Evaluating the London remote monitoring scale up programme for managing Long-Term Conditions

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Health Innovation Network
South London

Contents

Glossary

Acute Care: A term describing the hospital level care and treatment people receive when that care is active but short-term, and is normally in response to an injury, an episode of illness, an urgent medical condition, or during recovery from surgery. This type of care can be provided in primary, secondary or community care.

Hospital at Home: Hospital at home is a type of virtual ward. A virtual ward may also require face-to-face care, e.g. to deliver a care assessment or acute level interventions such as IV therapy. The model that blends in-person care at home with remote oversight and monitoring is often referred to as a hospital at home.

Long-term condition: A health problem that requires ongoing management over a period of years or decades. It includes a broad range of medical issues, for example asthma, diabetes. and arthritis that can be managed through medication and/or therapy.

Remote monitoring: Gathers patient data (e.g. images, symptoms, physiological observations) to give clinicians and patients information that would normally only be obtainable in a face-to-face assessment, to improve clinical decision making, provide reassurance, and enable the early detection of deterioration. This may include solutions that are enabled by digital technology, e.g. wearable devices.

Supported self-management: Supported self-management is part of the NHS Long Term Plan's commitment to make personalised care the norm. We use the term 'supported self-management' to mean the ways that health and care services encourage, support, and empower people to manage their ongoing physical and mental health conditions themselves.

Virtual ward: A virtual ward is a safe and efficient alternative to NHS bedded care that is enabled by technology. Virtual wards support patients who would otherwise be in hospital to receive the acute care, monitoring and treatment they need in their own home. This includes either preventing avoidable admissions into hospital or supporting early discharge out of hospital.

1. Background

The NHS Long Term Plan (LTP)[1] outlines an ambition to use digital technology to support remote monitoring of conditions across care settings. As part of this work, NHS England is focusing on supporting the accelerated spread and scale up of remote monitoring.

Across the five London Integrated Care Systems (ICS), several interventions aiming to support the remote monitoring of patients with Long Term Conditions (LTCs) have been scaled up over the last two years, across a number of clinical pathways. Each of these have been set up differently, influenced by local factors and the digital solution chosen to support the remote monitoring of patients in each ICS.

In order to understand how implementation and delivery have progressed at a local and pan London level, the London Digital team[2] at NHS England commissioned **a series of evaluations looking at the use of remote monitoring in supporting the management of LTCs across different clinical pathways (**_Figure 1 Evaluations by ICS and focus_**Figure 1).**

Each of the London Academic and Health Science Networks (AHSNs) were responsible for delivering one evaluation in each of their ICSs, with:
- The Health Innovation Network (HIN) carrying out an evaluation on remote monitoring of chronic obstructive pulmonary disease (COPD) and asthma in south east London and virtual wards in south west London.
- UCL Partners (UCLP) carrying out an evaluation on digital self-management of diabetes and COPD in north east London and diabetes risk stratification and management in north central London.
- Imperial College Health Partners (ICHP) carrying out an evaluation on remote monitoring across seven clinical workstreams in north west London.

Figure 1 Evaluations by ICS and focus

North Central London
UCLP - Diabetes risk stratification and management

North East London
UCLP - Digital self-management of diabetes and COPD

North West London
ICHP - Remote monitoring across seven clinical workstreams

South East London
HIN - Remote monitoring of COPD and Asthma

South West London
HIN - Virtual wards

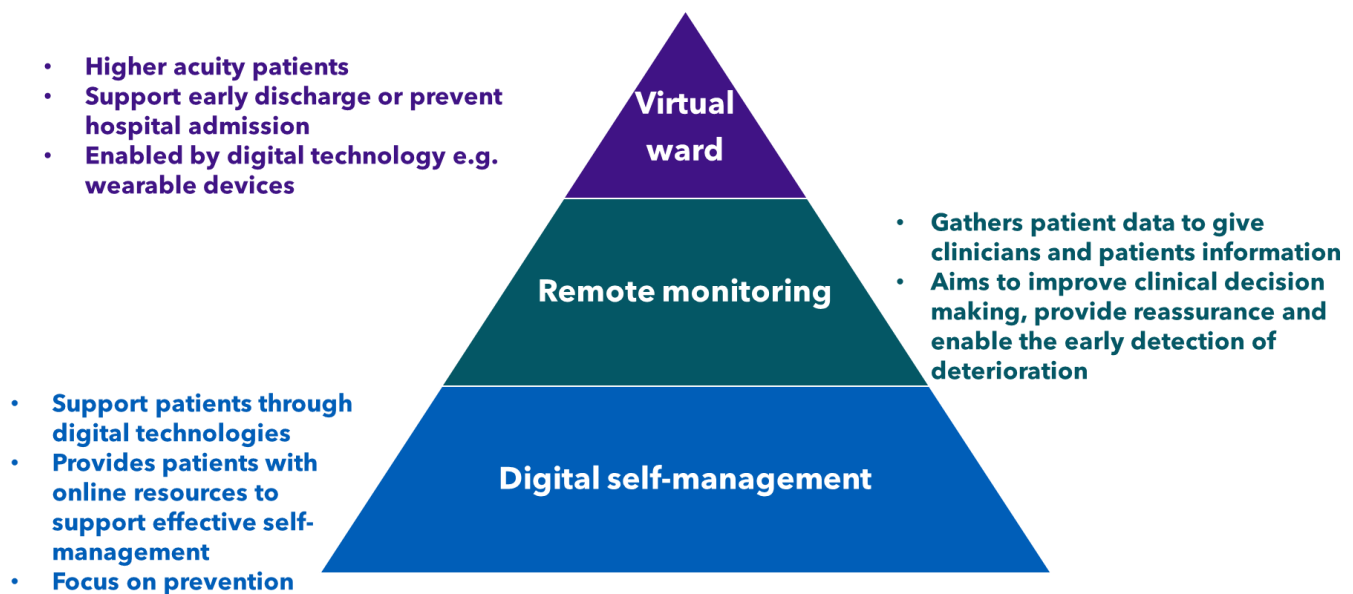---
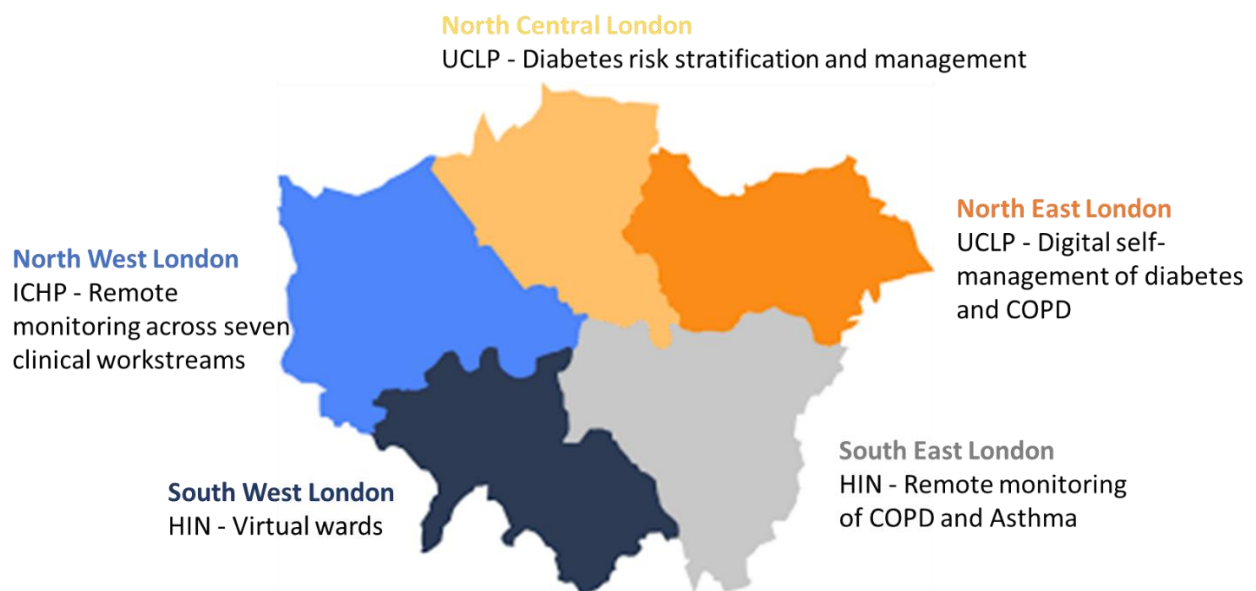
[1] https://www.longtermplan.nhs.uk/online-version/
[2] London Digital team oversees the delivery of efficient digital transformation across the capital to (1) enhance population health, ensuring alignment with local clinically driven and patient led requirements, and (2) support at scale transformation of London's ICS alongside Primary Care Networks

Remote patient monitoring refers to a channel of interaction or method of care between clinicians and patients in which the patient is monitored outside of a conventional clinical setting. It is a broad term that is not always restricted to people who would otherwise require inpatient hospital care. This may include the use of digital technologies to enable this tracking.

Remote monitoring can take several forms from supporting self-management to high acuity care (Figure 2):
- o Self-management, in which the patient monitors themselves and only they see their data.
- o Remote monitoring, comprising ad-hoc clinician support and intervention only when necessary.
- o Virtual wards, which support patients who would otherwise be in hospital to receive the acute care.

Figure 2 Continuum of remote monitoring care

- • **Higher acuity patients**
- • **Support early discharge or prevent hospital admission**
- • **Enabled by digital technology e.g. wearable devices**

Virtual ward

Remote monitoring

- • **Gathers patient data to give clinicians and patients information**
- • **Aims to improve clinical decision making, provide reassurance and enable the early detection of deterioration**

Digital self-management

- • **Support patients through digital technologies**
- • **Provides patients with online resources to support effective self-management**
- • **Focus on prevention**

Purpose

This report aims to summarise the insights generated through the five ICS-level evaluations addressing the following objectives:
1. Assess the practical acceptability and satisfaction of remote monitoring technologies for LTCs from the patient perspective.
2. Describe the conditions for implementation of remote monitoring technologies for LTCs from the staff perspective.
3. Describe the benefits (including financial benefits when possible) associated with the remote monitoring of LTCs.
4. Determine which factors support the successful implementation of remote monitoring technologies for LTCs.

It has done so by determining:

1. **Uptake and describing the patient characteristics** for each innovation evaluated, and responding to the following:
   a. How successful has the project been in reaching its target populations?
   b. Which type of patients are not using the innovations and why?
2. **Outcomes for patients, staff, and systems** associated with remote monitoring of LTCs.
3. **Effectiveness** of each innovation evaluated in assisting patients to manage their condition.
4. **Financial impact** of each innovation in assisting patients to manage their condition.

5. **Material, technical, and clinical challenges and facilitators** in implementing and delivering each innovation.

Error! Reference source not found. provides an overview of the overarching evaluation design, outlining the focus for each of the five ICS level evaluations.

