LLR-Doccla

Virtual Care Pilot Evaluation

01/10/2025

Contents

Executive summary

Chronic and complex conditions place a significant burden on both patients and the NHS, accounting for over half of GP consultations and a substantial proportion of outpatient visits and inpatient bed days. Digital health interventions to detect deterioration early, such as virtual care and remote monitoring, have shown promise in managing these complex conditions more efficiently.

The LLR-Doccla Virtual Care Programme was designed to detect early signs of deterioration in patients with complex and chronic needs from Patient Needs Groups 9, 10 and 11, and with a 33% risk of hospital admission (as identified using the John Hopkins ACG Risk Stratification Tool). To these patients, the pilot offers remote monitoring of soft signs of deterioration and vital signs, to provide guidance, treatment, monitoring and onward escalation when needed.

Over the nine-month pilot, 71 patients were recruited, with 56 successfully onboarded on a rolling basis. The pilot initially aimed to onboard 185 patients but fell short due to several mitigating factors. This included GP collective action, which prevented Doccla from accessing GP patient records, an essential requirement for onboarding patients onto the pilot.

Our analysis looked at the impact of the pilot on healthcare utilisation. Given the pilot recruited patients on a rolling basis over 9 months, we scaled all patients enrolled on the pilot for over 1 months up the full duration of the pilot (9 months). The results show the pilot demonstrated reductions in healthcare utilisation, including but not limited to a 89% reduction in GP appointments, 79% reductions in emergency department visits and 71% reduction in ambulance callouts. Due to a lack of data on the control group's inpatient hospital stay, a range for the pre-pilot length of stay was estimated, ranging from a 13% to 75% reduction in inpatient bed days.

Overall, the savings from reduced healthcare utilisation resulted in estimated capacity-releasing savings of £162,408. For this calculation we used the medium estimate for savings from saved inpatient bed days. These benefits did not outweigh the cost of the pilot, generating a cost benefit ratio of 0.6.

Sensitivity analysis on recruitment and inpatient bed day assumptions was also conducted to assess how much the results depend on these key assumptions. Sensitivity analysis of the inpatient bed day counterfactual assumption showed that if pre-pilot length of stay was assumed to be longer, or for admissions with a higher complication score, the cost-benefit ratio rises to 1.1. Additionally, sensitivity analysis of recruitment numbers showed that if all 185 patients had been recruited for the full 9 months as initially planned, the cost–benefit ratio rises significantly to 1.96.

In patient surveys, respondents reported feeling well-informed and supported in using the Doccla app and medical equipment, and valued the opportunity to communicate directly with a Doccla clinician. The pilot was also noted to increase patients' sense of safety and control over their health, contributing to an improved quality of life. A small number of respondents suggested enhancements to equipment accessibility and mentioned feeling alarmed by some automated reminders.

Overall, the pilot demonstrates that proactive virtual care models may play an important role in enabling early detection of deterioration in patients with complex clinical needs by enabling early detection of deterioration, reducing avoidable healthcare utilisation, and improving patient experience. However, the sensitivity analysis of the cost-benefit ratio indicated that future pilots

must focus on hitting recruitment target and collecting substantial control data on inpatient bed days to ensure accurate reporting.

1 Introduction

1.1 Introduction to Chronic Disease Management

Chronic disease refers to long-term conditions that can be managed but not cured. In England, these conditions are widespread, affecting 25 million people (The Patients Association, 2020), with more than one in four adults living with two or more chronic conditions (NIHR, 2021).

In LLR ICB in 2023, 54% of people reported having a long-standing physical or mental health condition (DHSC, 2024). People with multiple chronic comorbidities have a higher likelihood of poor health outcomes and lower quality of life, which often negatively affects their mental wellbeing and ability to work (NIHR, 2021).

In this report, we also focus on the most complex forms of chronic disease. Patient Needs Groups (PNGs) are a Johns Hopkins-developed patient grouping system used by the NHS to categorize individuals based on their healthcare needs and complexity. These range from healthy (Green, 1-4 PNG) to stable chronic conditions (Amber, 5-9 PNG) and complex, multi-condition needs (Red, 10-11 PNG). This work focuses on individuals in PNG groups 9-11.

1.1.1 The current impact of chronic diseases on the NHS

The prevalence of complex, chronic diseases not only impacts individual health and wellbeing but also places considerable strain on healthcare systems. Within the hospital setting, long-term conditions consume over half of all GP consultations, 65% of outpatient visits, and 70% of inpatient bed days (Williams and Law, 2018). These health impacts vary by chronic disease. **Table 1** outlines common chronic conditions and their health system impacts.

Table 1. Chronic Conditions

Condition	Overview	Health System Impact
Diabetes	Diabetes is a chronic disease, in which people's bodies struggle to process sugar from food because insulin does not function properly. This leads to elevated blood sugar levels, which can progressively harm various organs and increase the likelihood of developing additional health complications over time (NHS, 2023).	In 2023, public health data suggests close to 8% of England's population are living with diabetes (DHSC, 2024). The NHS allocates 10% of its total budget to diabetes care, with 60% directed towards treating complications arising from the disease (Hex et al., 2024).
Asthma	Globally, asthma stands as the most prevalent chronic respiratory disease and in the UK, the condition affects 12% of the population (Jacobs et al., 2023). Asthma can impact individuals of all ages, causing breathing challenges through inflammation of airways. When not managed well, it can compromise energy levels,	Annually, asthma imposes a substantial economic burden on the UK public sector as it is conservatively estimated to exceed £1.1 billion. The condition drives 6 million primary care consultations, 100,000 hospital admissions and causes 17 million lost

Condition	Overview	Health System Impact
	mental well-being and increase susceptibility to lung infections, such as pneumonia (NHS, 2021a).	working days each year (Jacobs et al., 2023). Further, the disease disproportionately affects those with severe forms, who experience great morbidity and reduced quality of life.
Chronic Obstructive Pulmonary Disease (COPD)	COPD is a preventable, debilitating, chronic respiratory condition characterised by progressive lung function decline and airflow limitation. Predominantly affecting smokers, more than 1 million people are diagnosed with COPD while an estimated 2 million remain undiagnosed (NICE, 2023).	Asthma and Lung UK released a report on COPD that showed a quarter of people wait five years or more for a diagnosis and 20% of people with COPD receive all elements of the standard care pathway recommended by NICE guidelines (Asthma and Lung UK, 2022). As a result, COPD is the second most common cause of emergency hospital admissions and estimated to cost the NHS £1.9 billion each year (The Lancet, 2018), primarily due to hospital management of COPD exacerbations (NHSE, 2024a).
Frailty	Frailty refers to a particular health condition predominantly affecting older adults and characterised by diminishing muscle strength and persistent fatigue. Individuals with frailty are most susceptible to adverse health outcomes, including falls, disability, hospitalisation, and the potential need for comprehensive long-term care (Young, 2013).	In England, frailty in adults aged 50 and older is estimated to be 8.1% (Sinclair, et al, 2022) and more than 50% of people aged over 85 live with moderate or severe frailty. Multiple demographic and social factors contribute to this increased vulnerability, including socioeconomic deprivation, Asian ethnicity, female sex and residence in urban areas (Powell, 2024). The total cost to the UK from frailty is estimated to be £5.8 billion per year, with each patient costing £561.05 for mild, £1,208.60 for moderate and £2,108.20 for severe

Condition	Overview	Health System Impact
		frailty annually (Han et al., 2019).
Cardiovascular Disease	Cardiovascular disorders include conditions like atrial fibrillation and heart failure. Atrial fibrillation (AF) refers to a chronic heart condition and presents as an irregular and rapid heart rate and affects 2.2% of the general population in England (DHSC, 2024). The prevalence increases to more than 10% in an elderly population (NHS, 2021b; Burdett and Lip, 2022). AF is considered a major preventable cause of stroke, heart failure, and dementia. Heart failure refers to an incurable medical condition where the heart struggles to pump blood effectively, compromising oxygen delivery and impacting bodily functions such as breathing and muscles (British Heart Foundation, 2024). While it can affect anyone, the condition is most prevalent among older individuals and can stem from various causes, including heart attacks, cardiomyopathy, and high blood pressure (British Heart Foundation, 2024). In the UK, heart failure significantly impacts healthcare, with approximately one million people living with the condition and 200,000 new cases emerge annually.	The financial impact of AF is considerable with direct NHS costs estimated at £1 billion in 2020. However, these figures may be underestimated due to the condition's complexity and common multimorbidity status, with projected costs ranging from £2.2 and £4 billion (Burdett and Lip, 2022). By 2022/2023, the NHS was spending £6 billion annually managing heart failure patients (Duffy, 2023). Further, studies show that the number with heart failure is growing by 10,000 per year (Hickey and Beecroft, 2018). Diagnosis is notoriously difficult, as the key symptoms – breathlessness and fatigue – can mimic many other medical conditions. Consequently, current estimates reveal that 80% of patients are only diagnosed after emergency hospital admission (Duffy, 2023), highlighting the condition's complex and often masked nature. The prognosis is particularly grave, with nearly 1 in 4 patients dying within one year of hospital admission (Roche Diagnostics Limited, 2020).
Multimorbidity	Multimorbidity refers to those with multiple long-term health conditions.	As this phenomenon becomes increasingly prevalent, especially among younger populations, it presents significant challenges for healthcare systems and patient well-being. Research

Condition	Overview	Health System Impact
		indicates that individuals with multimorbidity face substantial health risks, including higher rates of premature mortality, increased hospital admissions, and longer hospital stays. Beyond these clinical outcomes, they also experience reduced quality of life, diminished physical functioning, and heightened psychological stress (Head et al, 2021). The trend is particularly striking in demographic studies evaluating health. For instance, Scotland documented a 60% increase in multimorbidity prevalence at age 60 when comparing individuals born in the 1930s to those in the 1950s (Katikireddi et al, 2017). This shift underscores the growing complexity of healthcare needs. Patients with 1 to 3 conditions have between 1.55 and 2.85 times the expected total patient cost without any morbidity (Soley-Bori et al., 2020).

1.1.2 The growing challenges with chronic disease management in LLR

Chronic disease management has long been a challenge for the health system; however, the challenge is set to grow. The following section outlines some of the challenges facing chronic disease management.

Demand for chronic disease management is growing

Recent studies reveal that demand for chronic disease management is growing, particularly among older populations and those from less affluent areas (NICE, 2016). There is projected to be around 9.3 million people in England living with a major illness by 2040, which is an increase of nearly 2.5 million over 20 years (Raymond et al., 2024)

One of the greatest risk factors of chronic diseases such as dementia, heart disease, diabetes, arthritis, and cancer, is age. This also means that as individuals age, they increase their risks of multiple long term conditions, or multimorbidities. Nationally, the proportion of the population aged above 65 is growing and as a result the prevalence of chronic diseases and multimorbidities is growing. This in turn is placing a higher burden on the health system. This is particularly concerning for LLR where the population is older than the national average. In Leicestershire and Rutland, 20.6% and 24% of the population is over 65 respectively. This is higher than 18.5% seen across England (LSR, 2021; LLRHWP, 2025). Therefore, the impact of the ageing population may be significantly higher across the health system in LLR.

Additionally, prevalence of chronic conditions has been linked to deprivation. For example, analysis by the Health Foundation found that individuals in the 10% most deprived areas will develop chronic illness 10 years earlier than people in the 10% least deprived areas (Raymond et al., 2024). This increased risk of long-term conditions within deprived areas, also leads to increased risks of individuals developing multiple long-term conditions. This is again important context within Leicester, Leicestershire and Rutland (LLR) Integrated Care Board (ICB) which serves a diverse 1.1 million residents. The region's demographic complexity significantly impacts chronic disease management as 35% of Leicester residents live in an area classified as being in the most deprived 20% nationally and pockets of significant deprivation can also be seen in Leicestershire and Rutland. The high levels of deprivation will increase demand for management across the ICB.

Multiple long-term condition management requires system working

Multiple long-term condition management, particularly for patients with multiple long-term conditions, is particularly challenging, as patients must navigate complex healthcare services, interact with multiple health professionals, and maintain strict treatment adherence. This comprehensive management creates a significant patient burden, which research has linked to poor treatment compliance and suboptimal disease outcomes (Polus et al, 2024).

Historically the system working required to support multiple long-term conditions effectively, has been a challenge within the NHS. This is due to a combination of greater specialisation of clinicians (Whitty et al., 2020), poor data infrastructure (Keith, Grimm and Steventon, 2022), complex data-sharing agreements (McLaurin and Stibbs, 2022), and a lack of time from healthcare providers (NHS Professionals, 2019). Although work is underway to improve data infrastructure and promote a more collaborative system, many challenges remain which add complexities to chronic disease management.

1 Widespread workforce shortages

Across the NHS, including within primary and secondary care, there are significant workforce shortages.

