pressure readings in real time. Its aim was to empower women to be involved in their own clinical assessment, improve patient experience and satisfaction, and reduce hospital waiting times. Home Blood Pressure Monitoring (HBPM) significantly reduced the number of appointments for hypertension by 53% and the amount of time per appointment compared to

standard out-patient care for hypertensive pregnant women. This project also involved a hypertension clinic that was held once a week with a maternal medicine specialist midwife and a consultant for obstetrics and maternal medicine. The hypertension clinic has now become established as routine practice in the maternity setting.

University of Southampton Auditory Implant Service: Personalised long-term follow-up of cochlear implant patients using remote care

Innovating for Improvement Round 1 (May 2015 – August 2016)
South East, England

Around 1,400 people receive cochlear implants in the UK each year. These patients need a lifetime of follow-up, with regular adjustment and rehabilitation appointments in the first year and then annual follow-up appointments. Cochlear implant care is provided at one of 19 specialist tertiary centres in the UK, which may be several hours away from the patient's home, requiring travel costs, time off work and family disruption.

This project introduced a long-term follow-up pathway for people with cochlear implants that offered remote self-monitoring, self-adjustment of devices, and a personalised online intervention package for testing their own hearing at home. A six-month trial involved 60 people randomised to either the remote care pathway or a control group, who followed the usual care pathway. The remote care group were given tools to enable them to care for their implant and hearing at home, including a home hearing test on a tablet or computer, online troubleshooting, and remote assistant fitting. Trial results from a disease specific empowerment questionnaire (adapted Patient Activation Measure) showed that patients in the intervention arm experienced a significant increase in how empowered they felt to look after their own hearing and maintain their devices. On average, people in the remote care group were found to strongly agree with an additional five statements at the exit interview compared to at baseline, whereas the control group showed no changes. Home hearing test results improved in the remote care group, although results from a self-assessment hearing ability questionnaires revealed that patients had not noticed a change (whereas the control group felt their hearing had become slightly worse). Quality of life remained unchanged in both groups.

Heart of England NHS Foundation Trust: Smart rehabilitation at home before and after lung surgery

Innovating for Improvement Round 1 (May 2015 – August 2016)
West Midlands, England

This project involved the development of a tailored, at-home, app-based rehabilitation programme for patients before and after lung surgery. Studies had shown that outpatient based support programmes can reduce complications and readmissions, but there is a lack of access to these programmes for patients. This innovation consisted of self-care, education and exercise to help patients prepare for surgery and improve their recovery. It also includes use of a Bluetooth pulse oximeter to measure heart rate during exercises,

giving feedback to the patient on progress. It is the first validated enhanced recovery programme of its type for lung surgery patients.

In total 33 patients joined and completed the programme. Data was compared with patients on the outpatient rehabilitation programme. Overall the app-based group compared well with the outpatient-based group on some key measures like post-operative pulmonary complication (PPC) rate (9.4% compared to 10.6%). However, patients from the app group had noticeably higher three-month readmission rates (21.9% compared to 12.8%). Interviews with patients found very positive experiences of using the app with success contingent upon both the ease of use, personal levels of motivation and health status.

NHS Stoke on Trent: Text-based management of hypertension

Shine 2011 – 2012

West Midlands, England

The project team in Stoke developed an interactive SMS texting service to motivate and support patients to monitor their blood pressure and take appropriate action when needed.

The telehealth system, known as 'Florence', requires patients to send specific data, such as blood pressure or heart rate, to a secure server. Any data received prompts an automated text response from Florence. If the data falls outside of the expected range, the automated system will recommend corrective action to lower blood pressure or suggest that the patient seeks professional advice. The intervention group was compared with a matched control group, with baseline data confirming that the groups were similar at the start of the project. Compared to associated controls, over the length of the project, patients using Florence demonstrated a greater average and significant reduction in systolic blood pressure, significantly increased numbers of blood pressure readings and qualitative data highlighted improved self-management. 96% of patients reported being very satisfied with the SMS service.

University Hospitals of Leicester NHS Trust: Activate Your Heart - supporting individuals with coronary heart disease

Shine 2010 – 2011

East Midlands, England

This project aimed to improve access to and choice of cardiac rehabilitation and enable patients who would not otherwise be able to join a rehabilitation programme to do so. The team developed an online programme, Activate Your Heart (AYH), which offered patients tailored exercises along with access to health care specialists through discussion forums, live chat and emails.

Of the 68 patients that completed the programme, 90% said they would not have attended a conventional cardiac rehabilitation clinic. The project enhanced staff confidence in using new rehabilitation methods and freed up time for them to care for patients with more complex needs. AYH has now become embedded into working practices at the trust.