Figure 3 Overall evaluation design

South East London	South West London	North East London	North Central London	North West London
• Focus on remote monitoring within COPD and asthma pathways supported by Doctaly Assist.	Evaluation of three virtual ward models using Vcare and Current Health: • Kingston & Richmond • Sutton • Croydon	• Focus on the implementation of a risk stratification tool and AccuRx Florey for people living with type 2 Diabetes.	• Focus on remote monitoring within COPD and Diabetes pathways supported by *my mhealth*.	• Focus on the implementation of seven remote monitoring programmes, with four different providers.

HIN   UCLP   ICHP

Pan-London insights, learnings and implications on the use of remote technologies to manage LTCs

Pan-London metrics/outcomes

Although some metrics and outcomes were unique to each specific evaluation, several are common across the five individual evaluations:

- The implementation process
- User profile
- User activity
- Patient experience
- Professional experience (e.g. workload, satisfaction etc)
- Patient outcomes (such as clinical outcomes) when possible

However, it is important to note that given the different technologies, pathways, conditions, and availability of data locally, it has not been possible to draw direct commonalities or comparisons between the different interventions and innovations. **Rather than synthesising outcomes, this report focuses on articulating the lessons learnt and implications across the five evaluations.**

This report has two main aims to (1) give a high-level summary of the five reports for each of the local evaluations (Section 2) and (2) describe learnings and implications that emerged from the insights gathered in each evaluation, structured and presented around the different domains of the NASSS framework (non-adoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies)[3] (Section 3).

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[3] Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, Hinder S, Fahy N, Procter R, Shaw S. Beyond adoption: a new framework for theorizing and evaluating non-adoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. Journal of Medical Internet Research. 2017 Nov 1;19(11):e8775

2. Overview of the five local evaluations

This section takes each of the five local evaluations in turn and summarises their findings.

2.1. South East London: Remote monitoring LTCs with Doctaly Assist

Overview

This evaluation focused on the use of the Doctaly Assist platform by both patients with asthma and chronic obstructive pulmonary disease (COPD), and staff from One Health Lewisham (the GP federation for Lewisham).

Doctaly Assist uses the WhatsApp messaging platform to facilitate the collection of patient information and the completion of clinical assessments and annual reviews. Clinicians can assess and interact with patients remotely. Patients without access to smart phones or WhatsApp can be supported through remote telephone consultations. One Health Lewisham (OHL), a GP federation of 33 General Practices in Lewisham which cares for more than 300,000 people, is responsible for managing the Doctaly Assist Long Term Conditions Review service to assist GPs in reducing their workload. It operates as a hub-led model, with a centralised team.

Evaluation purpose and design

The evaluation aimed to answer the following questions:
* Who are the patients with COPD and asthma that are using Doctaly Assist?
* How did these patients engage with the service?
* What is the patient experience of the service? Do patients find using the technology acceptable?
* What is the staff experience of the service?

It used a mixed-methods approach including in-depth interviews with staff and patients, and an analysis of data collected by Doctaly Assist (i.e. service data from October 2021 to August 2022).

Evaluation findings

Overview of Doctaly Assist data

A total of 4,861 patients (35.6% of patients invited to use Doctaly Assist) completed the registration process. A larger proportion of patients with COPD invited, failed to respond and register (65.1%) compared to the patients with asthma (60.2%).

User demographics
* 65% of patients with asthma that registered with Doctaly Assist were female, compared to 54.6% female Doctaly Assist-registered patients with COPD.
* The average age of registered patients with Doctaly Assist was 48 for asthma and 68 for those with COPD. For patients with asthma, uptake of Doctaly Assist was the lowest in the 18-24 and 55-85+ age groups, whereas for patients with COPD, uptake was the highest in the 45-74 year old age groups.
* Registration was proportionately lower in all ethnic minority groups (excluding white minorities)

for both patient groups.

User activity

- Of those registered, the majority (72.7%) had at least one completed clinical assessment by the time of analysis[4]. A higher proportion of registered patients with asthma had at least one assessment (73.8%) compared to registered patients with COPD (67.4%).
- This means that a quarter (25.9%) of all invited patients on the two pathways have had at least one assessment.
- The proportion of registered patients with asthma and COPD having at least one assessment tended to decrease with age.
- All ethnic minorities (excluding white minorities) registered on Doctaly Assist are less likely to have undertaken at least one assessment compared to white patients.

What is patient experience of Doctaly Assist?

- Participants' acceptance of remote monitoring was influenced by whether their medical condition was stable, and whether they understood how it could relieve pressure on primary care services. Some participants had not completed an annual review for their respiratory condition in several years, suggesting Doctaly Assist had been successful in reaching patients who typically have low engagement.

- Participants agreed that the text-based invitation method to the service was acceptable. Initial perceptions of the service varied from very positive to mixed. Motivators to register included: potential benefits for LTC care, contributing to easing pressure on the NHS, efficient route to regular care and treatment, and familiarity with the WhatsApp platform. Because insights were gathered from people using Doctaly Assist, there were no notable barriers to uptake.

- Interview participants reported positive experiences of care through Doctaly Assist, echoing the results of the OHL patient survey, with more than two thirds of respondents either very satisfied or satisfied with their experience of using the platform.

- However, a minority of patients interviewed reported mixed or negative experiences due to a number of issues, such as:
    - problems with obtaining newly prescribed medication due to the lack of interoperability between the Doctaly Assist platform and EMIS (although the platform is now fully integrated in some GP practices, with more to follow)
    - lack of clarity around the healthcare professional's identity
    - lack of medical equipment to carry out full assessments
    - technological issues and lack of technical support

- Other issues mentioned included poor pathway integration for multiple conditions; having to complete a pre-assessment before being able to engage with a healthcare professional; and occasional lack of responsiveness from the healthcare professionals via the platform. There were also some misconceptions around what the service did, suggesting that even patients who engaged well did not always fully understand how the service works.

A number of areas for improvement were identified by patients, namely raising awareness of the platform through far reaching and also targeted communications, more 'user-friendly' information as part of the onboarding process, having the option to directly engage with a Doctaly healthcare professional, and better signposting to technological support.

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[4] A clinical assessment corresponds to a LTC annual review. However, additional clinical assessments might be needed for an annual review to be considered as complete. For instance, follow-up assessments might be needed to check on outcomes of an annual review, such as medication change.

What is staff experience of Doctaly Assist?

Views on implementation and delivery
- Reflecting on what helped and hindered implementation and delivery, staff identified a number of enablers including:
    - the previous successful perception of the COVID-19 version of Doctaly Assist in treating patients,
    - staff and patient acceptability of the platform, and
    - perceived advantages of having a hub-led model which included a reduction of GP practices' workloads, working with a centrally run team highly familiar with the platform, and consistency in how the service is delivered.

- Staff also identified a number of challenges, some directly attributable to the learning curve common to any new service, such as lack of awareness of the service, issues with information being disseminated effectively to frontline staff, as well as resourcing and recruitment challenges. They also found others linked to the technology itself such as the lack of integration between the Doctaly Assist platform and EMIS, and lack of an agile dashboard.

Clinical staff experience of working and treating patients with Doctaly Assist
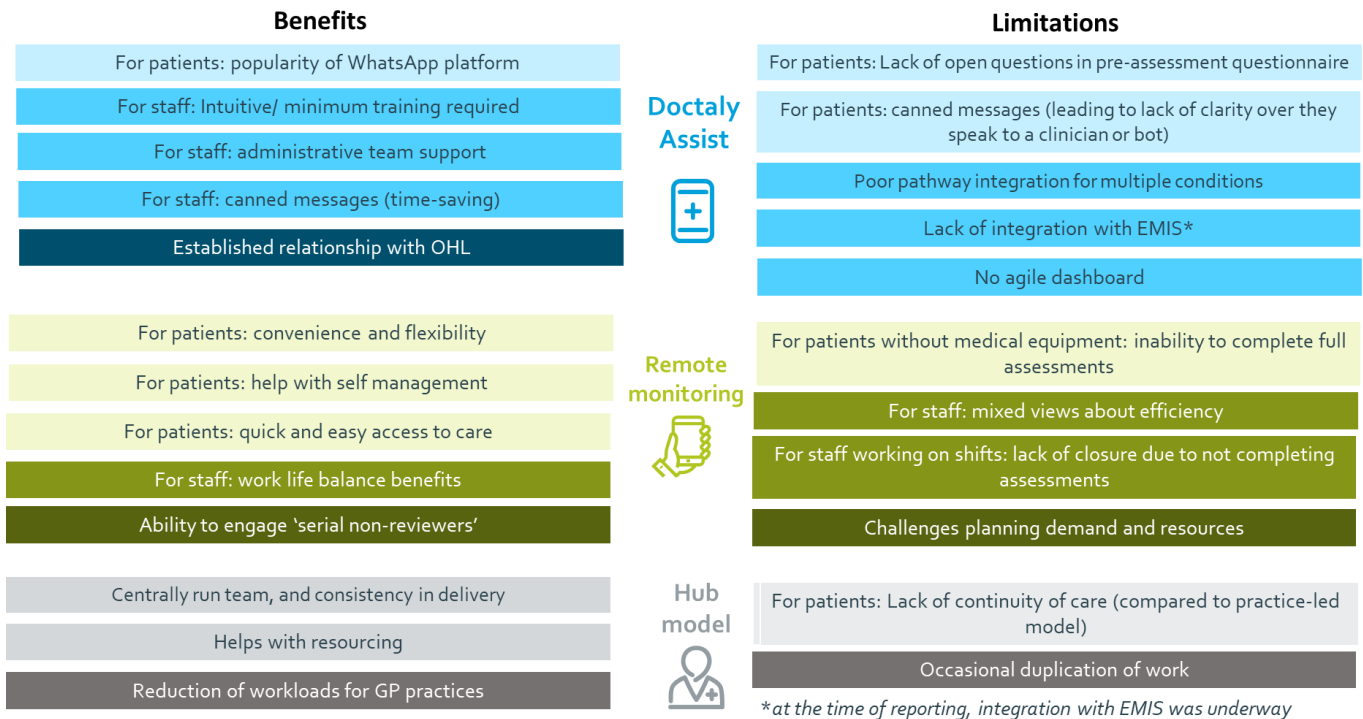- Clinical staff reported positive experiences of using the Doctaly Assist platform and praised its functionalities, such as the way it displays information about patients and its canned messages[5], as well as its administrative support team.

- They also noted benefits of the platform allowing them to work remotely and the positive impact this had on work life balance, including being able to work from anywhere, being able to manage their own workload, and how remote assessments tend to be less physically and mentally taxing than face-to-face appointments.

- Views around efficiency and productivity were mixed, with salaried OHL staff reporting more positive experiences of treating patients with asthma and COPD than locum GPs:
    - Some of the locum staff interviewed noted that remote assessments could take longer than face to face ones, and that they could feel disjointed due to a lack of responsiveness from some patients.
    - Salaried staff (who included nurses) reported more positive experiences which they attributed to (1) familiarity with completing face to face LTCs annual reviews as part of their clinical role (which meant they felt equipped to carry out remote ones too), and (2) working on the platform on a weekly basis rather than sporadically.

- Overall, staff believed remote monitoring and Doctaly Assist could be especially beneficial for people whose GP practices have found it hard to engage with, as well as patients who have a good understanding of their condition.