For example, the size of the GP workforce in the UK has not kept up with demand. Data suggests the number of patients per GP has increased 15% since 2015, putting an increasing clinical and administrative burden on practices (BMA, 203). The impacts of the shrinking workforce are being felt in LLR. Data from 2023 shows the area has 41 GPs per 100,000 people which is approximately 30% lower than the 56 per 100,000 reported as required (Philpott, 2023).

The shortages also affect the secondary care workforce. One example is within chronic kidney disease. In this speciality, there is a reported wide variation in the size of the workforce in England (Lipkin & McKane, 2021). In terms of consultants, the UK has one of the lowest ratios of nephrologists per million population (8.5 per million population) in the world.

2 Deteriorations are often identified late leading to higher health burden

Early identification of symptom deterioration and intervention to stop further decline is a key part of the strategy to manage chronic conditions. A Health Foundation report showed that 41% of emergency admissions coming from care homes could have been preventable as the conditions can be managed effectively (Wolters et al., 2019). This shows that conditions can be managed and prevented from escalating to hospital admissions. Deterioration can be detected either through physical changes, such as breathing, blood pressure or a loss of consciousness or more subtle (soft) signs such as a loss of appetite or behaviour (NHSE, 2024b).

In a hospital setting, early identification of deterioration is linked with significant reductions in mortality, emergency interventions and unscheduled intensive care unit treatments (Lourenço et al., 2023). An additional study also identified similar reductions for patients with respiratory conditions, whilst also showing that early intervention due to monitoring of vital signs did not incur an increase in nurse workload (Vincent et al., 2018). This shows that in a hospital setting, early identification can lead to better patient outcomes, whilst not increasing the burden on the health service. Reduction in length of stay not only benefits the health system and the patient but may also benefit other patients that can now be treated quicker due to the more efficient use of resources (NHSE, 2024b). Outside of a hospital setting, soft signs questionnaires can be used to identify symptom deterioration, often before they can be seen in monitoring (Health Innovation Wessex, n.d.). A combination of soft signs observations and monitoring of vital signs may be an effective way to detect deterioration of symptoms at the earliest opportunity for patients with chronic conditions.

The benefits of both monitoring and soft signs observations have led NHSE (2024b) to developing the PIER (Prevention, Identification, Escalation, Response) approach to help improve physical deterioration in health and social care. This approach spans both health and social care, so requires system working at an integrated level. This approach is specifically designed for ICBs to prepare systems to support pathways that improve patient outcomes by monitoring individual risk, prevent deterioration and ensure personalised care is delivered, both in hospital and in the community (NHSE, 2024b). Therefore, it is imperative that systems have programmes and policies in place that identify early deterioration of symptoms and prevent these symptoms from further deterioration.

1.2 Management and Interventions

Given the challenges outlined above, it is important the health system is prepared with appropriate and effective management approaches. LLR ICB have already trialled novel techniques to manage chronic diseases such as video assessments, tracking of clinical data and smart devices, which will be discussed in more detail in the following sections.

1.2.1 Overview of management approaches

While chronic diseases are considered some of the most common and expensive health conditions, they are also simultaneously considered the most preventable and can be effectively managed with appropriate interventions (Broadstairs Medical Practice, 2024). In fact, the NHS is estimated to spend approximately 40% of its budget on treating preventable conditions (UK Government, 2022). While current healthcare spending predominantly focuses on treating advanced-stage diseases, emerging research demonstrates that strategic investments in prevention and early intervention can effectively interrupt disease progression, preventing irreversible health damage and potentially reducing long-term healthcare costs (Wain and Miller, 2023).

1.2.2 Digital health technology

Digital health interventions, including virtual care wards, remote monitoring, and telehealth services, present a promising approach to managing chronic diseases more efficiently and cost-effectively. The COVID-19 pandemic has accelerated the adoption of digital health interventions due to the loss of face-to-face contact, demonstrating their potential to transform healthcare delivery (Getachew et al., 2023). Digital technologies enable more personalised, continuous and proactive health management.

Wearable devices, smartphone apps, and AI-powered health monitoring systems can provide real-time health insights, early warning signs, and personalised intervention strategies (Baumeister, Ebert and Snoek, 2021). These digital technologies require far less clinician time and estate than traditional monitoring methods, representing a large cost-saving area for ICBs and Trusts. LLR ICB itself has used digital technologies already to effectively manage their patients with chronic diseases.

During the pandemic, LLR rapidly expanded remote monitoring schemes for patients with chronic conditions like COVID-19, COPD, heart failure and pulmonary rehabilitation. Between April 2020 and May 2021, 1,000 patients used digital platforms to upload clinical data (NHS Transformation Directorate, 2024), which enabled healthcare professionals to remotely track patient conditions and identify early signs of illness deterioration and conduct video assessments, potentially preventing unnecessary hospital admissions and saving the healthcare system resources.

1.2.3 Disease specific approaches

The following section will focus on the six chronic conditions that are primary conditions within this pilot. These include diabetes, asthma, chronic obstructive pulmonary disease (COPD), frailty, heart failure and atrial fibrillation. Given that multimorbidity can lead to increased risk of severe complications and worse health outcomes, the literature review will also discuss touch upon comorbidities within intervention strategies.

This section will cover the potential strategies for early intervention, monitoring and disease management that are currently in place across England, as well as the economic and system costs of these conditions. These strategies include wearable devices to monitor vital signs, education platforms, messaging alerts to remind patients to monitor their symptoms and exercise initiatives to decrease the likelihood of symptom deterioration.

1 Diabetes

The 2024 Darzi review of the NHS emphasised prevention as a critical strategy, demonstrating that addressing potential health risks is substantially more cost-effective than treating advanced medical conditions. Specifically, the review showcased the NHS-funded Diabetes Prevention Programme as a compelling example, which has successfully decreased the likelihood of developing type II diabetes by approximately 40% (Darzi, 2024). The NHS Diabetes Prevention Programme aims to identify individuals at high risk of type II diabetes and provide a nine-month, evidence-based lifestyle intervention. This programme is offered across England with two delivery options: face-to-face group support and a digital platform. While the in-person service offers personalised guidance on weight management, nutrition, and physical activity, the digital service utilises technology like wearable devices, health coaching apps, online support groups, and electronic goal tracking to achieve similar health outcomes (NHSE, 2024c).

2 Asthma

Despite the availability of effective treatment, due to busy schedules and that medication is only needed when there is an imminent asthma attack, many people do not take their medication: this is considered non-adherence. A 2022 systematic review of digital interventions to improve maintenance medication adherence highlighted that patients receiving digital interventions, particularly using electronic monitoring devices (EMDs) and short message services (SMS) have increased adherence, leading to clinically significant improved management over asthma and a reduction in asthma exacerbations (Chan et al., 2022). A smart inhaler exemplifies an EMD, which has the ability to provide real-time feedback on medication usage. It tracks the precise date and time of each dose and monitors whether the patient is using the inhaler correctly, offering comprehensive, instantaneous insights into medication adherence (Lane, 2022). National Institute for Health and Care Research Leicester is launching the first UK clinical study in 2024 that investigates the use of smart inhalers for children with asthma (Dhull, 2024) across several GP practices, marking a significant step in paediatric respiratory care technology.

3 Chronic Obstructive Pulmonary Disease (COPD)

There is substantial interest in deploying a digital healthcare service to manage those with COPD who are at high-risk of exacerbations. A clinical trial in NHS Greater Glasgow and Clyde, from 2018 to 2021, deployed an innovative COPD service using AI to analyse patient-generated data from hospital electronic records and wearable devices. This approach enabled remote management and early identification of high-risk patients. Initial results are promising, demonstrating a reduction of 1 hospital admission and 9 hospital days per patient annually, translating to £8500 in savings per patient (NHSE, 2024a). NICE is currently assessing the unmet need and cost-effectiveness of implementing digital technologies for self-management of COPD within the NHS (NICE, 2024), illustrating the urgency to help patients more accurately recognise and respond to deteriorating symptoms.

4 Frailty

The British Geriatric Society identifies five critical “frailty syndromes” that significantly impact older adults’ quality of life: falls, immobility, delirium, incontinence and increased vulnerability to medication side effects. These interconnected conditions progressively erode an individual’s independence, creating a cascading cycle of health challenges. Falls are particularly alarming, with more than one third of people over 65 experiencing such incidents. The economic impact is substantial as hip fractures alone cost the NHS and social care system an estimated £6 million daily (NHS, 2024). Furthermore, a recent 2024 comprehensive study of over 2 million primary care records revealed that patients with severe frailty face nearly six times higher hospitalisation rates and nine times greater hospital records compared to non-frail individuals. Even those with mild frailty experience twice the hospital admission likelihood and three times the associated hospital expenses (Fogg et al., 2024).

Prevention is key to frailty – the NHS is the first global health system to systematically identify frailty among older adults, those aged 65 and over, by using the electronic Frailty Index (eFI). Thus, healthcare professionals can automatically analyse routine health records to determine an individual’s frailty level (NHS, 2024). Recognising the cascading risks of falls, the Falls Prevention Service in Leicester supports patient independence through targeted interventions. Patients with a fall history or high fall risk can be referred to prevention programs like "Steady Steps Falls," a 24-week free group exercise initiative designed to mitigate future falls (North West Leicestershire District Council, 2024). By proactively addressing frailty and fall risks, these strategies aim to enhance older adults' quality of life and reduce healthcare complications.

5 Cardiovascular Diseases: Atrial Fibrillation and Heart Failure

Early, accurate diagnosis and appropriate management are crucial in mitigating mortality, morbidity, and healthcare costs associated with cardiovascular disease. The NHS Long Term Plan aims to improve detection and treatment of high-risk cardiovascular conditions like atrial fibrillation, hypertension, and high cholesterol. Efforts include systematic practice audits to identify undiagnosed atrial fibrillation, maximising health checks, and incorporating pulse checking in GP and pharmacy services. Additionally, the plan explores integrating new digital technologies into clinical pathways to support atrial fibrillation routine care. Ultimately, the prevention strategies aim to reduce 150,000 cases of heart attacks, strokes, and dementia over the next decade (GOV.UK, 2019). Complementing these prevention strategies, disease management continues to be an effective way to reduce costs of hospital admissions and healthcare resources. As England's aging population increases heart failure prevalence, NHS England introduced the "Managing Heart Failure @home" strategy in 2022. This initiative supports self-management and remote monitoring, offering personalised care plans to improve patients' quality of life while reducing hospital visits (Linker, 2022). The approach involves tracking key health measurements like heart rate, blood pressure, and weight over time.

6 Multimorbidity

Given the heterogeneity of multimorbidity, traditional healthcare models struggle to address this group of patients effectively. Most medical systems are structured around treating single conditions, which becomes inadequate when patients present with multiple, interconnected health challenges. In England, this limitation is evidence: 50% of primary care consultations and 75% of prescriptions are due to patients with multimorbidity (Cassell et al., 2018). As illustrated earlier between atrial fibrillation, heart failure and stroke, many of these chronic conditions are intertwined and exacerbate health risks, leading to worse health outcomes. Thus, in this section, I aim to illustrate some more examples of comorbidities and strategies to alleviate their impact on both patients and the health system.

These interconnected health challenges are particularly clear in specific disease combinations. For instance, diabetes provides a stark illustration of comorbidity complexity. Nearly 30% of type 2 diabetes patients have three or more comorbidities at diagnosis, with hypertension being the most common (Pearson-Stuttard et al., 2022). This relationship is not merely statistical: diabetic patients with cardiovascular complications are 2-6 times more likely to experience a stroke (Maida et al., 2022).

The intricate links between chronic conditions become even more pronounced when examining respiratory and cancer-related comorbidities. COPD, for example, is a significant risk factor for lung cancer, predating the cancer in up to 80% of cases among smokers. Independent of other risk factors, individuals with COPD have a 4 to 6-fold increased risk of developing cancer (Parris et al., 2019). Critically, because COPD is preventable, targeted interventions could potentially reduce lung cancer incidence. These examples underscore the urgent need for a more holistic approach to healthcare- one that recognises the complex interconnections between chronic conditions and develops comprehensive strategies to address them.

2 Background to the Pilot

The LLR-Doccla Virtual Care programme is a pioneering model of care that seeks to detect deterioration earlier for complex, chronic disease patients. LLR ICB have co-designed this pathway with Doccla, a virtual care solution company, to ensure that the pilot detects early deterioration symptoms, triaging and escalating these deteriorations to the most appropriate service across the integrated care system.