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[5] Canned responses are predetermined responses to common questions. Doctaly Assist uses canned responses to send template responses providing common instructions or advice to patients.

Figure 4 provides an overview of the benefits and limitations identified by staff and patients for using Doctaly Assist to remotely monitor LTCs.

Figure 4 Benefits and limitations identified by staff and patients

Benefits		Limitations
	Doctaly Assist	
For patients: popularity of WhatsApp platform		For patients: Lack of open questions in pre-assessment questionnaire
For staff: Intuitive/ minimum training required		For patients: canned messages (leading to lack of clarity over they speak to a clinician or bot)
For staff: administrative team support		Poor pathway integration for multiple conditions
For staff: canned messages (time-saving)		Lack of integration with EMIS*
Established relationship with OHL		No agile dashboard
	Remote monitoring	
For patients: convenience and flexibility		For patients without medical equipment: inability to complete full assessments
For patients: help with self management		For staff: mixed views about efficiency
For patients: quick and easy access to care		For staff working on shifts: lack of closure due to not completing assessments
For staff: work life balance benefits		Challenges planning demand and resources
Ability to engage 'serial non-reviewers'		
	Hub model	
Centrally run team, and consistency in delivery		For patients: Lack of continuity of care (compared to practice-led model)
Helps with resourcing		Occasional duplication of work
Reduction of workloads for GP practices		

*at the time of reporting, integration with EMIS was underway

Conclusion

This evaluation has shown that overall patients with long term conditions who have registered to the platform find using Doctaly Assist acceptable and will engage with the platform to complete remote assessments successfully. It has also shown that the platform has managed to reach some patients with typically low engagement.

Having a hub-led model and a centralised team was considered as beneficial, helping with resourcing, and the reduction of workloads for GP practices.

While the data collected highlighted some clear benefits of remote monitoring solutions from patients' and staff perspectives (such as convenience and flexibility, and ease of use), staff views around efficiency and productivity were more mixed.

This evaluation was not able to quantify the impact that Doctaly Assist has had on healthcare utilisation and further evidence is needed to determine whether it has significantly increased the take up of annual reviews, delivered any savings for individual GP practices or across Lewisham as a whole, and its impact on health inequalities.

2.2. South West London: Virtual wards using Vcare and Current Health

Overview

The South West London Integrated Care System has developed four virtual wards covering six boroughs: Croydon virtual ward, Sutton virtual ward, Kingston and Richmond virtual ward, and Merton and Wandsworth virtual ward. Each ward is currently locally resourced and admits a mix of COVID-19 and non-COVID-19 patients (including patients with COPD and heart failure). The development trajectory of each virtual ward has been influenced by local factors and each model has been set up differently (see below).

Evaluation purpose and design

The aim of this evaluation has been to assess the role of virtual wards in reducing hospital (re)admission and supporting early discharge of high acuity patients in south west London. More specifically, it aims to answer the following questions:
1. What are the core components of the virtual ward models?
2. What factors have supported the successful implementation of the virtual wards?
3. Who are the patients being admitted to virtual wards?
4. What is patient engagement with and adherence to the remote monitoring technology?
5. What is patient experience of the virtual ward models?
6. How do staff engage with and work on virtual wards?
7. What is staff experience of the virtual ward models?
8. What patient outcomes are associated with the ward models?

This evaluation provided in-depth case studies of the virtual wards in Sutton and Kingston/Richmond. **In addition, it supplemented a previous evaluation of the Croydon virtual ward**[6] with additional data. In order to answer the evaluation questions, a mixed-method approach was deployed, including:

- An analysis of pre-existing quantitative data provided by each of the local systems in scope for this evaluation.
- An analysis of data collected by Vcare for Sutton, and Kingston and Richmond.
- Qualitative fieldwork with virtual ward staff, and with clinical staff in acute settings.
- Qualitative fieldwork with patients admitted and treated on the virtual wards.
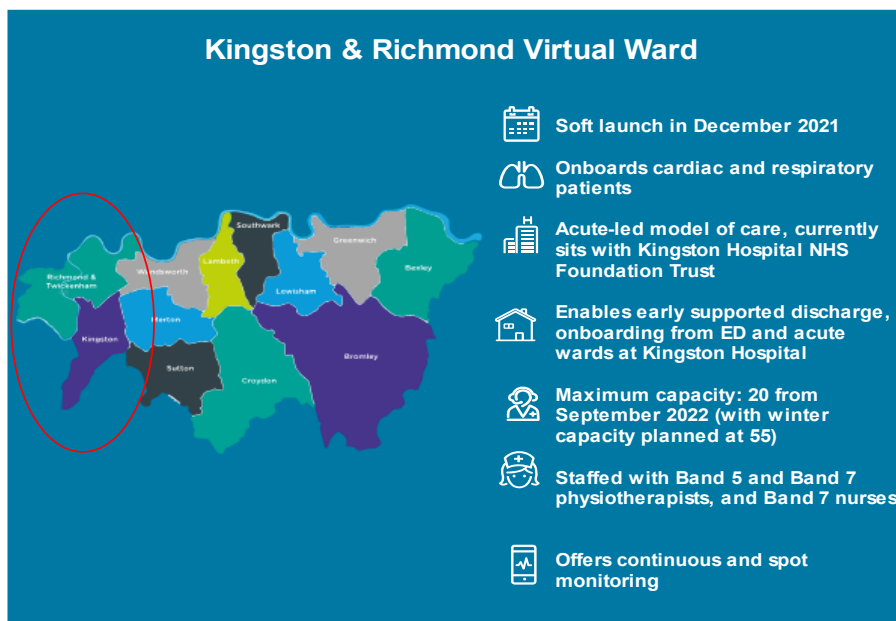
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[6] Health Innovation Network (2021), Rapid Evaluation of Croydon Virtual Ward, London. Available on: https://healthinnovationnetwork.com/wp-content/uploads/2022/01/Croydon-VW-Evaluation-Report-to-NHSX-v10.pdf

Evaluation findings

Kingston and Richmond

Figure 5 Overview of the Kingston and Richmond Virtual Ward

Kingston & Richmond Virtual Ward

- Soft launch in December 2021
- Onboards cardiac and respiratory patients
- Acute-led model of care, currently sits with Kingston Hospital NHS Foundation Trust
- Enables early supported discharge, onboarding from ED and acute wards at Kingston Hospital
- Maximum capacity: 20 from September 2022 (with winter capacity planned at 55)
- Staffed with Band 5 and Band 7 physiotherapists, and Band 7 nurses
- Offers continuous and spot monitoring

Overview of virtual ward activity
- Between January and July 2022, there were 42 admissions to the virtual ward. In this time, there was only 1 readmission.
- 83% of patient referrals were via an acute hospital inpatient department, and 17% were via an emergency department or same day emergency care.
- Length of stay ranged from 1-29 days, with a median average length of stay (ALOS) on the virtual ward of 13 days.
- The average length of stays on the virtual ward for patients with COVID-19, chronic obstructive pulmonary disease (COPD), and heart failure were higher compared to average length of stays at Kingston Hospital NHS Foundation Trust.

What factors have supported the successful implementation of the virtual wards?
- Staff felt that overall the Kingston and Richmond virtual ward was successful at what it was to set up to achieve, with one participant noting: "you're not only seeing the benefits of the patient being at home, but you see the benefits of beds opening up in the hospital."
- They identified a number of factors that had supported the successful implementation of the virtual ward, including being an acute secondary care led model, having pre-existing relationships within the community, having a mix of skills within the virtual ward team, and putting an emphasis on data collection.
- They also described a number of challenges, including lack of similar existing models to refer to (due to the novel nature of the service), lack of awareness of the virtual ward by clinicians in primary care and acute care settings, challenges in getting some consultants' buy in, and lack of administrative support.
- From an operational perspective, some questions were raised over the sustainability of the model, with it remaining to be seen whether the service could be an effective model to reduce length of stay.
- Other issues highlighted as slowing down the implementation of the virtual ward included recruitment challenges (as a new team had to be created from scratch) and that the number of patients being onboarded on the ward had been lower than originally anticipated.
- Finally, the lack of consistency in defining the virtual ward was viewed as problematic, which had

implications on funding allocation choices.

Who are the patients being admitted to virtual wards?
- The majority of patient admissions (81%) were for an exacerbation of an existing respiratory or cardiovascular long-term condition. A further 12% of patient admissions were for exacerbations of cardiovascular conditions which include heart failure and pulmonary hypertension. A further 19% of admissions were for an acute incident, which included covid-19 (14%) as well as other incidents (5%) such as falls and pneumonia.
- Patients admitted to the virtual ward were more likely to be white, between 65-84, and female.
- The average number of comorbidities per patient was 5.1.

What is patient engagement with and adherence to the remote monitoring technology?
- Over a quarter of patients wore their device for 60% or more of their time on the ward, giving them complete adherence to the technology.
- In the qualitative interviews, staff reported that overall patients engaged with the technology well, as long as they were given clear instructions on how to use it.
- Continuous monitoring was preferred by patients over spot monitoring, as it required minimum technical expertise from patients. However, technical issues were commonly reported, meaning some patients had to switch to spot monitoring.

What is patient experience of the virtual ward models?
- Staff reported receiving mainly positive feedback from patients, including the use of remote monitoring equipment.
- They felt the virtual ward was most beneficial to: patients with chronic long-term conditions who tend to be pro-active in their treatment and care, elderly patients who need some extra support going home after hospital discharge, those suffering anxiety, and those experiencing cognitive decline.

How do staff engage with and work on virtual wards? (i.e. staff activity)
- Number of telephone contacts per virtual ward admission ranged from 1-17, with an average of 0.39 telephone contacts per patient per day.
- Number of home visits per virtual ward admission ranged from 1-4, with an average of 0.18 home visits per patient per day.
- Clinicians tasked with monitoring patients reported taking an average of 5 minutes to check one person's readings (which they did throughout the day).

What is staff experience of the virtual ward models?
- Clinical staff on the virtual ward team described positive experiences of working for the service.
- Positive experiences were directly attributable to the team, its multidisciplinary make-up (which meant its staff could learn new skills from each other) and good relationships between colleagues. Staff praised the flexibility in assigning team roles and responsibilities, as well as the perceived lack of hierarchy within the team.
- They also felt a sense of satisfaction and pride from working for an innovative service which they believed was highly beneficial to patients.
- Clinical virtual ward staff highlighted previously feeling anxious occasionally when 'leaving patients' unmonitored over long periods of time e.g. at evenings and weekends. These concerns had been largely alleviated when the service started operating seven days a week.

What patient outcomes are associated with the virtual ward models?
- All patients but two (40 patients) were discharged to their usual place of residence. Ten per cent (10%) of patients were referred to pulmonary rehabilitation following discharge. Only one patient was admitted to hospital.
- Data on hospital admissions 30 days after discharge from the virtual ward showed that 7 patient admissions (17%) had been admitted to hospital in the 30 days after being discharged from the
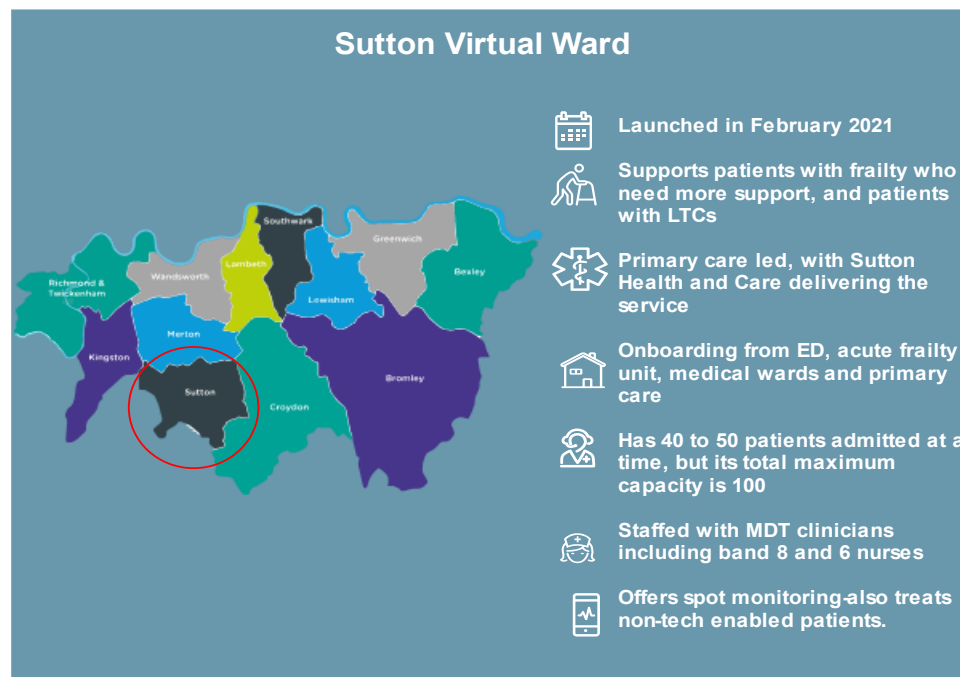
virtual ward.
- Information on deaths in the 30 days following discharge was also obtained showing that 3 patient admissions (7%) had died in the 30 days following discharge from the virtual ward.
- Staff noted a number of positive outcomes to being admitted onto the ward, such as encouraging patients to self-manage over time, supporting functional recovery by encouraging them to move around the house and engage in normal activities of daily living, giving staff the opportunity to optimise patients' medication, and reducing the risk of hospital-acquired infections.

What is the financial impact on acute beds?
- Due to the discrepancies between length of stay on the virtual ward and length of stay in hospital, it has not been possible to assume that for every day spent on the virtual ward an acute bed day has been saved. Due to the small number (7) of patients that were stepped up to the virtual ward and therefore avoided an acute hospital admission, the recommendation is to gain more data on acute length of stays for patients that are transferred from a hospital setting to a virtual ward and to enable the collation of data of a larger cohort of patients before undertaking economic modelling of acute bed usage.

Sutton

Figure 6 Overview of the Sutton Virtual Ward

Overview of virtual ward activity
- The 458 referrals that were accepted onto the ward related to 402 individual patients, with 89% of patients having one admission to the virtual ward during this period and 11% having more than one admission.
- Over half (53%) of referrals to the virtual ward came from an acute hospital inpatient department, with 41% of referrals coming from GP practices and 5% coming via a community health service. There were a small number (6, 1%) that were referred via other routes including the ambulance service, self-referral, or the telephone access service.
- The average (median) length of stay on the virtual ward was 10 days.

What factors have supported the successful implementation of the virtual wards?
- From a patient perspective, it was viewed to be highly beneficial as it was well positioned to provide holistic care, including being able to offer packages of care when discharging patients.

- From a staff perspective, it could sometimes be challenging working with multiple partners, and getting different stakeholders' buy-in, especially GPs.
- Staff also felt that whilst remote monitoring equipment was a useful tool to support the delivery of the Sutton virtual ward, it should not be at the centre of it, so the service also included non-tech enabled patients who had more complex needs.
- In terms of workforce, staff valued having senior and experienced nurses working for the virtual ward, a leadership team with a clinical background, and an in-reach nurse identifying/ sourcing patients on acute wards.
- Staff noted the importance of establishing trust and communicating to wider healthcare staff about the benefits of the virtual ward through a clear engagement plan to support better partnership working.

Who are the patients being admitted to virtual wards?
- Data on the primary complaint/ reason for admission to the virtual ward was only recorded for 80 (17%) patient admissions.
- Of these, 31% were admitted due to respiratory conditions or symptoms, 18% due to an infection, 15% due to trauma and musculoskeletal conditions, and 10% due to an altered mental state or neurological symptoms. A further 26% were admitted with general symptoms, such as pain or dizziness or with an exacerbation of a non-respiratory condition.
- The majority (74%) of patient admissions were aged over 75.
- A higher proportion of patient admissions were female (57%) than male (43%).
- Of those patient admissions where ethnicity was recorded 91% were white.

What is patient engagement with and adherence to the remote monitoring technology?
- The Sutton virtual ward uses spot monitoring by having patients take health observations using the provided kit at regular intervals. Patients are advised to take a minimum of one set of observations a day and a maximum of three.
- Data from VCare shows that there were 79 virtual ward patients in Sutton that were onboarded to the VCare remote monitoring platform. All virtual ward patients are offered the remote monitoring kits, meaning that approximately 83% declined use of the kits. Reasons for declining have not been recorded.
- Of the 79 patients who used the kits all took some form of observation during their time on the platform. Of the 68 patients that were on the platform for a day or more the average number of observations taken per patient per day was 5.3 across all tests.
- On average patients were undertaking most tests (temperature, respiratory rate, blood pressure, oxygen saturation and heart rate) at least once a day.

What is patient experience of the virtual ward models?
- Patients were positive about the service and saw the benefits of being cared for at home rather than on a hospital ward.
- Overall, patients felt they were discharged from hospital at the right time and broadly understood the concepts behind the virtual ward, although further explanations on how the ward works in practice would have been welcome.
- Positive experiences of the technology were also linked to: carers providing support, swift technical support from the virtual ward team, and a perceived good level of 'contact' and communication with the virtual ward nurses.
- Among those with more mixed experiences, it was felt that more follow-up action and contact from the virtual ward team was required, and there needed to be more clarity around the discharge process (for instance by discharging patients through a face-to-face visit, rather than over the phone).

How do staff engage with and work on virtual wards? (i.e., staff activity)
- There was information recorded on the number of times patients were in contact with VW staff (either via a telephone call or a home visit) for 265 patient admissions.

- There were 514 phone calls made, which equates to 1.9 phone calls per patient. The number of telephone calls received per admission varied from 0 up to 20 calls.
- There were 1,243 home visits to virtual ward patients, giving an average of 4.7 home visits per patient admission. The number of home visits per patient admission ranged from 1 up to 43 home visits.

What is staff experience of the virtual ward models?
- Interviews with staff mainly focused on implementation barriers and enablers. Unfortunately, the HIN was not able to interview virtual ward nurses about their experiences of working for Sutton virtual ward.

What patient outcomes are associated with the virtual ward models?
- The majority of patient admissions were discharged back to their usual place of residence (74%), with just over a quarter (26%) being admitted to an acute hospital.

What is the financial impact on acute beds?
- Due to a lack of data on the primary complaint of Sutton virtual ward patients it has not been possible to use information on length of stay to model the financial impact of the virtual ward on acute bed days for this virtual ward.

Croydon

Figure 7 Overview of the Croydon Virtual Ward
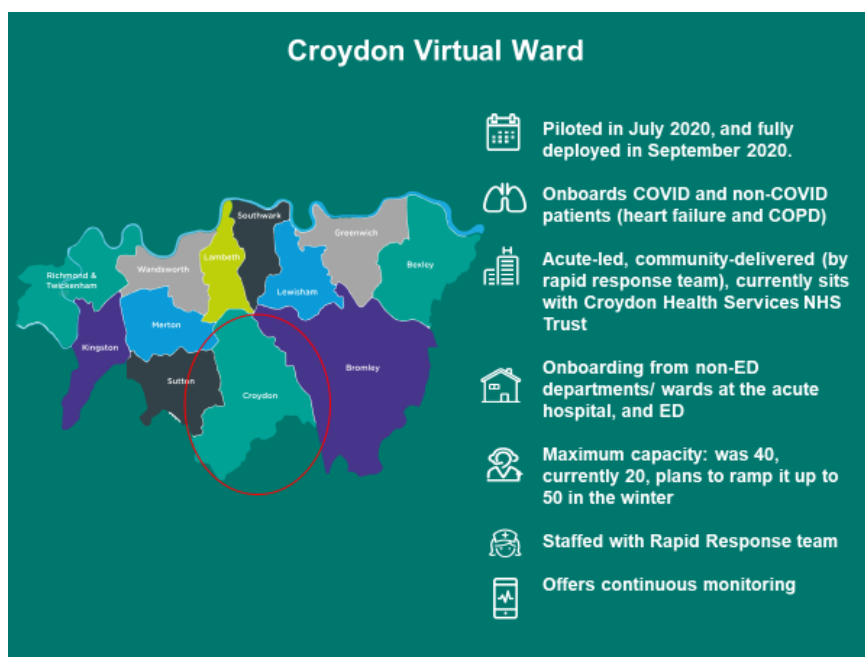
Overview of virtual ward activity
- Between October 2021 and July 2022, there were 272 admissions to the Croydon virtual ward, which is approximately 27 admissions per month.
- The highest proportion of referrals (39%) came via non-ED departments and/or wards at the acute hospital, with a further 20% of referrals coming from ED. Smaller proportions of referrals came via GPs (15%), the Rapid Response team where the ward is hosted (14%) and community nursing staff (5%).
- Average (median) length of stay on the ward was 7 days. Length of stays ranged between 0 and 48 days.
- When comparing the average length of stay on a virtual ward to an acute hospital stay, patients with COPD had longer stays on a virtual ward by 1.9 days., with COVID-19 patients having longer

stays by less than a day (0.6 days) and heart failure patients staying on average half a day longer (0.5) than they would have done in hospital.

What factors have supported the successful implementation of the virtual wards?
- In the HIN's 2021 report, staff identified a number of factors they saw as essential to making a virtual ward model effective, namely the ward being run by community (not acute) services, pathways in place to ensure emergency treatment is accessed when needed, upskilling staff so they know how the technology can be used to optimise care for individual patients (and therefore can determine when continuous monitoring might be more suitable than spot monitoring, and vice versa), and having a cross-system multidisciplinary team.
- Staff discussed how sitting within an urgent community response team had a number of advantages, including being able to piggyback on pre-established relationships with GPs and the hospital, and having access both to hospital and community Electronic Patient Record (EPR) systems.
- Implementation learnings identified by staff included acknowledging the culture change required in implementing a virtual ward, having an effective engagement plan in place (including face-to-face engagement), resourcing the virtual ward with an adequate number of staff (especially in the early phase of implementation), basing a member of the rapid response staff within the acute hospital, diversifying patient pathways, and developing a comprehensive training offer for virtual ward staff.