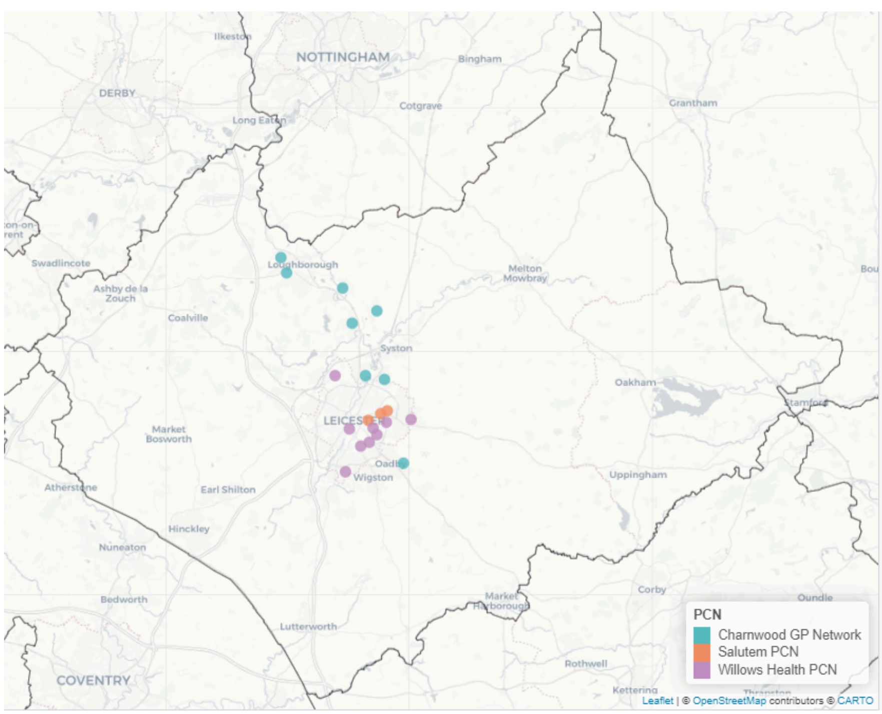
2.1 Participating Primary Care Networks

The patients on this programme come from three Primary Care Networks across the Leicester, Leicestershire and Rutland Integrated Care Board area:

- Salutem PCN
- Willows Health PCN
- Charnwood GP Network (Watermead PCN, Soar Valley PCN, Carillon PCN and Beacon PCN)

Expressions of Interests were sent to all PCNs across LLR. Please see the distribution of the participating GP practices within their respective PCN and LLR ICB in **Figure 1**. For the full list of participating practices, please see **Appendix 1**.

Figure 1. Distribution of practices within LLR ICB



These PCNs / GP Networks vary in size and demographics, with some practices representing urban geographies, whilst others represent rural. The variety in these PCNs ensures that this pilot is evaluated for a patient cohort that is representative of LLR's demographic makeup.

2.2 Pilot implementation and evaluation

This pilot was implemented in these PCNs and patient recruitment started in November 2024. This pilot ran for just over 9 months and concluded in August 2025. The pilot will deliver key benefits through:

- Detecting early deterioration of patients that are at a higher risk of admission.
- Treating patients' deterioration appropriately.
- Escalating significant deterioration to the appropriate services.

Figure 2 displays the pathway that patients experience when being onboarded and monitored as part of the LLR-Doccla Virtual Care programme.

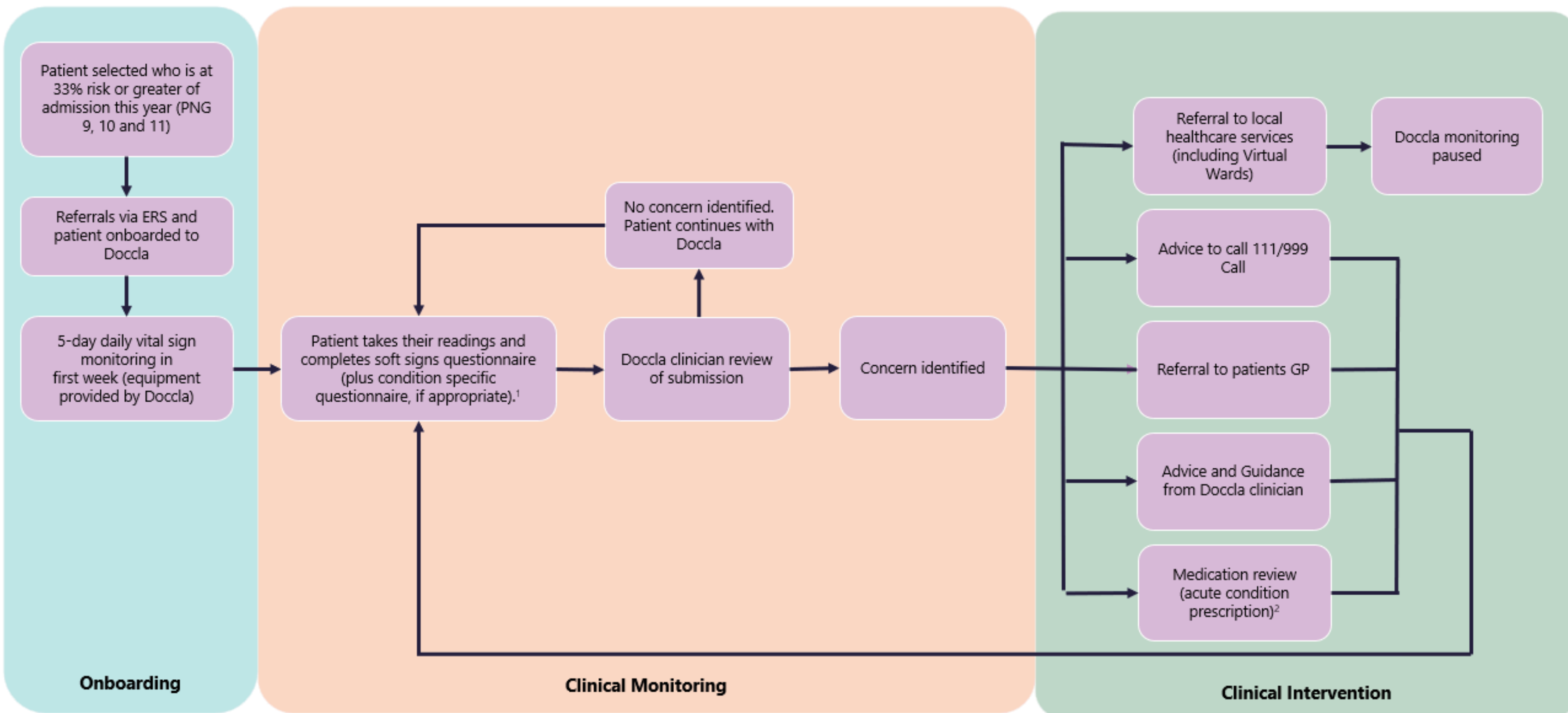
Firstly, LLR ICB had access to the Population Health Management Platform, Aristotle. Aristotle had a segmentation tool which allowed the ICB to create a list of patients based on a range of criteria or data fields, The Aristotle tool was used as part of the LLR-Doccla Virtual Care programme to identify patients with chronic conditions at the highest risk of admission within the LLR population. Please see **Section 2.3** for more details on the search criteria used to identify eligible patients.

Eligible patients identified through Aristotle were referred through GP Electronic Referral Systems (ERS). Once consent and onboarding was completed, Doccla provided a digital platform, including a 'soft-signs' questionnaire that were evaluated and monitored by a dedicated team of clinicians. Doccla also provided remote monitoring equipment which was sent out to patients prior to onboarding. Remote monitoring equipment for all patients consisted of a smart device such as a phone or tablet, thermometer, blood pressure cuff and a sats probe. Additional, condition-specific, equipment were also provided by Doccla, such as an ECG for patients who had atrial fibrillation.

At the start of a patient's time on the pilot they had 5-days of vital sign monitoring in their first week to establish their baseline. After this was complete, the patient completed symptom questionnaires and virtual monitoring throughout their time on the pilot at regular, pre-determined intervals. The schedule of monitoring was determined on a case-by-case basis. These questionnaires and readings were reviewed by a Doccla clinician. If any concerns were identified (also known as a "red alert"), the patient either had a consultation or was discussed within a consultant-led MDT. If escalation was required, a plan was made with the patient. Where no escalation was required, the patient went back to regular monitoring.

Given the importance of these questionnaires and readings, patients on the pilot were expected to submit their readings and remain compliant with the pilot. Readings on average took between 5 and 15 minutes to complete, depending on the complexity of the patient. Doccla conducted compliance monitoring to ensure that patients were submitting their readings on time and correctly. When a patient was not compliant with the programme, they were contacted by a member of the Doccla team, and if the patient remained non-compliant, they were removed from the programme. This was done to ensure that the pilot was safe for patients.

Figure 2. Doccla Patient Pathway.



[1] Frequency of readings and questionnaires depends on patient condition
[2] LTC medication change in exceptional circumstances

2.3 Patient Eligibility

A total of 1,500 patients were identified for the pilot. The pilot had a maximum capacity of 185 concurrent patients. To be eligible for the pilot, patients had to meet the following inclusion criteria:

- 18 years of age and above;
- Gives consent to go onto Remote Monitoring;
- Has capacity to give consent OR a "best interests" decision has been made on their behalf;
- Has dexterity to use the devices OR has carer/next of kin (NOK) who has dexterity to use the devices; and
- Has been identified from the following search criteria:
  - Patient Needs Group (PNG) 9, 10 or 11[1](Johns Hopkins, n.d.).
  - Risk of admission >33%.
  - At least one long term condition from the following: asthma, COPD, heart failure, diabetes, Atrial Fibrillation and Frailty.

In addition to the inclusion criteria outlined above, the Doccla-LLR VC pilot has several exclusion criteria:

- Does not give consent to go onto Remote Monitoring;
- Does not have capacity to give consent and it is not assessed as being in the person's best interests;
- Severe/acute mental health issues or substance abuse issues that are significant enough to greatly impact ability to maintain compliance, contact with clinicians, and safety with remote monitoring;
- Any other significant social/physical/mental health issue that will have a significant impact on maintaining compliance and communication with clinicians;
- Lives in an area with no signal for EE or Three AND doesn't have wifi AND doesn't have a telephone landline;
- Diagnosed with a cognitive impairment that would impair ability to maintain compliance with no additional support;
- Patient is acutely unwell - at the point of onboarding the patient's observations are outside of an acceptable range for the individual;
- Receiving active treatment for malignancy;
- Patients who are immunosuppressed due to active malignancy, severe renal impairment requiring dialysis or organ transplants; and
- Patients on end-of-life management.

[1] PNG 9- Dominant Major Chronic Condition, PNG 10- Multimorbidity High Complexity, PNG 11- Frailty

2.4 Impact pathways

The Doccla-LLR VC pilot has a wide range of impacts on patients, staff and the health system. The impact pathway in **Figure 3** was developed to show the inputs, outputs, outcomes and impacts of the pilot. We developed this through engagement with key individuals involved in the pilot and existing research. This model is used to inform subsequent analysis.

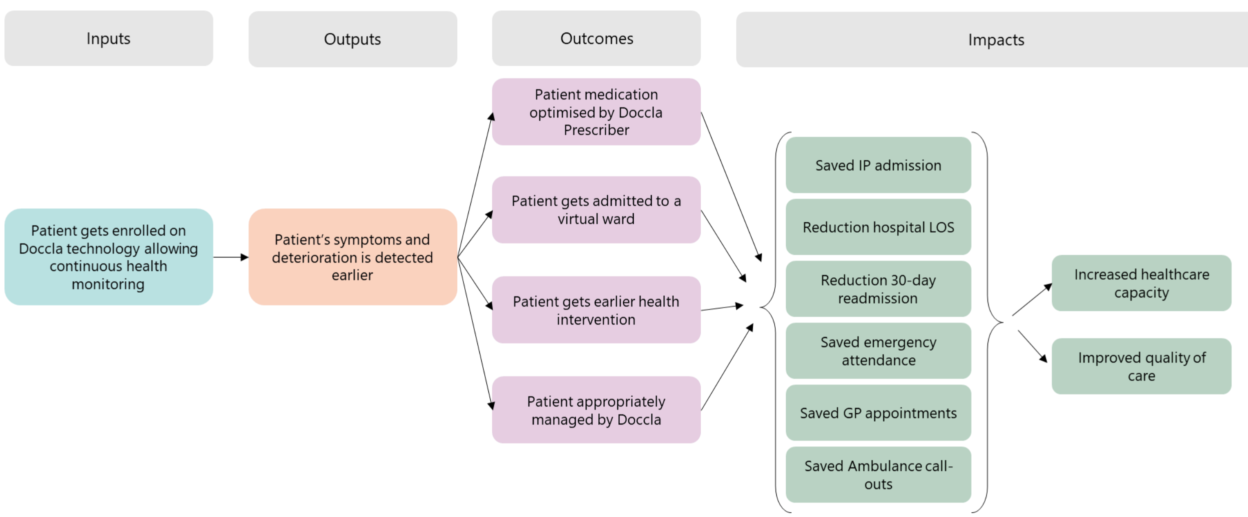
The "Input" stage of the logic model highlights the three key inputs of the pilot: the patients begin enrolled on the Doccla pilot and receiving the technology.

The "Output" sets out what happens as a consequence of the input, patients symptoms and deterioration being detected earlier.