Who are the patients being admitted to virtual wards?
- A large proportion of virtual ward admissions were for acute episodes (60%). These included 50% of patients that were admitted due to COVID-19, 6% due to an infection and 4% due to pneumonia or a lower respiratory tract infection. A further 30% of admissions were for an exacerbation of a long-term condition. Smaller proportions (4%) were admitted for further investigations and monitoring.
- Whilst the majority (61%) of admissions were aged 65 or older there were still a significant number of admissions of working age (39%).
- There was a higher proportion of females (59%) admitted to the virtual ward than males (41%).
- The majority of patients were white (62%), 15% were from an Asian ethnic background, 15% were of black ethnicity and a further 8% were either from a mixed or multiple ethnic background, or from an 'other' ethnic group.

What is patient engagement with and adherence to the remote monitoring technology?
- The 2021 evaluation highlighted high levels of acceptability and adherence with the technology. Feedback survey scores were largely very positive, with 87% agreeing virtual ward technology was simple to use.
- The analysis undertaken as part of this evaluation found that there were a small number of patients (5, 2%) that declined the use of the technology and self-discharged themselves from the virtual ward. The vast majority (98%) of patient admissions were able to engage with the technology.

What is patient experience of the virtual ward models?
- Patient insights were collected as part of the 2021 evaluation, with interviewed patients and carers reporting overall positive experiences on the virtual ward.
- While patient insights were not gathered as part of the 2022 Croydon evaluation, staff interviewed also reported receiving positive feedback from patients about their experiences of being treated on the virtual ward.

How do staff engage with and work on virtual wards? (i.e., staff activity)
- Quantitative data on staff engagements with virtual ward patients was not collected for this evaluation. A previous analysis of modes of interactions between staff and patients can be found

in the initial Croydon virtual ward evaluation.[7] However, 9% of patient admissions received at least one home visit from a community nurse during their time on the ward.

What is staff experience of the virtual ward models?
- Heitz (2022)[8] identified a number of staff benefits of working on the virtual ward, including: increase of community and hospital collaborative working, skill acquisition (such as remote assessment and trend monitoring), reduction of in-person visits, and the opportunity for remote working.
- Insights gathered through the staff interviews highlighted how these benefits could have positive implications in relation to workforce retention.
- Staff emphasised how working on a virtual ward required a specific set of skills and identified development of a comprehensive training offer as a key priority for the service, including training on the device and technology, in acquiring digital skills, in learning how to read non-verbal cues, how to monitor deterioration, and on data collection and quality improvement, which was perceived especially important due to the novelty of the service.

What patient outcomes are associated with the virtual ward models?
- The discharge outcomes from the Croydon virtual ward showed that 81% of patient admissions remained at home until they were discharged from the ward. This included 72% that remained at home with only remote access to healthcare, and a further 9% who also remained at home but received a home visit during their time on the virtual ward.
- Twelve per cent (12%) of patients were discharged from the virtual ward into a hospital inpatient setting.
- The remaining patient admissions were discharged early from the virtual ward either due to the realisation that telehealth services were not appropriate (13, 5%), or patients declining the technology and self-discharging from the virtual ward (5, 2%).

What is the financial impact on acute beds?
- It is likely that there was a cost saving in terms of acute beds of between £477,000 – £715,500 with a cost saving per patient that was stepped up to the virtual ward from a community setting of approximately £3,000 - £4,500. This modelling is based on all virtual ward admissions that were stepped up (but not on those who were stepped down).
- The total acute bed savings as a result of the virtual wards will be higher than this as patients that were referred via an acute inpatient setting (stepped down) are likely to also save bed days as a result of a reduced length of stay in hospital, however more data and economic analysis would be required to understand what the financial impact of patients that have been stepped down is.

Conclusion

This evaluation has shown that the three south west London Virtual Ward models, although set-up differently, were all successful in treating patients safely and comfortably at home. Figure 8 provides a summary of the key enablers for implementing and delivering a virtual ward. This evaluation also identified some clear benefits of virtual wards from a patient and staff perspective:

- **Although discharge outcomes varied between the different virtual ward models, patients across the three services were able to be cared for at home** through a combination of remote monitoring, telephone calls, and home visits.

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[7] Health Innovation Network (2021), Rapid Evaluation of Croydon Virtual Ward, London. Available on: https://healthinnovationnetwork.com/wp-content/uploads/2022/01/Croydon-VW-Evaluation-Report-to-NHSX-v10.pdf
[8] Heitz, Liz (2022) Optimisation, evaluation and service development of a community-based, technology-enabled, acute virtual ward: an evaluation study. Unpublished Master's dissertation, Faculty of the Institute of Global Health Innovation, Imperial College London.

- **Patients and their carers felt they were being kept out of hospital whilst receiving the same standard of care as they would in a hospital environment and saw the benefits of being cared for at home.** They were generally compliant and satisfied with remote monitoring solutions (for both continuous and spot monitoring models). Acceptability of remote technology solutions was highest when clinical teams were given dedicated time to support patients in how to use the technology optimally. This was especially important for patients with limited digital skills and was key to increasing their confidence in using the technology autonomously.

- **Interviews with clinical virtual ward staff also highlighted positive experiences of working on the ward**. These were linked to working among multidisciplinary teams, developing new skills, as well as being proud of working for an innovative service, and receiving positive patient feedback. Developing a comprehensive training offer for virtual ward staff was identified as a key priority going forward.

- **There was also some indicative modelling of the financial savings associated with acute bed days saved for one of the virtual wards, with estimated savings of between £3,000 - £4,500 per patient**. Although it is important to note this does not take into account the costs associated with running the virtual wards.

Figure 8 Key enablers for delivering virtual wards

2.3. North East London: Diabetes risk stratification tool and AccuRx Florey

Overview

Along with introducing new roles and digital technologies, the priorities for North East London (NEL) Integrated Care System (ICS) has been to reduce variation and inequalities (for example, half of the type-2- diabetes population lives in the most deprived areas) and improving self-care and self-management of diabetes.

As part of this, the Diabetes Risk Stratification Tool (v5) was used to identify patients with type 2 diabetes and stratify them into priority levels, based on clinical and social factors (Figure 9). This was facilitated by sending the AccuRx diabetes pre-appointment[9] Florey questionnaire sent to patients via SMS to gather useful information ahead of a diabetes review appointment.

Figure 9 Summary of diabetes risk stratification groups (NEL onboarding webinar, April 2022)

Type 2 Diabetes Risk Stratification priority groups

This search identifies all patients with T2 Diabetes. These patients are then arranged into priority groups based on HbA1c levels, complications, co-morbidity, social factors and ethnicity

High risk		Medium risk		Low risk
Staff type: Group 1 – Diabetes Specialist Nurse Staff type: Group 2 - GP or experienced clinician review		Staff type: Group 3 - Prescribing Support Pharmacists (PSPs) Staff type: Group 4 – GP or other primary care review		Staff type: Group 5 - HCA/ other appropriately trained staff
Group One Hba1c >9%	**Group Two** Patients with at risk characteristics with: • Stroke or TIA in last 12 months • Foot ulcer in last 3 years • eGFR < 45 • Metabolic syndrome • Patients with CHD in the last 12 months	**Group Three** Patients with Hba1c 7.5 to 9% with any of the following: • BAME • Mild to moderate frailty • Previous CHD/ TIA > 12 months ago • BP >/140/90 • Proteinuria or Albuminuria	**Group Four** Patients with missing care processes or annual reviews or increased risk (high BMI, Q risk, high BP) • BMI > 30 • BP>140/80 • No urine ACR in last 24months • No annual review in last 24 months • No Q risk recorded • Q risk>10% however no statin prescribed since Jan 2021 • Interpreter needed • Learning Disability • Housebound	**Group Five** All other patients

Evaluation purpose and design

The overall aim of this evaluation was to understand whether the implementation of a risk stratification tool and AccuRx Florey for people living with type 2 diabetes in NEL was successful. In doing so, it aimed to address the following objectives:
- Determine the extent to which practices have successfully adopted the intervention.
- Determine the uptake of the intervention and describe the patient characteristics.

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[9] The questionnaire covers lifestyle, habits, BMI, blood pressure, medicine adherence, consequences of diabetes and provides space for patients to raise any queries.

- Determine any additional benefits arising from adoption of the intervention for patients and practitioners.
- Determine the factors that have enabled or hindered successful implementation of the interventions

The evaluation used a mixed-methods approach comprising in-depth interviews with GP practice staff, and the analysis of AccuRx Florey activity data and of Quality and Outcomes Framework (QOF) data. It is important to note that the programme launched in April 2022 and therefore limited data was available. As such, the evaluation describes the current state of the programme (as of August 2022) and provides recommendations for development and spread of the programme moving forward.

Evaluation findings

Engagement and spread
Between 14th February 2021 and 14th August 2022, from the 273 GP practices identified across NEL:
- 83 (30%) had sent a Florey.
- 55 (20%) were 'active users' (i.e. having sent more than one Florey).

In this same period, 8,604 Floreys were sent, with 4,974 (56%) returned.

Practices across the region were divided into four categories based on their adoption (whether they sent more than one Florey) and engagement (whether they registered for the onboarding webinar held in April 2022, or signed up to be a pilot practice):
1. Adopted and engaged: 37/273 practices, 14%
2. Adopted, not engaged: 18/273 practices, 7%
3. Not adopted, but engaged: 63/273 practices, 23%
4. Not adopted, not engaged: 155/273 practices, 57%

Categorising practices in this way may help identify where targeted communications and support would be most effective in NEL to promote engagement and adoption of AccuRx Florey tool.

GP practices' insights
Insights gathered through interviews with GP practice staff is divided into four sections (Figure 10).

Figure 10 Key themes from GP practice staff interviews

Process mapping	Ways of working	Impact on workforce	Patient perceptions
Illustration of variation of the process across NEL	Reflections on processes and pathways put in place to support the programme	Reflections on staff experience, the benefits and challenges of ways of working	Initial insights into patient experience and impact of the programme

Process mapping

Figure 11 provides a summary of the pathway for recall for patients with diabetes highlighting where risk stratification and the Florey questionnaire was used.

Figure 11 Pathway map

Recommended pathway (Onboarding Webinar)   Areas of Variation

Risk Stratification

Practice Admin team runs the EMIS Diabetes Risk Stratification searches

Responsible person: Variation in who runs the searches. This role could be assigned to anyone in the admin team, practice managers, LTC nurses and care coordinators.

Version: Some practices are using the older version of the UCLP Proactive Care Frameworks, independently downloaded to their system from March 2020. Some are using the same framework through Ardens & Clinical Effectiveness Group.

Identifies patients in priority 1&4 groups

Group selection: Most practices move through the framework from Priority groups 1 to 5. One practice reviewed groups "from the outside in", i.e. 1 and 5, 2 and 4 etc to manage capacity. Some practices selected groups based on workforce availability and operational focus.

Practices will often **review the list** at this stage to exclude specific patients or inform next steps*

Florey Distribution

Practice Admin team will send a batch AccuRx Diabetes Pre-Appointment Florey Questionnaire via SMS

When and how Floreys are used: Pre-appointment Floreys are sent at various stages by different practices, including before or after Part 1 appointments. One practice does not use Floreys alongside their risk stratification process but as part of their annual recall. Another practice uses Floreys as a method of contacting patients who do not respond to the initial appointment letter.