The "Outcome" stage sets out what happens as a consequence of the output. Examples include patient medication optimisation, earlier health intervention and patients more appropriately managed in primary care by Doccla clinicians.

Finally, the "Impact" stage summarises the impact associated with the outcome. For example, saved inpatient admissions and reduced LOS, reduced readmissions, saved GP appointments and emergency interventions (ED attendances, 999/111 calls, ambulance call-outs).

Figure 3. Doccla impact



Note: A change in prescription through Doccla may have led to reduction in healthcare utilisation compared to if the patient continued the medication prior to change. However, the impact of changed prescription could not be quantified using the data

3 Methodology

Our independent evaluation aims to both quantitatively and qualitatively assess the impact and benefits of the Doccla-LLR VC pilot for patients with chronic conditions in LLR ICB and whether this service provided a return on investment.

3.1 Data sources

Data for the evaluation was obtained from the Doccla team and LLR stakeholders involved in the pilot. A data sharing agreement was in place between Doccla, Edge Health and LLR ICB. The following data was used:

- **Patient-level pseudonymised data from SystmOne.** We worked with Doccla and LLR ICB to design data collection within SystmOne at the start of the pilot. This data included information on patient demographics, interventions and outcomes for patients on the pilot.
- **Aggregated data from Aristotle.** Aggregated metrics were obtained from LLR ICB's Aristotle platform. These included assumptions used within our health economic analysis. See **Section 7.1** for further details.
- **Interim patient survey.** The Doccla team shared responses from patients that responded to the interim survey circulated in the middle of the pilot.

3.2 Data analysis

We used a mixed methodology, combining qualitative and quantitative data on implementation and impact outcomes.

The analysis plan was developed based on the impact pathway outlined in **Section 2.4**.

3.2.1 Quantitative analysis

Quantitative data analysis was conducted using the programming language R and Microsoft Excel. The analysis explored patients' demographics and compared them with overall ICB demographics. The primary focus was to quantify the impact and outcomes of the VC pilot by comparing pre-pilot data, which served as a counterfactual, with pilot-period healthcare utilisation. Cost-benefit analysis was performed by comparing the benefits and savings from pilot outcomes against pre-pilot data. Healthcare costs and other utilisation-related assumptions were sourced from publicly available data and academic literature.

Survey responses were analysed quantitatively using ratings and Likert-scale questions to assess patients' experiences with the Doccla service.

3.2.2 Qualitative analysis

Survey responses also included free-text answers, which were thematically analysed to complement the quantitative findings and provide deeper insight into patients' experiences of the VC pilot.

Results from both quantitative and qualitative analysis have been reported as charts, flow diagrams, tables and described in the text.

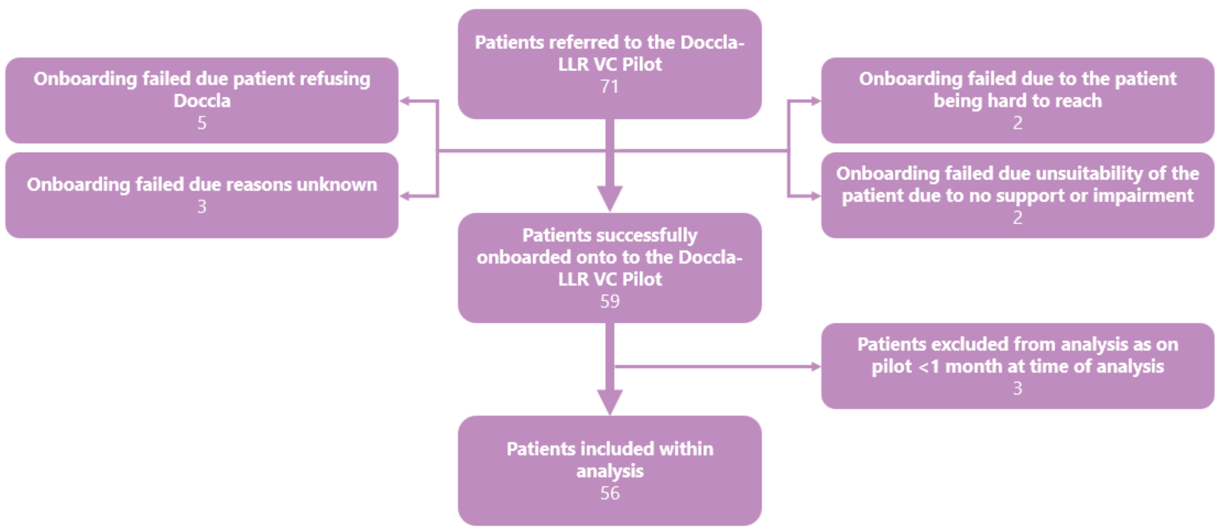
4

4 Doccla-LLR VC pilot activity

Since the beginning of the pilot in November 2024, a total of 71 patients were recruited, out of which 59 were successfully onboarded and 12 failed their onboarding **(Figure 4)**. The failed onboarding of the 12 patients was due to patient being hard to reach (N = 2), unsuitability of the patient due to no support or impairment (N = 2), patient refusing Doccla (N = 5) or reasons unknown due to no onboarding ticket (N = 3).

For this report, 3 patients were excluded from the analysis, as they had used the VC Pilot for less than a month. In the interest of ensuring the statistical reliability of any conclusions drawn from the pilot data, these exclusions were agreed upon by all stakeholders.

Figure 4. Patient flow and inclusion for VC Pilot evaluation analysis



The following sections of the report provide demographics, outcome and healthcare service utilisation of 56 patients that used the VC Pilot.

4.1 Demographics

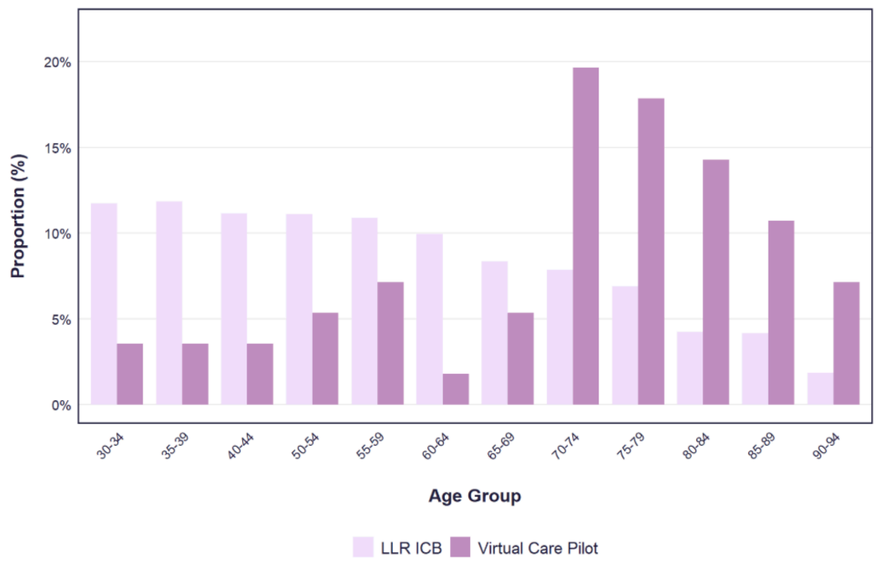
Patients included in the pilot were identified as belonging to PNG group of 9, 10 or 11 with a 33% risk of hospital admission in the following year as identified using the John Hopkins ACG Risk Stratification Tool.

Demographic information on age (as five-year age bands), sex, area of residence (partial postcode) and IMD decile of residence was obtained on the 56 patients on the pilot.

Patient ages in the pilot ranged from 30 to 94 years, with a median age group band of 70-74 years old. The pilot cohort had a higher proportion of older patients, with 70% aged between 70 and 94 years.

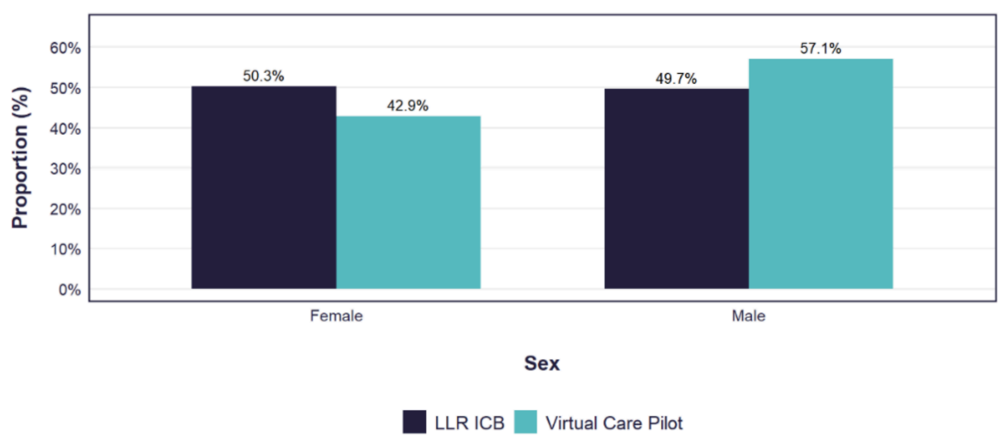
In contrast, the overall age distribution of the LLR ICB population skews younger, with a larger share of people under 60 years old (**Figure 5**). This indicates that the pilot population is older on average compared to the general LLR ICB population whose median age band is 35-38 years old.

Figure 5. Age distribution: Virtual Care Pilot vs general LLR ICB population



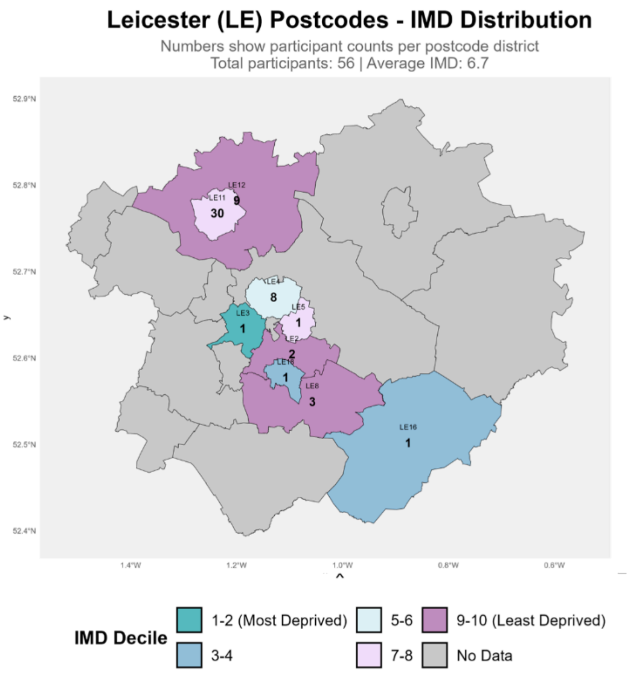
There is a slightly larger proportion of males than female patients on the pilot (Females: 43% vs male: 57%). This differs from the LLR ICB population, where the proportions of males and females are nearly equal (**Figure 6**).

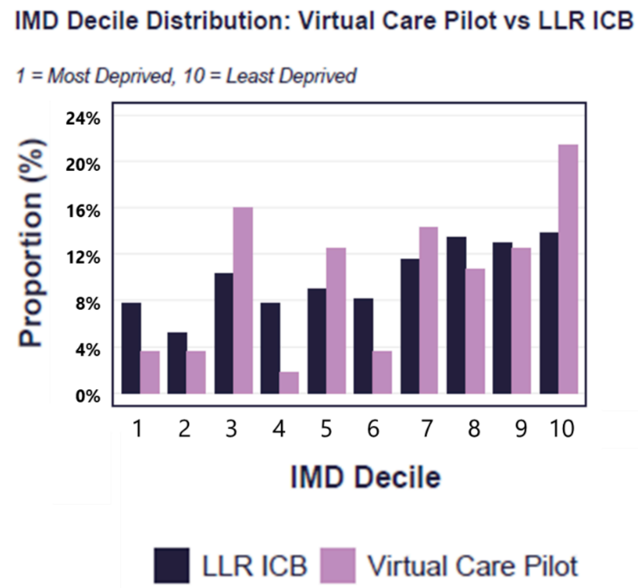
Figure 6. Sex distribution : Virtual Care Pilot vs LLR ICB



Around 70% of patients in the pilot reside in the north-west region of the LLR ICB which is characterised by lower deprivation (IMD deciles 7-10). However, 20% live in areas of moderate to high deprivation within the ICB (IMD deciles 1-6). Compared to the general LLR ICB population, there are proportionally less representation of patients from more deprived regions of LLR ICB (IMD decile 1-4) in the pilot (**Figure 7**).

Figure 7. IMD Decile distribution: Virtual Care Pilot vs LLR ICB

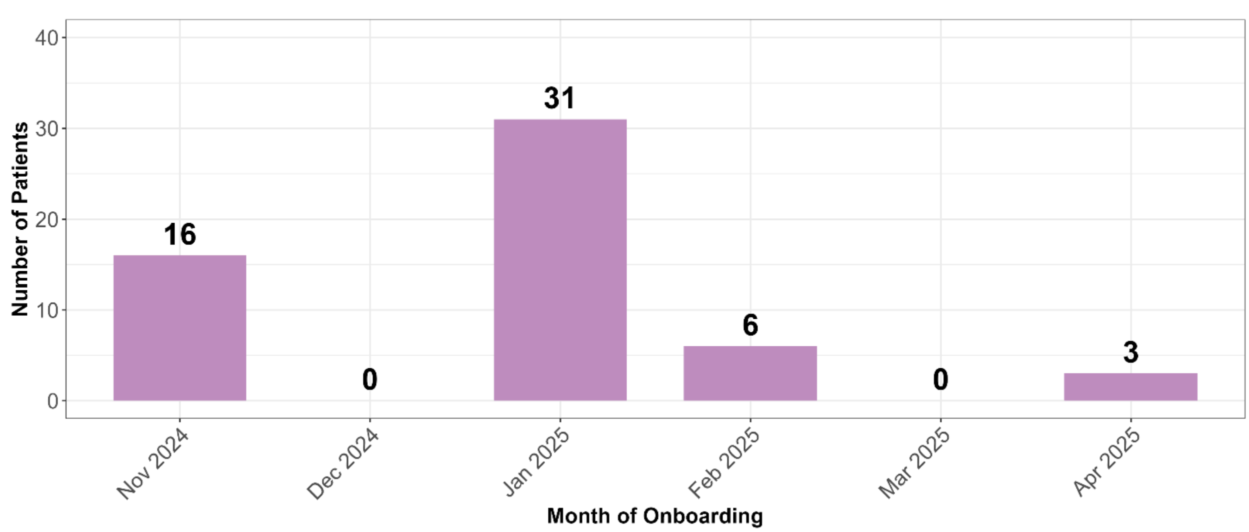




4.2 Onboarding on Virtual Care Pilot

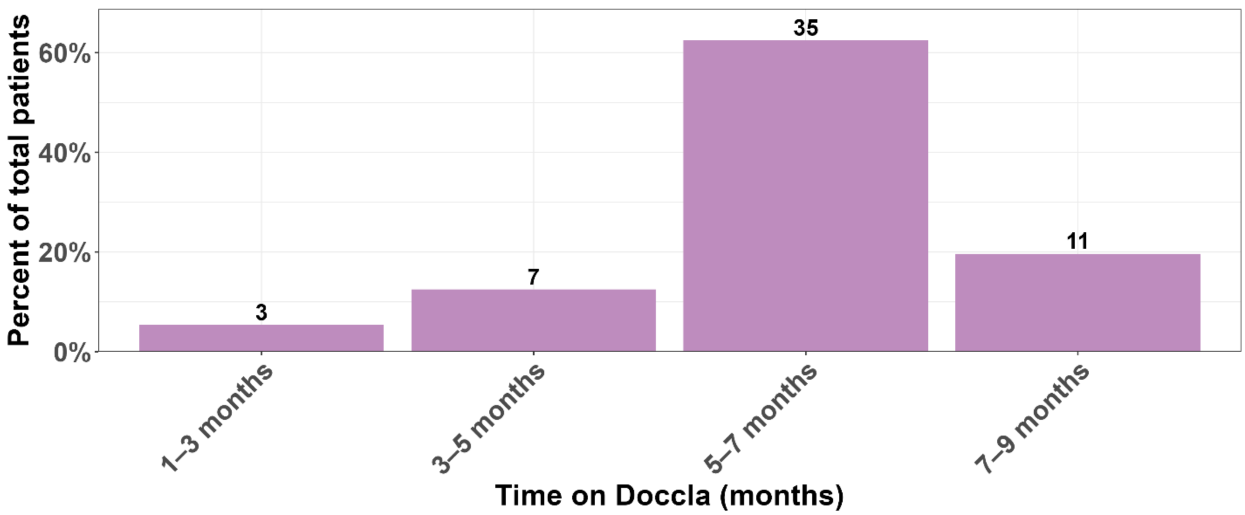
Patients were onboarded onto the Doccla-LLR VC pilot over 6 months. Onboarding was not continuous over these 6 months, with 16 patients onboarded in November 2024, 31 in January 2025, 6 in February 2025 and 3 in April 2025 (**Figure 8**). The large number of onboarded patients in January 2025 coincides with the pilot expanding its eligibility criteria. See **Section 2.3** for more details.

Figure 8. Patients onboarded on Virtual Care Pilot over time



The length of use of the VC Pilot varied from less than two months to 9 months. Most patients used the service for 5 to 7 months (Figure 9) which is as expected since the majority were onboarded in January 2025 and the pilot ended in early-August 2025.

Figure 9. Distribution of patients by time on Virtual Care Pilot



In August 2024, a few months prior to the start of the pilot, GP "collective action" began following a national BMA ballot of GP partners. This was not a strike but a "working-to-rule" approach, where practices limited non-contractual activity, tightened referral and administrative processes, and capped unsafe workloads in line with BMA safe-working guidance. Although GP practices remained open, non-contracted activity, were an essential part of the process of onboarding patients onto the pilot and therefore, the collective action significantly reduced the pool of patients that could be recruited.

Discussions with LLR stakeholders revealed that the contract for the Doccla pilot was designed for 185 patients for at least 6 months. However, as the pilot relied on recruitment of patients by GP's the coinciding timeframe of the GP collective action. This action included GPs not signing data sharing agreements which limited Doccla's ability to onboard patients on the pilot. This negatively impacted the recruitment rate.

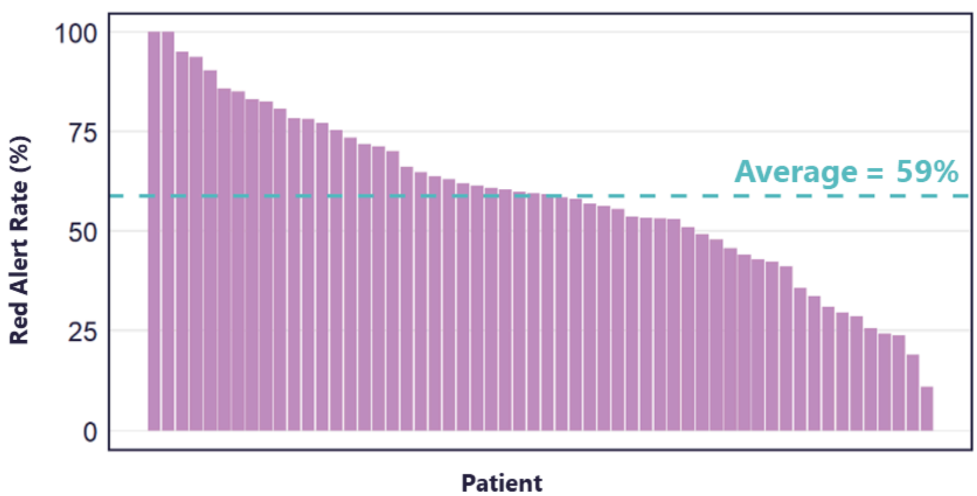
5 Patient Outcomes

5.1 Red alert rate

Over the 10-month period, a total of over 4,500 questionnaires were completed by patients. This equated to an average of 80 questionnaires per patient. Of these questionnaires, 2,600 (59%) were flagged as red alerts (**Figure 10**). There was considerable variation, for some patients, every questionnaire triggered a red alert, while for others, only about 1 in 10 did.

A standard general questionnaire is used for all patients which includes questions on their general health and others specific to their chronic condition. There are also additional questionnaires, including one of UTI, however, discussion with Doccla revealed that these bolt on questionnaires were not used often.

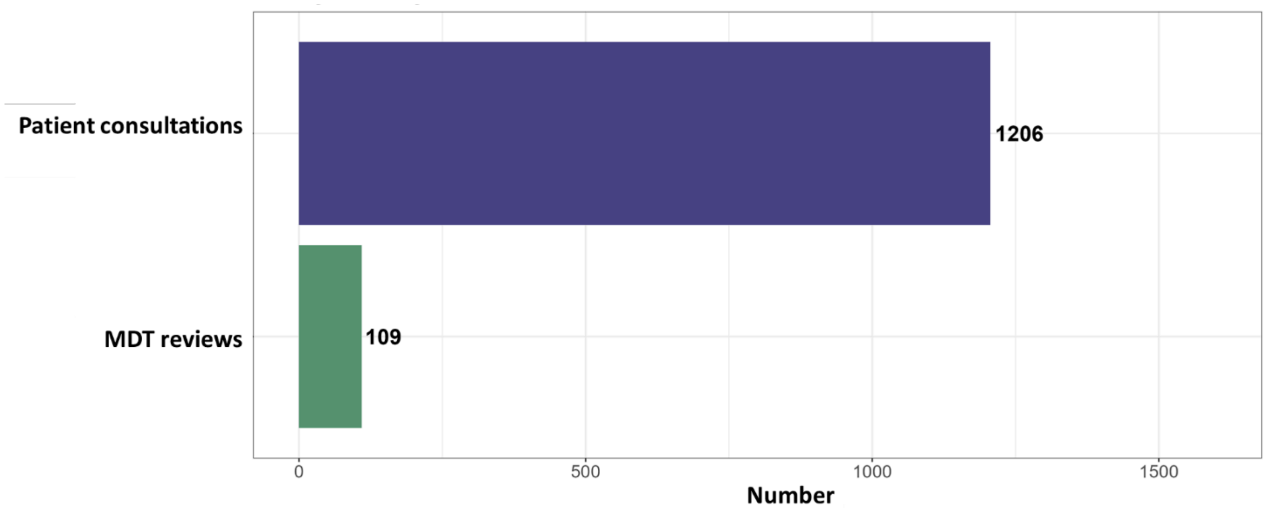
Figure 10. Distribution of Red Alert rates in patient questionnaires



5.2 Healthcare referrals by Doccla clinicians

Some red alerts triggered a patient consultation or MDT review by a Doccla clinician whereas others did not lead to escalation. Each red alert is reviewed by a clinician and any decision for further consultation or discussion at MDT is at the discretion of the reviewing clinician. Following red alerts, 1,200 patient consultations and 111 MDT reviews took place (Figure 11).

Figure 11. Total Patient consultations and MDT Reviews conducted during pilot



Additionally, some patients were referred on to GP, hospital (ED and admissions) and advised to make 111 or 999 calls as summarised in **Table 2**. The most common referral was for GP appointments (N = 24). An additional two referrals to other services (LLR monitoring service and home visiting service) during the pilot.

Table 2. Referrals to healthcare services by Doccla

Referral type	Total referrals (Nov '24 – July '25)	Total referrals (adjusted by patient length of VC Pilot use)
GP referrals	24	41
ED referrals	3	5
111 calls advised	2	3
999 calls advised	4	6
Hospital referrals	4	6

5.3 Prescriptions issued by Doccla clinicians

A total of five prescriptions were issued for five patients during the pilot. This included drugs – Nitrofurantoin and Fosfomycin typically prescribed for treatment or prevention of UTIs and Eumovate cream to treat topical inflammation like eczema and dermatitis.

5.4 Hospital admissions

Over the course of the pilot, a total of 25 hospital admissions occurred (including referrals through Doccla and ones external to Doccla). Out of these, 7 were elective (or planned) and 18 were non-elective (or emergency) admissions. These admissions include those that came as a direct result of Doccla intervention, for example an ED referral, as well as other admissions, for example, from routine outpatient appointments. Full admission Hospital Resource Group (HRG) codes and descriptions can be found in Appendix 2.

Elective admissions: The length of stay of patients with elective admissions ranged from 1 to 8 days, with a median length of stay of 3 days. Admissions were for a variety of scheduled surgical procedures and planned interventions, with Trapeziectomy being the most frequently recorded.

Emergency or non-elective admissions: The length of stay of patients with non-elective admission ranged from 2 to 21 days, with a median length of stay of 7 days. Overall, respiratory conditions accounted for the majority of admissions and tended to be associated with longer hospital stays.

These included multiple cases of shortness of breath and Asthma exacerbations due to varied causes such as post-procedure complications, bronchiectasis exacerbation, pneumonia, and pulmonary embolism. Other admissions reasons included heart attack (MI NSTEMI), chest pain, pancreatitis, mental health issues, abdominal pain, and pre-syncope. Pulmonary embolism was recorded in two cases, both with associated complications. Stays of longer than 10 days were seen in cases of shortness of breath (12 days), pancreatitis (19 days), and bronchiectasis exacerbation with COVID-19 (21 days).

6 User Experience

A total of 20 survey responses were obtained from pilot patients to learn about their experience of using Doccla and its impact. This survey was designed and disseminated by the Doccla team during the initial phase of the pilot. Please note this survey was completed at a mid-point in the pilot when many patients may have been new to the pathway and technology. A further discharge survey will be disseminated to patients in September 2025 which was not available at the time of this evaluation.