Patient responds

YES — Designated admin or clinician reviews responses and saves to patient record

NO — Practice to consider calling patient or follow usual non-responder process

Sending Floreys: Floreys are sent by members of the admin team, nurses and GPs. Some practices are resistant to sending Floreys in large batches due to concern over the implications of holding data without clinical review.

Approaching non-responders: Every practice has a process for following up with non-responsive patients, including techniques such as texts, phone calls or letters. Floreys are used as a helpful addition to the process but a lack of response does not act as a blocker to accessing care.

Some practices **use information** from the Florey response to **recommend** appointment length and type.

Admin team to follow usual practice process to book patient in for face-to-face review with HCA or equivalent for part 1 of the review

Assigning types of appointments to patients: Practices use the guidance provided in the risk stratification tool for booking patients with specific staff groups.

*Patients are excluded for different reasons, e.g. recent annual review. The patient list is checked for required procedures, e.g. recent HbA1c which impact next steps.

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Ways of working
Reflections on processes and pathways put in place to support the programme were identified.

What's working well
- All practices who attended the onboarding webinar found it useful.
- Flexibility in the implementation of tools likely allows for greater adoption.
- Practices with previous experience of innovation reported feeling comfortable using the risk stratification tool and Florey.
- All practices reported straight forward use of the risk stratification tool and Florey.

Areas for improvement
- Inconsistency in how practices used the tools (e.g., using older versions) may be a challenge when evaluating the impact of the programme at a regional level.
- Improved communication in how the risk stratification tool and Florey are connected, and their added value when using them alongside each other.
- Although the risk stratification tool is useful, manual editing is still required. Further adaptations may be necessary for patients residing in care homes.
- There was some resistance to use the Florey due to a preference for similar tools and concerns around coding of information. Concerns were based on previous experiences of how information is coded for other Floreys (e.g. Asthma Florey).

Impact on workforce
The benefits and challenges of ways of working were highlighted by staff.

What's working well
- Practices recognise that use of the risk stratification tool ensures that patient needs are always matched to staff capability and capacity.
- The risk stratification tool has the support of the whole practice team, and ensures their skills are used in the most appropriate way.
- As practices do not need to adhere to guidance set out during the onboarding webinar, they can adapt it to their own needs.
- Clinical staff support the use of the Florey and highlight the positive impact they have on supporting patient centred care.

Areas for improvement
- Use of the risk stratification tool and Florey automates and creates efficiencies in some parts of the diabetes pathway but there are parts which require staff support (e.g., manual edits and coding).
- Although risk stratification was well understood, in some practices there was a lack of awareness across teams on the use and purpose of Floreys. Guidance should be made available for all relevant team members in the practice when Floreys are being distributed to patients.
- There is an opportunity for shared learning, with most practices expressing an interest in hearing how other practices are using the tools. A community of practice could be formed, led by NEL, to share lessons across the region and to support and inspire practices who have not yet adopted.
- More could be done to encourage feedback on the tools to the NEL team, in addition to directly requesting feedback from practices in all stages of adoption.

Initial insights into patient experience and impact of the programme[10].

What's working well
- Although they have not directly asked patients for feedback, practices noticed minimal hostility to Floreys from patients.
- Practices noted a positive patient response to the holistic approach to care. Practices report that review of the Florey prior to the appointment has helped patients feel more heard and that the clinicians care about them as people, not just another task to be completed.
- Practices were able to address concerns around remote monitoring and recall such as:
  - Digital exclusion (with each practice using an alternative route to contact patients who could not complete a Florey).
  - Language barriers (with some practices noting that using a Florey could enable better communication).
  - Non-responsive patients (with Floreys acting as another tool for recall teams to communicate with patients).

Areas to explore
- None of the practices had actively collected patient feedback on risk stratification or the Florey tool. Although unsolicited feedback has largely been positive, it is essential to gather ongoing insights in a systematic way as this programme emerges.
- Further analysis into the characteristics of the non-responsive cohorts could be beneficial in order to target communications channels and other interventions as appropriate.

Conclusion

This evaluation indicates acceptability of the risk stratification tool and Florey questionnaire. It is interesting to observe that even if practices used a different tool, they accepted the approach of reviewing by risk. A significant part of the programme included stepping away from the GP-first approach to actively involve all the primary care workforce.

Although clinical engagement presented a challenge and took time, the dissemination of the implementation pack was a good exercise and has contributed to activation of the practices. However, following-up with additional engagement, considering approaches to recall and developing recommended actions, might be necessary which would require additional capacity from the clinical leads and NEL team.

Clinical teams have observed an increase in patients being more involved in their care. Having coded responses, enabled by the technology, along with the digital inclusion coding, highlighted where adaptations to the approach were necessary and contributed to including all patients regardless of their digital confidence levels.

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[10] Note: No practices we spoke to had actively collected patient feedback on the Florey tool. These reflections are the perceptions of practice staff.

2.4. North Central London: *my mhealth* for LTCs

Overview

The *my mhealth* platform enables the remote monitoring of vital signs and soft signs of patient deterioration, and supports digital self-management and education, to improve outcomes for patients with LTCs. The platform gives access to specific interventions for COPD (*myCOPD*), heart disease (*myHeart*), asthma (*myAsthma*), and diabetes (*myDiabetes*).

North Central London (NCL) Integrated Care Board (ICB) agreed the provision of remote monitoring for diabetes and/or COPD with the following NCL Community Trusts:
- Central and North West London Trust (CNWL) – *myDiabetes* and *myCOPD*
- Central London Community Healthcare Trust (CLCH) – *myDiabetes* and *myCOPD*
- Barnet, Enfield, and Haringey Mental Health Trust (BEH) – *myDiabetes*
- Whittington Health Trust (WH) – *myDiabetes* and *myCOPD*

Patient onboarding to the platform was supported by a Digital Health Advisor (DHA), who worked across community providers and supported both *myDiabetes* and *myCOPD* digital health platform onboarding process.

Evaluation purpose and design

This evaluation focused on the use of the *my mhealth* platform by patients with chronic obstructive pulmonary disease (COPD) and/or diabetes within the North Central London (NCL) ICB. Specifically, it addressed the following three areas:
1. Utilisation and acceptability: how successful has the project been in reaching its target populations?
2. Benefits realisation: to what extent is the platform effective in supporting the management of patients with COPD and diabetes?
3. Conditions for implementation: what factors facilitated (or hindered) its effective implementation?

To answer key evaluation questions, UCLPartners used a mixed-methods approach drawing on insights from semi-structured interviews with patients and staff as well as secondary care data.

Evaluation findings

Implementation and ways of working

- The implementation of *my mhealth* digital health platforms in NCL was seen as successful overall.

- Staff reported that digital technologies generally appeal to some patients due to the ease of use and accessibility but are limited in their reach due to language barriers, digital literacy and comfort.

- Staff identified how the digital health platforms complement what they were doing. This included providing additional education to patients, including more patients who are unable to attend in person sessions, additional monitoring of patients, and allowing patients to self-manage their condition.

Patient onboarding

- From June 2021 to July 2022, a total of 958 patients were registered to *my mhealth* digital platforms across NCL. Up to May 2022, 753 patients were registered for *myDiabetes* and/or *myCOPD*. Out of 753 patients, 477 have activated the platform (63.3%):
    - For *myDiabetes*, that was 76.9% of patients (350/455 patients).
    - For myCOPD, that was 42.6% of patients (127/298 patients).
    - Discrepancies between activation of *myDiabetes* and *myCOPD* may partially be due to the nature of the condition.

- The recruitment of a digital health advisor and partnership with the ICB project team were key enablers to successful implementation of *my mhealth* platforms. The peak activation month and general increase in number of patients activating the platforms happened after the recruitment of a digital health advisor for *myDiabetes* and *myCOPD*.

- Patient demographics were explored for those patients that had accessed secondary care from January 2021 to May 2022 (n=587 patients).
    - Out of 587 patients, 308 were female and 277 were male, with 2 patients having gender registered as unknown.
    - Average age of patients registered for *my mhealth* digital platforms was 61 years: 65 years for patients with COPD, and 57 years for patients with diabetes. There was a gradual decrease in proportion of patients who activated *my mhealth* digital platforms when exploring activation by age group, mostly driven by activations records for patients with COPD.
    - Out of 587 patients, the registered ethnicity group for 306 patients was White, for 73 was Black, 47 Asian, 42 Other and 9 Mixed. 110 patients did not have ethnicity recorded.

Patient perspectives on the use of my mhealth platforms

- Nine patients took part in interviews conducted by UCLPartners. Three used the *myCOPD* app, five used the *myDiabetes* platform, and one used both.

- The patients reported that the platform was generally easy to install and straightforward to use. They reported various uses of the platform including having an additional source of knowledge about their condition, helping with lifestyle management, facilitating active monitoring of health metrics, and having medication reviews.

- The interviewees also highlighted the convenience of the app as it was available at any time. They also noted its accessibility, including storing everything in one place.

- Patients were keen to continue using the platforms but that their use of the platform will depend on their personal capacity, and access to clinical guidance and input.

Benefits of using my mhealth platforms

Impact on patient pathway

- NCL community providers' implementation of the *my mhealth* digital health platforms varied; some providers focused on the educational aspect of the platforms, some focused on exercise aspects, whilst some did not focus on a particular aspect of the platform but have used it as an additional tool in LTC management.

- As a result of these differences, the impact on the patient pathway differs per provider, ranging from *my mhealth* digital platforms having no impact on patient pathway, *my mhealth* digital

platforms presenting an additional resource available along with usual practice, to a complete change of the patient pathway, with patients being managed through *my mhealth* digital platforms.

- Community care providers did not notice an increase in number of patient calls or requests following the implementation of the platforms.

Identified benefits

- Some patients reported that *my mhealth* digital platforms have an impact on the management of their condition, through:
  - Motivation – the platform supports the patient with information on diet, exercise and management and,
  - Increased knowledge of their condition – patients have an approved knowledge resource that helps them with management of their condition.

- Some patients reported that *my mhealth* digital platforms did not have an impact on the management of their condition, because of:
  - Lack of clinical input – patients were unclear on how or when to use the platforms.
  - No clinical indication to use the platform i.e., their condition was stable.
  - Personal capacity – patients did not have time to explore/repeatedly use the platform.

- Activation rates and motivation had a key impact on the success of the programme. Additionally, majority of patients reported that using the platforms did not have an impact on their use of medical services. However, a few patients reported they could envisage it having an impact in the future.

Secondary care utilisation

- The secondary care utilisation, including A&E, inpatient and outpatient activity was explored from January 2021 to May 2022 (latest available data). Out of 753 patients offered *my mhealth* digital platforms, 587 patients accessed secondary care (78.0%). Overall, 243 patients had a record of inpatient activity from January 2021 to May 2022.

Conclusion

This evaluation was not able to quantify the impact of patients using *my mhealth* platforms on healthcare utilisation and waiting lists. It found however that *my mhealth* digital platforms did no harm, and provided additional benefits to staff, patients, and the system during an extremely hard time in the NHS.