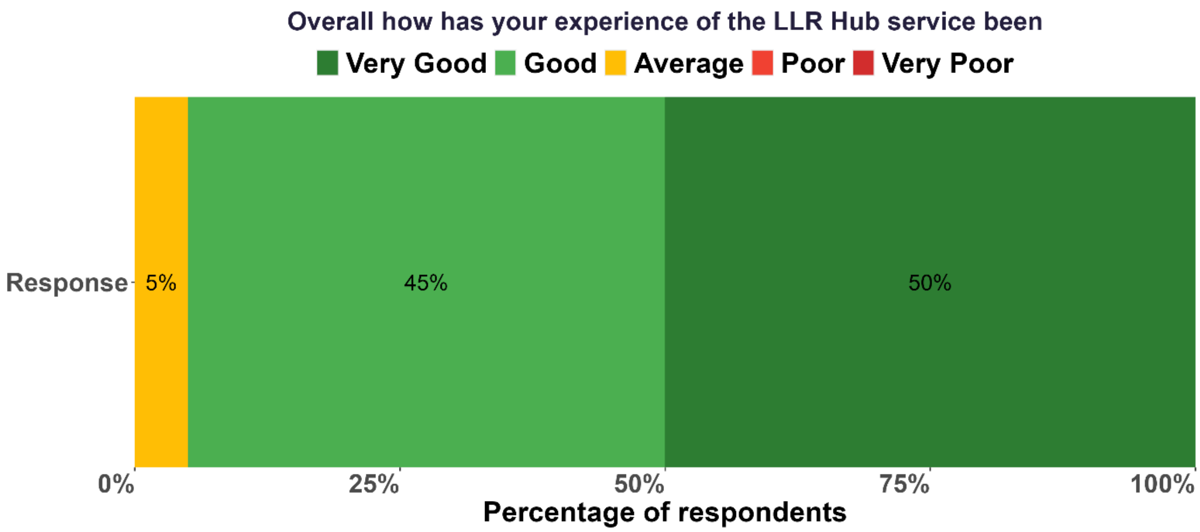
6.1 Communication and support from Doccla team

The survey responses suggest that the overall experience with the LLR Hub service has been largely positive with 95% of respondents rating it “Good” or “Very Good” (**Figure 12**). People particularly valued the quick access to care, the responsiveness of the service, and the reassurance of having their health monitored and supported. One respondent quoted *“Very reassuring to myself also knowing assistance is available if I need it”*.

Several mentioned feeling listened to and well advised, with interventions such as timely contact and referral pathways being especially appreciated. In one case, a respondent expressed that the service did not feel significantly different from standard GP support.

Most patients also reported to have received enough information when they were first informed about Doccla, although four patients responded feeling less strongly (3 on a scale of 1 to 5, where 5 signified complete agreement with the statement). Respondents also reported positively about the guidance offered by the Customer Support Team on how to use the Doccla app and medical equipment.

Figure 12. Overall how has your experience of the LLR Hub service been?



6.2 Experience of Doccla equipment other healthcare features

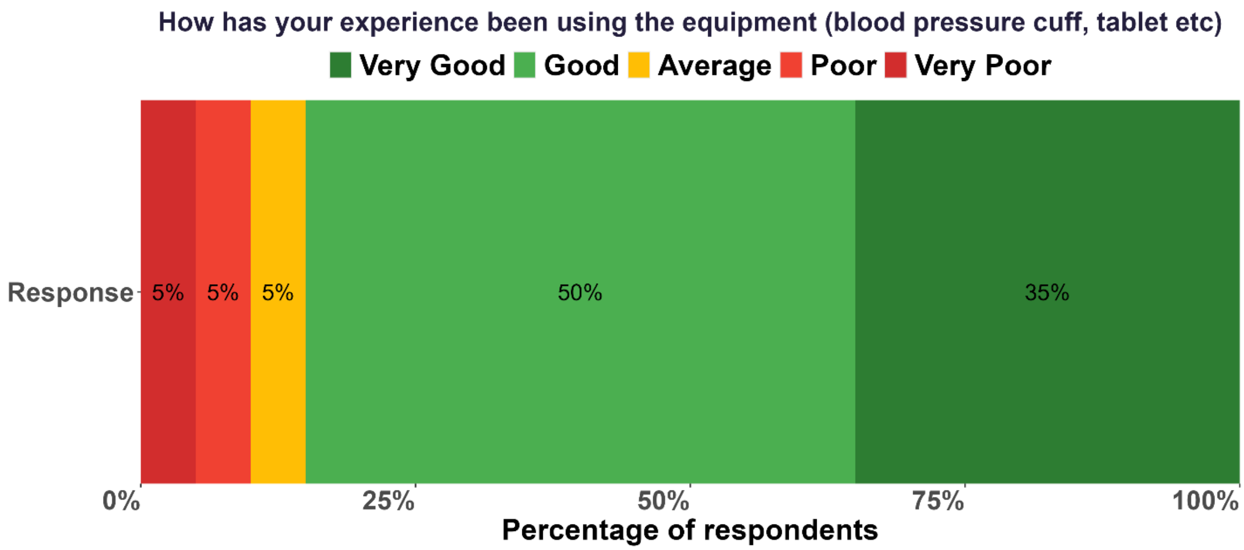
Over 80% of all respondents reported a positive experience of using the equipment (including blood pressure cuff, tablet, etc.) provided by Doccla with three respondents that had a "Very Poor" or "Average" experience (**Figure 13**).

A few practical challenges were raised, including difficulty using equipment (blood pressure monitor cuffs, typing pads), issues with automated reminders or scheduling communications feeling inflexible or confusing. Similarly, respondents also reported having a positive experience of using the Doccla app to complete questionnaires (90% rating their experience as "Good" or "Very Good").

When asked about how useful respondents found speaking with a Doccla clinician, over 80% of respondents that had spoken to a Doccla clinician found it to be "Good" or "Very Good" with three respondents that gave an average rating and two respondents that reported to have not spoken to a Doccla clinician.

When asked what could be improved about the service, there were suggestions to make the BP monitoring equipment easier to put on, improved typing feature as the respondent found the keys to be too close together to type easily, others found the automatic reminders to return results to be alarming. One respondent also requested an improved referral service to be able to skip A&E.

Figure 13. How has your experience been using the equipment (blood pressure cuff, tablet etc.)



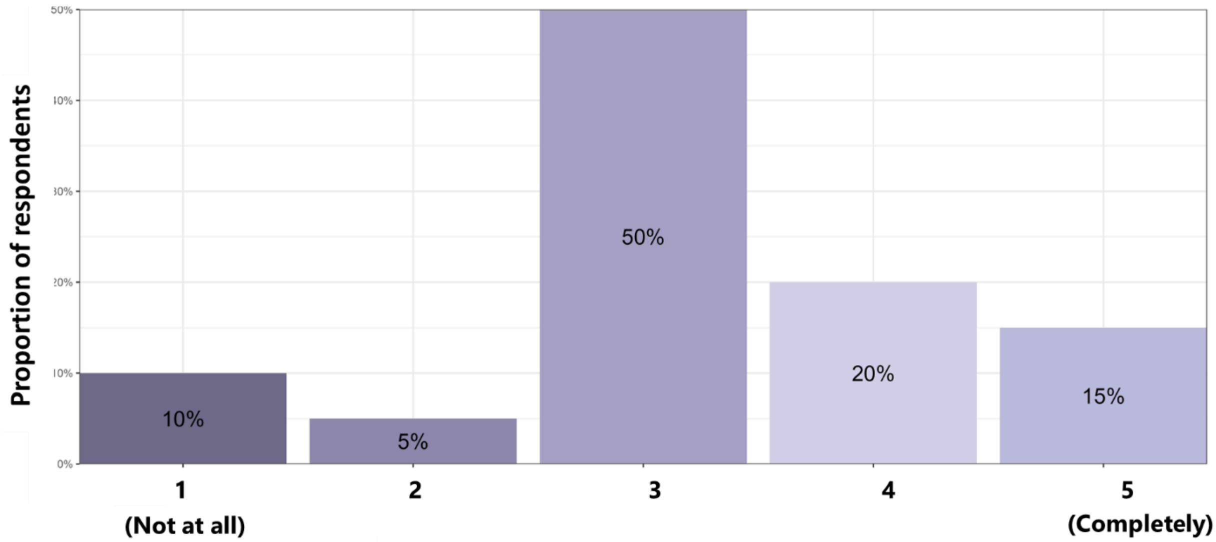
6.3 Impact of Doccla on respondents

On a scale of 1 to 5, with 1 being "Not at all" and 5 being "Completely," 35% of respondents rated the VC Pilot as 4 or 5 in terms of improving their quality of life, while 50% gave it a score of 3 (**Figure 14**). When asked whether being on the hub service made them feel safe, over 60% of respondents rated it 4 or 5. The majority also strongly agreed that Doccla provided them with more information about their health and helped them feel more in control of it.

Respondents generally found the service easy to use and efficient, with some noting that it became even easier to navigate over time. Many reported that the service offered convenient access to clinical support and that the ability to monitor their own health was a valuable feature. One respondent suggested adding a feature to track their diabetes score. A few less enthusiastic respondents felt they had not used the service long enough to form an opinion, one reported that it did not improve their condition, and another considered it an additional burden.

Overall, the service was described as helpful, responsive, and reassuring, with most respondents expressing satisfaction with some suggestions for improvement of service.

Figure 14. Response to: 'Being on the LLR Hub Service has improved my quality of life'



Proportion of respondents
10%
5%
50%
20%
15%
1
(Not at all)
2
3
4
5
(Completely)

7 Health Economics

7.1 Data and assumptions

The health economic analysis relies on real-world data as well as a number of assumptions. Key data inputs to quantify costs and benefits were derived using:

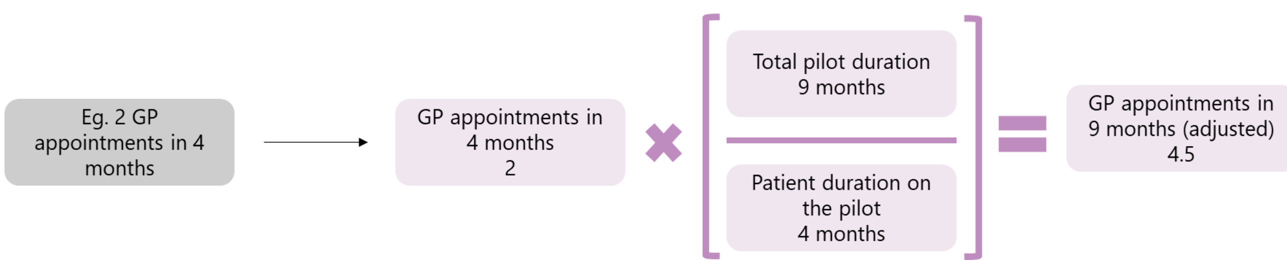
1. Assumptions from relevant literature.
2. Pre-pilot data from Aristotle (LLR ICB Population Health Management System) on patients in LLR ICB that met the following criteria:
    - Risk of admission > 33%;
    - Suffer from long term conditions of asthma, COPD, heart failure, diabetes, atrial fibrillation and/or frailty; and
    - Patient needs groups 9, 10 and 11.
3. Pilot data on 56 patients.

All data and assumptions are provided and were validated with clinical and operational stakeholders.

7.1.1 Scaling data

Patients were onboarded on the pilot on a rolling basis over the 9 months and therefore, have varying lengths of time on the pilot. As a result, we have scaled their real-world healthcare utilisation for each patient to 9 months, thereby assuming each patient was onboarded at the start of the pilot.

The method used to scale the benefits is outlined below using a worked example where a patient had 2 GP referrals in the 4 months that they were on Doccla, equating to 4.5 GP appointments in 9 months after applying the adjustment:



The following **Table 3** provides a summary of assumptions, with appropriate adjustments applied to the pilot data.