It is recommended to review the benefits of the platforms through primary and secondary care utilisation once a sufficient number of patients have used the platforms for at least six months and a mode of delivery is agreed by the community providers.

2.5. North West London: Remote monitoring programmes using AccuRx, Huma, InHealthcare and Luscii

Overview

Throughout 2021/2022, North West London (NWL) Integrated Care System (ICS) continued and/or initiated the implementation of the following seven remote monitoring programmes, with four different technology providers (Table 1 Remote *monitoring programmes and associated technologies*

Table 1 Remote monitoring programmes and associated technologies

Programme	Technology Provider
Blood pressure (BP)	AccuRx
Type 2 diabetes (T2D)	HUMA
COVID	HUMA
Serious mental illness (SMI)	InHealthcare
Care homes	InHealthcare
Heart failure (HF)	Luscii
Chronic obstructive pulmonary disease (COPD)	Luscii

Imperial College Health Partners (ICHP) were asked to conduct an implementation evaluation to review progress to date on remote monitoring work taking place across the sector. This included an overarching look at lessons that could be learnt across the evaluation of seven clinical workstreams listed above.

Evaluation purpose and design

The aim of this evaluation was to summarise progress to date on activity and outcome, review the implementation process, identify the challenges experienced by those programmes and develop recommendations based on those challenges.

This evaluation consisted of two parts:
- Quantitative data was used to look at the scale and spread of adoption of the programmes.
- Qualitative data was used to look at the factors which positively or negatively influenced the adoption of remote monitoring programmes.

Evaluation findings

Overall, despite challenging circumstances and a sub-optimal implementation environment (a time of unprecedented demand and change), meaningful implementation occurred. This is considered (direct causation cannot be established) to have significantly contributed to the estimated circa. £2M (non-cash releasing) benefits of the clinical pathways (COPD, Heart Failure and Diabetes) demonstrated in the 21/22 Regional scaling Programme Benefit Management Register.

However, adoption and use were found to be highly variable across patient cohorts, clinical teams, and geographies. Numerous barriers to spread and adoption were identified using the NASSS (non-adoption, abandonment, scale-up, spread, sustainability) framework[11], which focuses on the condition, technology, value proposition, adopter system, organisation, and wider context.

The condition

The complexity of the conditions addressed with remote monitoring were not directly evaluated by this work but have been accorded varying degrees of complexity in other studies dependant on the specific setting and cohorts. Key factors included:

- There was a lack of clear inclusion/ exclusion criteria for patients suitable for remote monitoring pathways.
- There were cross organisational/ pathway inconsistencies on patient eligibility (i.e. different providers used different criteria for the same condition or the same provider used inconsistent criteria across different conditions).
- Clinicians and administrative staff expressed uncertainty around remote monitoring pathways (for instance, some administrative staff were unaware of services' existence when asked questions by patients).
- All the pathways were single condition pathways meaning that some patients with co-morbidities (significant numbers given the cohorts) were confronted with multiple remote monitoring tools/platforms/ measurement requests.

The technology

Key themes that added complexity and hindered adoption related to material features, knowledge, and data:
- There was lack of remote monitoring solutions integration into existing Electronic Health Record (EHR) systems.
- There were significant requirements for initial training and ongoing support with using the technology for both staff and in particular patients. However, this was not pre-emptively resourced and often created an additional workload for clinicians.
- Infrastructure for the collection of data and the mechanism for reporting was lacking or not put in place at all.

The value proposition

- Although not directly evaluated with this work, the level of engagement required by the programmes and the ongoing need for direct engagement with the clinicians using the technology was a consistent theme and significant business/ resourcing risk for the supplier.
- There was often no detail/ understanding of the specific objectives/ outcomes for pathways, or a limited alignment on objectives.
- Staff noted a perceived focus on activity and scale over patient/ staff experience and outcomes, and a feeling some products were "pushed from the centre".

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[11] Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, Hinder S, Fahy N, Procter R, Shaw S. Beyond adoption: a new framework for theorizing and evaluating non-adoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. Journal of Medical Internet Research. 2017 Nov 1;19(11):e8775

The adopter system

- There were varying degrees of staff input/ co-production opportunities, although significant ongoing clinician engagement was seen as key to engagement and adoption. As such, adequate clinician time was viewed as vital to enable pathways.
- For patients, a clear theme which hindered adoption was that of too many readings/ same readings being repeatedly asked for.

The organisation

- Too much change/ innovation at the same time was identified as a barrier to adoption of remote monitoring.
- Protected time for staff to engage/ support/ deliver was seen as vital to successful adoption.
- Pathways were often perceived as designed to meet the funding/ activity requirement, as opposed to the needs and problems of the patients and clinicians.
- The absence of a benefits management/ evaluation strategy for the programmes from the outset meant evidence of efficacy and justification of ongoing funding is challenging to provide.
- Adoption of a remote patient monitoring solution which is embedded in a pathway as a solution was far less complex than those where it was a bolt onto an existing pathway/ programme.
- Project teams, clinical leads/ champions joined implementation and planning processes too late to have meaningful influence or make changes that could address barriers to successful adoption. Funded delivery teams are needed on the ground from the outset.

The wider context

- There was a lack of alignment across providers and programmes.
- Information governance processes were consistently identified as unclear, not timely, tackled too late or were overlooked in planning.
- Local clinical champions appeared to be key in persuading their peers that a technology-supported service was effective and safe.
- Significant ongoing public engagement was perceived as a requirement to make the case for the implementation and utilisation of remote monitoring in healthcare.

Conclusion

One of the key lessons learned in the evaluation was realising the benefits of the investment (financial and non-financial) requires investment in the people concerned. Comprehensive change management programmes where patients/public, staff and leadership are brought into the journey are a key success factor. Therefore, the recommendations are set out against Change Theory [12], as demonstrated in Figure 12 *Recommendations Mapped Against Change Theory* below.

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[12] Based on Lewin's Change Management Model, Roger's Adoption Curve, and Kotter Change Model.

Figure 12 Recommendations Mapped Against Change Theory

Unfreeze | Change | Refreeze

1. Create a sense of urgency
2. Build a guiding coalition
3. Form and communicate a vision
4. Enlist a volunteer army
5. Enable by removing barriers
6. Generate short-term wins
7. Sustain acceleration
8. Institute change

Define a problem statement

Work directly with front line clinicians

PPIE | Articulate the expected benefits and outcomes

Justification, Objectives, High Level Plan | Adequately and sustainably resource

System Approach to Stakeholders | Single model/ objectives/ SOP

Align stakeholders | National templates and standards | Delivery teams on the ground

Local Clinical Champions | Community of practice/ shared learning | Utilise an iterative methodology

CRG | Share Case Studies/ Stories | Planning tools | Tools to support users

Include all organisations | Data Visibility | Evaluation

Plans, Processes and Criteria | Address IG early | Suitable, dependable, and accessible tech

Governance and reporting lines | Integrate into BAU

Flexible approach to delivery | Effective tech management

Key
Lewin's Stage of Change
Rogers Adoption Curve
Kotter's Change Step
Recommendations

3. Recommendations and lessons learnt

Remote monitoring care of long-term conditions (LTCs), whether performed through virtual wards or through lighter touch monitoring solutions, represents an opportunity to safely support patients in their homes. Although the five evaluations were not able to look at long-term impact on patient outcomes and overall impact on healthcare utilisation, they identified early evidence that remote monitoring solutions can offer some clear benefits for patients and clinical staff.

The recommendations should be considered when implementing, delivering, and scaling up remote monitoring interventions. These have been formulated using the different domains from the NASSS (non-adoption, abandonment, scale-up, spread, sustainability) framework[13].

The NASSS (non-adoption, abandonment, scale-up, spread, sustainability) framework

The NASSS framework has been developed to help study health technology projects as they are being implemented. It aims to help identify emergent uncertainties and complexities that can impact programme implementation and delivery at different levels within the health system. NASSS explores the dynamic interaction between seven domains (the technology, the people, the healthcare organisation and so on) in a complex system and how these domains and their interdependencies evolve over time, and how this can affect the success or failure of a technology-supported innovation.

Figure 13 The NASSS framework. Image adapted from Greenhalgh et al (2017)

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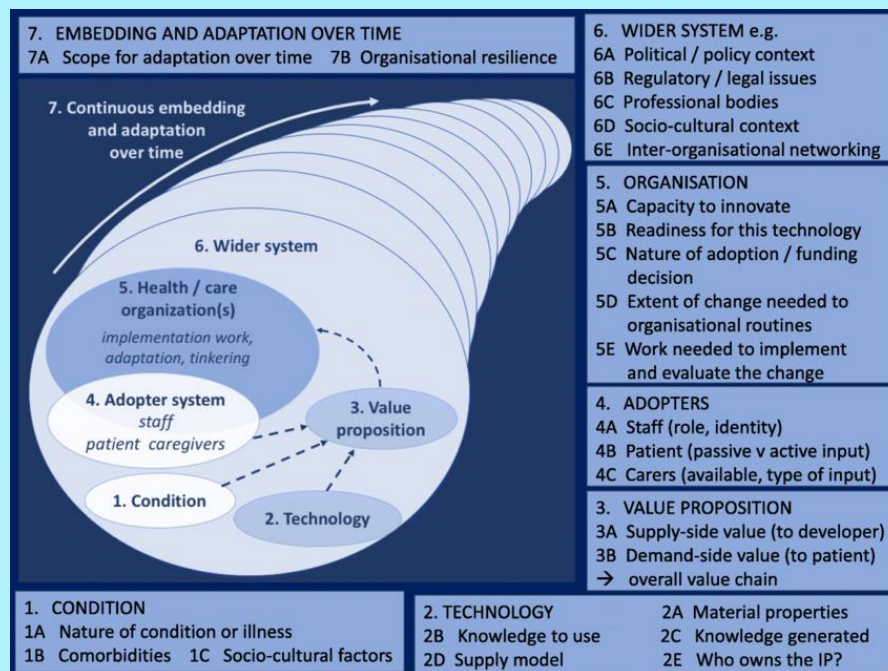
[13] Greenhalgh T, Wherton J, Papoutsi C, Lynch J, Hughes G, Hinder S, Fahy N, Procter R, Shaw S: Beyond adoption: a new framework for theorizing and evaluating non-adoption, abandonment, and challenges to the scale-up, spread, and sustainability of health and care technologies. Journal of medical Internet research 2017,

Domain 1: Condition

Early evidence from these five evaluations suggests that long term condition (LTC) management needs, and acute exacerbation of LTCs in a patient can be monitored safely and effectively through remote monitoring. However, the following should be addressed when embarking on remote monitoring programmes:

- **Establishing clear exclusion and inclusion criteria**, **and reviewing them on a regular basis,** through ongoing evaluative work and analysis of patient and staff feedback. Our evidence shows that remote monitoring solutions might not be suitable for certain cohorts of patients (e.g. newly diagnosed patients).

- **Clearly defining digital pathways, including establishing multi-conditions pathways for patients with co-morbidities**. Insights gathered across several evaluations have shown how the digital pathways established were single condition pathways. This meant that some patients with co-morbidities were confronted with multiple remote monitoring tools/platforms/ measurement requests. As part of this, tailoring the chosen solution to the pathways must be prioritised over limiting the pathways based on its technical functionality.