Table 3. Assumptions used for quantitative analysis

Assumption	Value	Assumption source
Counterfactual-specific		
Average number of ED attendances per year	1	Aristotle data system
Proportion of ED attendances from ambulance	17%	Literature (Nuffield Trust, 2017)
Number GP appointments per year	9	Literature (Cassell et al., 2018)
Average number of inpatient admissions per patient per year	1.8	Aristotle data system
Proportion of patients readmitted within 30-days	20%	Literature (Aubert et al., 2019)
Pilot-specific		
Proportion of 111 calls resulting in an ED attendance	21%	Literature (Nuffield Trust, 2017)
Proportion of 999 calls resulting in an ED attendance	44%	Literature (NHS England, 2023)
Number of patients on pilot	56	Pilot data
Total Doccla clinician ED referrals on pilot (adjusted for 9 month pilot)	5	Pilot data
Number of times patients referred to call 111 (adjusted for 9 month pilot)	3	Pilot data
Number of times patients referred to call 999 (adjusted for 9 month pilot)	6	Pilot data
Proportion of ED attendances from ambulance	17%	Literature (Nuffield Trust, 2017)
Total Doccla clinician GP referrals on pilot (adjusted for 9 month pilot)	41	Pilot data
Total inpatient admissions on pilot (adjusted for 9 month pilot)	46	Pilot data
Total inpatient days of stay in hospital on pilot (adjusted for 9 month pilot)	144 days	Pilot data
Total number of times patients have two inpatient stays within 30-days of each other during pilot (adjusted for 9 month pilot)	6	Pilot data
Healthcare utilisation cost assumptions		
Cost per ED attendance	£182	Literature (The King's Fund, 2025)
Cost per ambulance call-out	£252	Literature (Schofield, 2020)
Cost per GP appointment	£36	Literature (Brook Medical Centre, 2024)
Cost per inpatient bed day	£630	LLR data

7.2 Quantifiable impact on healthcare utilisation

Impact on healthcare utilisation of patients on the pilot was quantified by comparing healthcare utilisation metrics of patients in pilot vs outcomes of patients that met pre-pilot criteria defined in **Section 7.1. Table 4** below shows healthcare utilisation outcomes, contrasting the expected results (based on Aristotle data and literature) with the actual results observed (from SystmOne) while patients were on the VC Pilot scaled to 9 months.

The expected (counterfactual) inpatient length of stay was estimated using national averages for the Healthcare Resource Groups (HRGs)[2] that would have been assigned to each patient based on their admission diagnosis, as validated by a clinician. As information on complexity (or CC score) was unavailable, a sensitivity analysis was conducted by taking the average between two extremes: the shortest stay associated with the HRG at the lowest CC score (lower bound (LB)) and the longest stay associated with the HRG at the highest CC score (upper bound (UB)). The reported counterfactual LB and UB values were calculated by summing, across all patients, the shortest possible stays (trim point for lowest CC score) and the longest possible stays (trim point for highest CC score), respectively. These are provided in **Appendix 2**.

Overall, by being on the VC Pilot a reduction in healthcare utilisation was observed for the pilot cohort (**Table 4**). This includes 337 saved GP appointments, 33 saved ED attendances, 5 avoided ambulance call outs and 30 admissions avoided (or 227 bed days). The avoided inpatient hospital days are reported as a range based on the sensitivity analysis. On average, 227 days were avoided; however, the estimate ranges from a lower bound of 22 days (derived from the difference between 166 counterfactual days and 144 pilot days) to an upper bound of 432 days (derived from the difference between 576 counterfactual days and 144 pilot days).

Table 4. Healthcare utilisation: Counterfactual vs Pilot data outcomes.

	Counterfactual	Pilot data	Difference
GP appointments	378	41	89% reduction (337 appointments avoided)
ED attendances	42	9	79% reduction (33 attendances avoided)
Ambulance callouts	7	2	71% reduction (5 callouts avoided)
Hospital admissions	76	46	39% reduction (30 admissions avoided)
Inpatient hospital days	371 days (LB: 166 days; UB: 576 days)	144 days	61% reduction (227 days reduced) (LB: 13% reduction, 22 days; UB: 75% reduction, 432 days)
Re-admissions within 30 days	11	6	45% reduction (5 admissions within 30 days avoided)

[2] 2023/25 NHS Payment Scheme: 2024/25 prices workbook, 2024/25 Annex A. NHS England.

	Counterfactual	Pilot data	Difference

**Note, values reported have been rounded to the nearest whole number.*

7.3 Value for money

7.3.1 Cost of the pilot

The costs of the pilot were primarily from the Doccla contract and ICB costs. The **Doccla contract in total costed £207,328** from the following sub-costs:

- Software and services of £116,000 (including VAT £23,200)
- Clinical monitoring of £84,000 (excluding VAT[3])
- GP time reimbursement costs of £9,160 (including £1,832 VAT)

The VAT for clinical monitoring and GP time reimbursement were recovered by the Doccla team. An additional cost of **£66,231 was incurred by LLR ICB for provision of three staff members** (including on-cost). Please see **Appendix 3** for a full breakdown of roles and FTE provided by LLR ICB..

The total quantified cost of the pilot is £273,559.

It should be noted that the majority of ICB staff costs were incurred during the pilot development and mobilisation phase, which required intensive involvement in activities such as pathway design, establishing IG agreements, engaging with practices, identifying suitable patients, and refining the delivery model.

Additionally, discussions with LLR ICB stakeholders indicated that the pilot was originally expected to recruit 185 patients, based on the contract value. However, recruitment was significantly lower than anticipated, with only 56 patients enrolled, while the total cost of delivering the pilot remained unchanged.

Therefore, these costs are likely higher per patient than would be expected for long-run costs as well as with more optimal recruitment.

7.3.2 Quantitative benefits

The benefits and costs of the pilot have been quantified using the impact of healthcare utilisation adjusted for 9 months. Please note, due to the scaling, these are likely an overestimate of the benefits generated during the pilot period as many patients were on the pilot < 9 months.

Capacity releasing savings come from the reduction in GP appointments, ED attendances, ambulance callouts and reduced inpatient hospital days.

GP appointments cost £36 therefore, estimated savings are **£12,132 for 337 avoided GP appointments** in 9 months.

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[3] VAT recoverable.

Reduced number of GP attendances 337 × **Cost of a GP attendance** £36 = **Total cost saved from reduced GP attendances** £12,132

Cost of an ED attendance is £182 therefore, the estimated savings are **£6,006 for 33 saved ED attendances** in 9 months.

Reduced number of ED attendances 33 × **Cost of an ED attendance** £182 = **Total cost saved from reduced ED attendances** £6,006

Ambulance call-out cost £252 therefore, estimated savings are **£1,260 for 5 saved Ambulance call-outs** in 9 months.

Reduced number of Ambulance call-outs 5 × **Cost of an ambulance call-out** £252 = **Total cost saved from reduced ambulance call-outs** £1,260

The average cost of an inpatient bed day of £630 was determined using the average cost per inpatient bed for patients with chronic conditions in University Hospital of Leicester as an approximation for patients in LLR ICB. Therefore, the estimated average savings are **£143,010 for 227 days of reduced inpatient hospital admission** in 9 months.

Reduced inpatient hospital length of stay 227 days (LB: 22days ; UB: 432 days) × **Cost per inpatient bed day** £630 = **Total cost saved from reduced inpatient bed days** £143,010 (LB: £13k; UB: £272k)

Therefore, the total quantified benefits are £162,408.

7.3.3 Cost-Benefit Analysis

Using the benefits and costs quantified for the Doccla pilot, the overall benefit to cost ratio is 0.6 (**Table 5**) meaning that the pilot is not cost-beneficial. Therefore, currently for each £1 spent, the healthcare system only returns 60 pence.

Table 5. Cost benefit analysis for Doccla pilot

		Total
Benefits	Total cost saved from reduced GP attendances	+£12,132
	Total cost saved from reduced ED attendances	+£6,006
	Total cost saved from reduced ambulance call-outs	+£1,260
	Total cost saved from reduced inpatient bed days	+£143,010
	Total benefits (in 9 month pilot)	**+£162,408**
Costs	Doccla contract	-£207,328
	ICB costs	-£66,231
	Total costs (in 9 month pilot)	**-£273,559**
Net savings (in 9 month pilot)		**-£104,179**
Cost Benefit Ratio (in 9 month pilot)		**0.6**

7.3.4 Sensitivity analysis: inpatient admissions

The total cost savings from reduced inpatient bed days in **Table 5** are based on an average estimated pre-pilot inpatient hospital stay of 371 days. However, the pre-pilot cohort could have ranged from 166 days (lower bound) to 576 days (upper bound), resulting in an estimated reduction of 22 to 432 bed days for the pilot cohort. This wide variation has a significant impact on the overall results.

Table 6 summarises the net savings and cost benefit ratio using the LB and UB values for cost savings from reduced inpatient bed days:

Table 6. Sensitivity analysis for Doccla pilot

	LB Saving	Average	UB Saving
Total benefits (in 9 month pilot)	+£32,398	+£162,408	+£291,398
Total costs (in 9 month pilot)	-£273,559	-£273,559	-£273,559
Net savings (in 9 month pilot)	**-£241,161**	**-£111,151**	**+£17,839**
Cost Benefit Ratio (in 9 month pilot)	**0.1**	**0.6**	**1.1**

Sensitivity analysis shows that if we assume the counterfactual cohort were more severely ill or had a higher complication score (closer to the upper bound), the pilot cohort savings increase substantially to £17,839, with a cost-benefit ratio of 1.1, making the service cost-beneficial.

7.3.5 Scenario modelling: Increased patient recruitment

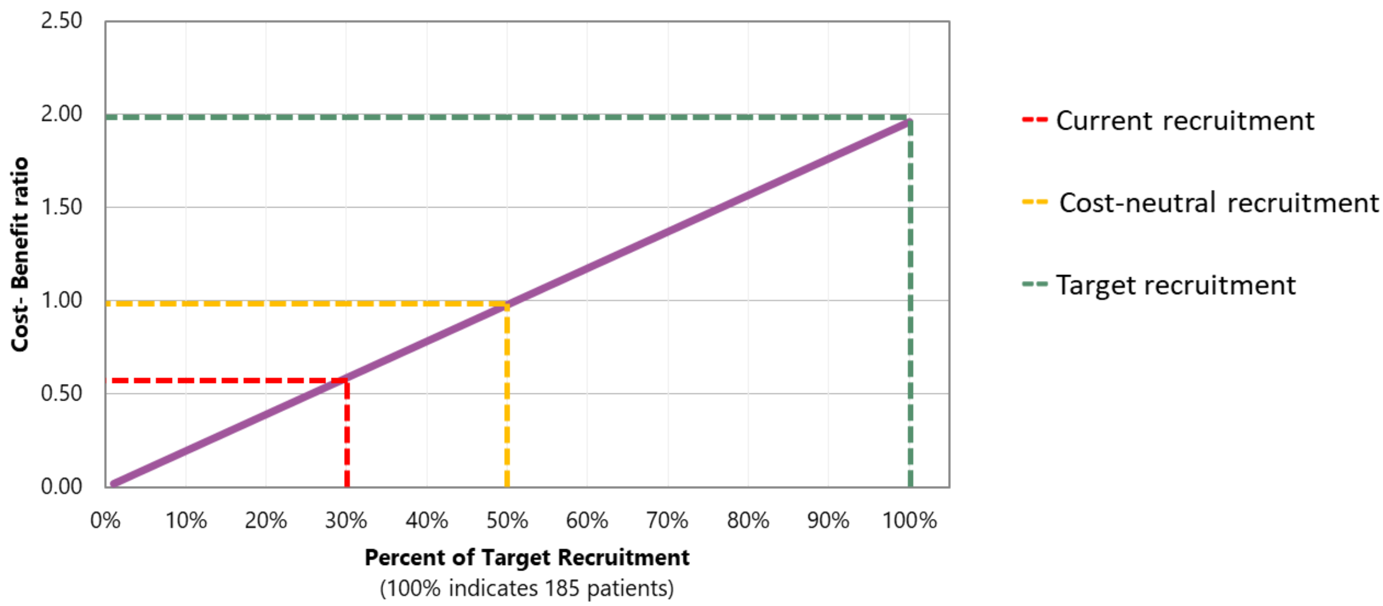
Sensitivity analysis also looked at the impact of higher recruitment. This is because the pilot was originally expected to recruit 185 patients based on the contract value however, recruitment achieved was significantly lower partly due to the GP collective action preventing Doccla from being able to onboard patients on the pilot. The following analysis determines the impact on cost benefit ratio if higher recruitment were achieved.

For the analysis we used the following assumptions:

- There are sufficient eligible patients to reach a pilot cohort of 185 matching the same eligibility criteria as the pilot cohort.
- The additional recruited patients would have the same demographics and health profiles as those recruited during the pilot.
- Cost would not change for LLR ICB staff.

Figure 15 illustrates how the cost–benefit ratio changes as patient recruitment increases toward the target of 185 patients, based on the assumptions outlined above. At the current recruitment level of 33% (N = 56), the cost–benefit ratio is 0.6. Achieving break-even (a ratio of 1) would require recruiting approximately 51% of the target, or 95 patients. If full recruitment of 185 patients were achieved, the cost–benefit ratio would rise to 1.96.

Figure 15. Variation in cost benefit ratio with changing recruitment rate



If the target recruitment of 185 patients were achieved, the estimated total benefits over a 9-month period would be net savings of £536,526, with costs remaining unchanged at £273,559. This would result in an overall net saving of £262,967 and a favourable return on investment, with a cost–benefit ratio of 1.96 (summarised in **Table 7**).

Table 7. Full recruitment scenario cost benefit analysis for Doccla pilot

Total benefits (in 9 month pilot)	+£536,526
Total costs (in 9 month pilot)	-£273,559
Net savings (in 9 month pilot)	**+£262,967**
Cost Benefit Ratio (in 9 month pilot)	**1.96**

7.4 Other Benefits

There are also other benefits that could not be monetarily qualified, however, are still important to consider due to their impact on the patient and the environment.