Domain 2: Technology

Interoperability between remote monitoring solutions and patient administration systems should be a key consideration when procuring such solutions. Integration between provider systems (e.g. EMIS) and specialist applications is key to delivering efficiencies. Solutions must "plug and play" within existing electronic health record (EHR) systems. Significant customisation or bespoke solutions add significant resource, complexity, and risk to implementation.

Solutions should include automated feedback mechanisms (such as surveys) for both clinicians and patients. Clinicians working with and patients using remote monitoring solutions should have regular opportunities to give feedback on their overall experiences, as well as on their features and functionalities. Feedback mechanisms should be designed to encourage ongoing engagement from both groups. This includes embedding structured forms in each system's Electronic Patient Records (EPR) to help with routine collection of data for future monitoring of the services. This should be supplemented by Patient Reported Outcome Measures (PROMs) and Patient Reported Experience Measures (PREMs), gathered through systematic and structured patient and carer feedback.

Linked to the above, infrastructure for the collection of performance and operational data, and the mechanism for reporting should be in place from the onset. Selecting suppliers who can evidence being responsive to data sharing needs (including having an infrastructure for the collection of data and the mechanism for reporting in place) should be a key priority. As part of this, adequate resources to data monitoring tasks should be allocated both on the provider and the suppler sides. In addition, the data shared with implementation/ clinical teams need to be sufficiently detailed to support thorough analysis and iterative improvement.

Domain 3: Value proposition

Articulating the expected benefits and outcomes clearly for the local population and staff early on is key to establish buy-in and ensure objectives and expected outcomes align between commissioning and clinical staff. Strategies should be put in place to ensure ongoing engagement as part of this:

- **Engaging existing clinical reference groups and recruiting local clinical champions** which can push and promote the remote monitoring solutions (and in doing so can reduce the perception that these solutions are "pushed from the centre").
- **Creating communities of practice** to support with activation and engagement across the Integrated Care Systems (ICS), and other mechanisms to share learnings. As part of this, it is important to create and share case studies and patient stories (in addition to quantitative data on outcomes and activity).
- **Setting up a cross organisational steering group** - including senior sponsors and clinical leaders- to maintain visibility and transparency of processes.

Establishing whether the supplier has the technical and operational capabilities to support multiple pathways and comorbidities is important to consider in order to reduce heterogeneity by minimising the number of solutions for different conditions.

Linked to the above, **it is important to establish capabilities early on and as part of this to agree on a collaboration approach between the provider and supplier encompassing co-design, implementation, and delivery support**, as the level of engagement required can constitute a significant business and resourcing risk for supplier.

Domain 4: Adopters

Patients

Accessibility and usability of remote technology solutions should be key considerations beyond the procurement phase. As such, having a patient-centred design approach including mechanisms for ongoing patient involvement in solution development is recommended (as mentioned above).

In order to reduce potential digital exclusion and ensure equitable access, providing patient support (through digital navigators, staff providing support etc) needs to be prioritised. The evaluations have highlighted how acceptability of remote technology solutions tend to be highest when clinical teams or digital navigators are given dedicated time to support patients in how to use the technology. This is especially important for patients with limited digital skills, and this can help ensure the remote monitoring programmes are as inclusive as possible. Doing so can also have potentially longer-term implications in encouraging self-management.

Full equalities impact assessments should be undertaken to determine:
- The impact of remote monitoring of LTCs on health inequalities, and
- Explore further the reasons why take-up is lower among certain cohorts of patients. For instance, the SEL evaluation has shown take-up lower was lower among ethnic minority groups**.** Assessments should also focus on how older patients and patients with specific communication needs might or might not engage with the platform.

Linked to the above, there should be mechanisms in place to collect feedback from non-users, including patients who do not register to use or engage with remote monitoring solutions.

For virtual wards specifically, the discharge process should include a home visit, so patients are clear they have been discharged from the virtual ward. Discharge processes over the phone were not viewed as satisfactory by patients, who required a sense of closure. In addition, discharge visits should include collection of the remote monitoring equipment, so patients do not have to keep it for long periods of time and try to arrange collection themselves.

Communications with patients should be a key priority going forward and considered at every

stage of their remote monitoring journey. However, striking the right tone and balance of too much versus not enough information can be challenging. Testing messages, communication materials, and modes of communication with patient representatives could help achieve the right balance.

Healthcare professionals

Significant ongoing clinician engagement is key to engagement and adoption - it is therefore important to consider varying degrees of staff input/ co-production opportunities for staff, including face-to-face and shared learning events (such as communities of practice).

The training of clinicians on remote monitoring solutions should include guidance around how to communicate effectively and empathetically with patients. Training should also include considerations on some remote monitoring solutions' use of canned/ pre-written messages[14] ; while they can be helpful and save clinician time, over relying on them can have a detrimental impact on patient engagement.

Job descriptions should include practical details on what is entailed in working with a remote monitoring solution. For instance, the terms 'virtual' or 'remote' can be interpreted in many ways, and job applicants should be clear about what working for a specific remote monitoring service entails (i.e. the extent to which staff can work from home for instance).

Appropriate communication strategies need to be put in place to ensure primary care staff are aware of remote monitoring programmes and that information is effectively disseminated to all GP practice staff to avoid any confusion or work duplication.

Domain 5: Healthcare organisation

To facilitate adoption, delivery teams (including project teams, clinical leads/ champions, and tech providers) need to work on the ground with clinicians. This should be done early on so they get a chance to influence **i**mplementation and planning processes and in doing so make changes that could address barriers to successful adoption.

Linked to the above, protected time for staff to engage, support and deliver is key to successful adoption. Practically this means creating some 'headroom', rather than getting staff to engage with remote monitoring programmes in addition to business as usual.

This also means adequately resourcing remote monitoring services with administrative and project management support from the onset. As part of this, the responsibility for improving recording, analysing and reporting performance monitoring data should be clearly allocated to one or more members of remote monitoring services and to trust business intelligence teams. Consideration must also be made of the resource required to perform these tasks.

The use of evidence-based project management tools specifically developed to support the effective and efficient implementation of technology in health can help identify barriers to implementation and delivery and should be considered when setting up remote monitoring programmes. The implementation of health and social care interventions involving technologies which include remote monitoring solutions are typically complex. In addition, at a time when the NHS faces multiple pressures, implementing a new service can be especially challenging. Building on Greenhalgh and colleagues' non adoption, abandonment, scale-up, spread, and sustainability (NASSS) framework

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[14] Canned responses are predetermined responses to common questions. Doctaly Assist uses canned responses to send template responses providing common instructions or advice to patients.

and a complexity assessment tool (CAT) [15], the NASSS-CAT tools[16] comprise of range practical tools for understanding, guiding, monitoring, and researching technology projects in health care or social care settings. They can therefore help support implementation and evaluation of remote monitoring programmes.

Data monitoring needs to be prioritised, with some standardised data fields in place. Linked to this, a benefits management/ evaluation strategy needs to be put place from the outset. Without, evidence of efficacy and justification of ongoing funding can be challenging to provide.

Standard Operating Procedures for each pathway supported by remote monitoring technologies should be agreed by clinical and operational stakeholders in all boroughs where the pathway will operate.

An understanding of requirements regarding information governance (IG) should be established and clearly communicated to suppliers at the earliest possible opportunity, as well as timelines for their completion. Evidence gathered across the evaluations found that some instances of unclear IG processes, tackled too late or overlooked in planning. In addition, a lack of IG expertise within some ICSs had led to delays in remote monitoring projects. The creation of a template repository (either centrally or regionally held), which teams could adapt to fit the needs of their specific remote monitoring projects, could help address this.

Domain 6: Wider system

Across the wider system, adoption and alignment of objectives and priorities can be facilitated though:
- **Regional clinical reference groups**, which can a vital role in system and cross provider alignment.
- **Local clinical champions**, who can persuade their peers that a technology-supported service is effective, safe, and appropriate.
- **Significant ongoing public engagement and dialogue** with clear messaging built around normalisation and reassurance.

Domain 7: Embedding and adaption over time

In addition to the routine collection of data for future monitoring of remote monitoring services, **evaluations should be repeated to determine if/ how the benefits of RM implementation and delivery change overtime**. As part of this, baseline data, costs and benefits should be assessed against national and local metrics on an ongoing basis to support future business cases.

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[15] Greenhalgh T, Maylor H, Shaw S, Wherton J, Papoutsi C, Betton V, Nelissen N, Gremyr A, Rushforth A, Koshkouei M, Taylor J, The NASSS-CAT Tools for Understanding, Guiding, Monitoring, and Researching Technology Implementation Projects in Health and Social Care: Protocol for an Evaluation Study in Real-World Settings, JMIR Res Protoc 2020;9(5):e16861

[16] The NASSS-CAT tools are available here: https://www.phc.ox.ac.uk/research/resources/copy_of_nasss-cat-tools

Figure 14 Overview of recommendations

Condition

Establish clear **exclusion and inclusion criteria**

Clearly **define digital pathways**, including multi-conditions pathways

Technology

Consider **interoperability** at the procurement stage

Consider solutions with **automated feedback mechanisms** for both clinicians and patients

Infrastructure for the **collection of operational data** and mechanisms for reporting should be in place from the onset

Value proposition

Put strategies in place to ensure ongoing engagement, including:
- Engaging existing **clinical reference groups** and recruiting **local clinical champions**
- Creating **communities of practice**, and mechanisms to share learnings
- Setting up a cross organisational steering group

Establish whether the supplier has the technical and operational capabilities to support **multiple pathways and comorbidities**

Establish capabilities early on and agree on a **collaboration approach** between the provider and supplier

Adopters

Patients
Consider **accessibility and usability** beyond the procurement phase

Provide patient support (through digital navigators, staff providing support etc)

Full **equalities impact assessments** should be undertaken

Collect **feedback from non-users**

Communications with patients should be a considered at every stage of their remote monitoring journey

Healthcare professionals
Encourage ongoing **clinician engagement**

Include guidance around how to **communicate effectively and empathetically** with patients in clinician training

Include practical details on what is entailed in working with a RM solution in **job descriptions**

Put in place appropriate **communication strategies** to increase awareness of RM solutions among staff

Healthcare organisation

Delivery teams need to **work on the ground** with clinicians

Ensure there is some **protected time** for staff to engage, support and deliver RM services

Adequately resource with **administrative and project management support** from the onset

Consider using **evidence-based project management tools** specifically developed to support the effective and efficient implementation of technology in health such as the NASSS-CAT tools

Prioritise **data monitoring needs**, with some standardised data fields in place

Agree on **SOPs for each pathway** with clinical and operational stakeholders in all boroughs where they will operate

Establish IG requirements and clearly communicate them to suppliers at the earliest possible opportunity

Wider System

Alignment of objectives and priorities can be facilitated though **regional clinical reference groups, local clinical champions, and significant ongoing public engagement** and dialogue

Embedding and adaption over time

Evaluations should be repeated to determine if/how the benefits of RM implementation and delivery change overtime