7.4.1 Patients perceived impact of Doccla

A total of 20 pilot patients provided feedback on their experience with Doccla. Respondents reported largely positive experiences, with 95% rating the LLR Hub service as "Good" or "Very Good." Patients particularly valued the quick access to care, responsiveness of the service, and reassurance from having their health monitored and supported. Many felt listened to and well advised, and interventions such as timely contact and referral pathways were appreciated.

The guidance provided by the Customer Support Team on using the Doccla app and medical equipment was also well received. 35% of respondents felt that Doccla improved their quality of life (rating 4 or 5 out of 5), and over 60% felt safer being on the hub service. Most respondents agreed that Doccla provided more information about their health and helped them feel more in control.

7.4.2 Environmental benefits

The reduced number of GP appointments, ED attendances, ambulance callouts, and hospital admissions compared with the estimated healthcare utilization without Doccla helped avoid travel to these facilities, thereby reducing CO_2 emissions. This aligns with the NHS Carbon Footprint Plus initiative, which aims to achieve net zero for all emissions the NHS influences by 2045 (NHSE, 2022)[4].

[4] NHS England, (2022) 'Delivering a 'Net Zero' National Health Service', https://www.england.nhs.uk/greenernhs/wp-content/uploads/sites/51/2022/07/B1728-delivering-a-net-zero-nhs-july-2022.pdf . Accessed: 18/09/2024.

8 Key Findings

The impact of complex and chronic conditions is only expected to grow over the next decade with significant impacts on the quality of life of the individual affected as well as the NHS. Therefore, now more than ever, effective management approaches need to be trialled and implemented across the healthcare system.

The findings from this evaluation show success in the LLR-Doccla Virtual Care Programme in supporting earlier detection of deterioration for complex and chronic diseases. It also highlights key learnings to support greater success in future pilots. The following section highlights these findings.

8.1 Healthcare utilisation

In the 9 months of the pilot, a total of 71 patients were recruited, out of which 56 were successfully onboarded and had used the service for over a month.

It is important to note that this pilot took place in the context of GP collective action which began in August 2024. As the Doccla pilot relied heavily on GP recruitment, the overlap with collective action significantly constrained patient enrolment, resulting in only around 70 recruits over nine months compared to the 185 initially planned.

However, for the patients successfully onboarded on the pilot, significant reductions in healthcare utilisation were estimated based on scaled outcomes of the pilot. These include:

- GP appointments reduced by 89%.
- ED visits were reduced by 79%.
- Ambulance callouts reduced by 71%.
- Hospital admissions reduced by 39%.
- Inpatient hospital bed days reduced by 61%.
- Readmission within 30 days of hospital admission was reduced by 45%.

Of note is the savings from inpatient hospital bed days. The expected (counterfactual) inpatient length of stay was estimated using national averages for the HRGs from the NHS Payment Scheme and information on diagnosis severity was unavailable. Therefore, assumptions were made on the counterfactor complexity (CC score). Savings ranged from 13% to 75% reduction in bed days. Our main analysis was conducted on the average complexity.

8.2 Health economics

Using the estimated healthcare utilisation saving outlined above, the evaluation found the pilot generated capacity releasing savings of £162,408 over the 9-month duration of the pilot. This is likely an overestimate of the savings of the pilot as benefits were scaled to 9 months, rather than actual time spent on the pilot.

When compared to the cost of running the pilot, it was not found to be cost-beneficial. The total cost of the pilot was £273,559 which came from the contract with Doccla for service provision and staffing costs incurred by LLR ICB. The current cost-benefit ratio is 0.6 meaning for every £1 invested in the service, the health service only receives a return of £0.60.

It is important to also note that costs may also be inflated during this pilot. For example, as is true with most pilots, the majority of ICB staff costs were incurred during the pilot development and mobilisation phase, which required intensive involvement in activities such as pathway design, establishing IG agreements, engaging with practices, identifying suitable patients, and refining the delivery model. These would not be incurred if this pilot were to extend within LLR.

Additionally, the Doccla contract value is based on the assumption that 185 patients would have joined the pilot. However, recruitment was significantly lower than anticipated, with only 56 patients enrolled, while the total cost of delivering the pilot remained unchanged. Therefore, the cost per patient was significantly higher than expected.

8.2.1 Sensitivity analysis

The evaluation also included sensitivity analysis to understand the impact of key assumptions on the return on investment. Recruitment was chosen for sensitivity analysis as it was significantly lower due to the GP Collective Action and inpatient bed days was chosen due to the uncertainty within the counterfactual assumption.

Uncertainty existed within the impatient bed days assumption due to a lack of control data for the cohort. Therefore, we performed sensitivity analysis of inpatient bed day reductions highlights the uncertainty in cost savings, with estimates ranging from a net loss of £241,161 to a net saving of £17,839. This highlights the importance of sufficient data collection of control cohorts to ensure robust estimation of savings. Data for the patients pre-pilot was not possible to collect as part of this work due to barriers with data sharing agreements and the timeline of the evaluation.

Additionally, results (using average inpatient bed day estimates) were extrapolated to estimate outcomes if the pilot was able to recruit a larger number of patients. The pilot would have become cost-neutral if 95 patients had been recruited (51% of the target recruitment). Furthermore, if the full target of 185 patients had been recruited as initially planned, the return on investment would have been significantly higher with net capacity-releasing savings of £262,967 and yielding a cost-benefit ratio of 1.96 meaning for every £1 invested in the service, the health service would have received a return of £1.96.

8.3 Patient experience

The pilot also received positive interim feedback from patients. A survey of 20 patients on the pilot reported that patients received adequate information when they were first informed about Doccla and felt positively about the guidance offered by the Customer support team on how to use the Doccla app and medical equipment. They also reported positively on the experience of using the equipment and the Doccla app to complete surveys.

Over 80% of respondents also reported positively about being able to speak with a Doccla clinician. By using the VC Pilot, patients reported on feeling safer, more informed and in control of their health and overall, improved quality of life.

Some suggested adaptations to equipment and application for improved accessibility. Two respondents reported feeling alarmed by the automated reminders.

9 Conclusion and recommendations

Overall, the Doccla pilot in LLR has demonstrated that proactive virtual care models can play an important role in addressing the growing burden of complex and chronic conditions by enabling earlier detection of deterioration.

Despite the limited scale of the pilot (only 9 months with lower-than-expected recruitment of patients), results suggest significant reductions in GP consultations, emergency attendances, ambulance callouts and hospital admissions, translating into capacity-releasing savings for the NHS.

However, the pilot also highlighted key challenges. Recruitment was substantially lower than planned, largely due to the overlap with the period of GP collective action in LLR preventing GPs from signing data sharing agreements, which constrained Doccla's ability to enrol patients. This lower than planned recruitment during the pilot, alongside expected higher implementation costs for the ICB team during the pilot, significantly reduced the generated healthcare savings. Therefore, the quantified benefits did not outweigh the costs of implementation.

To ensure return on investment in future pilots it is important that recruitment targets should be predetermined and tracked throughout future pilots to ensure mitigation actions are in place as quickly as possible. For example, alternative plans to circumvent GP involvement e.g. end-to-end implementation ownership for Doccla.

Additionally, the evaluation showed the importance of data collection. Although the evaluation has significant data on the patients in the pilot it was limited on control data. This was due to complexities with data sharing with LLR ICB and timelines of the evaluation. Given the importance of this data collection, particularly for savings associated with inpatient bed days, it is important adequate time or data collection is considered for future pilots to maximise robust reporting on the impact of pilots such as this.

Overall, this evaluation shows that proactive virtual care services have the potential to deliver not only financial benefits but also improved health outcomes and greater empowerment for patients living with long-term conditions.

References

Asthma and Lung UK (2022) COPD In the UK: Delayed diagnosis and unequal care. Available at: https://www.asthmaandlung.org.uk/conditions/copd-chronic-obstructive-pulmonary-disease/world-copd-day/delayed-diagnosis-unequal-care [Accessed 29 Nov. 2024].

Aubert, C.E., Schnipper, J.L., Fankhauser, N., Marques-Vidal, P., Stirnemann, J., Auerbach, A.D., Zimlichman, E., Kripalani, S., Vasilevskis, E.E., Robinson, E., Metlay, J., Fletcher, G.S., Limacher, A. and Donzé, J., 2019. Patterns of multimorbidity associated with 30-day readmission: a multinational study. *BMC Public Health*, 19(1), p.738. Available at: https://bmcpublichealth.biomedcentral.com/articles/10.1186/s12889-019-7066-9

Baumeister, H., Ebert, D.D. and Snoek, F. (2021) 'Special issue on digital health interventions in chronic medical conditions: Editorial', Internet Interv, 28, p. 100457.

British Heart Foundation (2024). Heart failure. Available from: https://www.bhf.org.uk/informationsupport/conditions/heart-failure (Accessed 2 Dec. 2024).

Broadstairs Medical Practice (2024). Long Term Conditions. Available from: https://www.broadstairsmedicalpractice.nhs.uk/long_term_conditions.htm (Accessed 21 Nov. 2024).

British Medical Association [BMA], (2023) "An NHS under pressure", Available from: https://www.bma.org.uk/advice-and-support/nhs-delivery-and-workforce/pressures/an-nhs-under-pressure. (Accessed 21 Nov. 2024).

Brook Medical Centre (2024) 'How much does using your GP surgery cost?', *Brook Medical Centre*. Available at: https://brookmedical.co.uk/appointments/how-much-does-using-your-gp-surgery-cost/

Burdett, P. and Lip, G.Y.H. (2022). Atrial fibrillation in the UK: predicting costs of an emerging epidemic recognizing and forecasting the cost drivers of atrial fibrillation-related costs. European Heart Journal - Quality of Care and Clinical Outcomes, 8(2), pp.187-194.

Cassell, A., Edwards, D., Harshfield, A., Rhodes, K., Brimicombe, J. and Payne, R., et al. (2018) 'The epidemiology of multimorbidity in primary care: a retrospective cohort study', Br J Gen Pract, 68(669), pp. e245-51.

Chan, A., De Simoni, A., Wileman, V., Holliday, L., Newby, C.J. and Chisari, C., et al. (2022) 'Digital interventions to improve adherence to maintenance medication in asthma', Cochrane Database Syst Rev, 6(6), p. CD013030.

Darzi, A. (2024) Independent investigation of the national health service in England. London: Department of Health and Social Care.

Davies, M. and Khunti, K. (2021) New type 2 diabetes support service launching across Leicester, Leicestershire and Rutland. Leicester Diabetes Centre. Available from: https://www.leicesterdiabetescentre.org.uk/news-blog/new-type-2-diabetes-support-service-launching-across-leicester-leicestershire-and-rutland (Accessed 28 Nov. 2024).

Department of Health and Social Care [DHSC] (2024). Fingertips: Public Health Data Collection. Available at: https://fingertips.phe.org.uk/ [Accessed 21 Nov. 2024].

Dhull, K. (2024) UK First as new NHS study of digital 'smart inhalers' for children with asthma starts in Leicester. NIHR Leicester Biomedical Research Centre. Available from: https://leicesterbrc.nihr.ac.uk/digital-smart-inhalers/ (Accessed 28 Nov. 2024).

Duffy, D. (2023) The NHS must break the cycle on heart failure. Integrated Care Journal. Available from: https://integratedcarejournal.com/the-nhs-must-break-the-cycle-on-heart-failure/ (Accessed 2 Dec. 2024).

Fogg, C., England, T., Zhu, S., Jones, J. and de Lusignan, S., et al. (2024) 'Primary and secondary care service use and costs associated with frailty in an ageing population: longitudinal analysis of an English primary care cohort of adults aged 50 and over, 2006–2017', Age Ageing, 53(2), p. afae010.

Getachew, E., Adebeta, T., Muzazu, S.G.Y., Charlie, L., Said, B., Tesfahunei, H.A., et al. (2023) 'Digital health in the era of COVID-19: Reshaping the next generation of healthcare', Front Public Health, 11, p. 942703.

GOV.UK (2019) Health matters: preventing cardiovascular disease. Available from: https://www.gov.uk/government/publications/health-matters-preventing-cardiovascular-disease/health-matters-preventing-cardiovascular-disease (Accessed 2 Dec. 2024).

GOV.UK (2022) Health and Social Care Secretary speech on Health Reform. Available from: https://www.gov.uk/government/speeches/health-and-social-care-secretary-speech-on-health-reform (Accessed 21 Nov. 2024).

Han, L., Clegg, A., Doran, T., & Fraser, L. (2019). The impact of frailty on healthcare resource use: a longitudinal analysis using the Clinical Practice Research Datalink in England. Age and ageing, 48(5), 665–671. https://doi.org/10.1093/ageing/afz088

Head, A., Fleming, K., Kypridemos, C., Pearson-Stuttard, J. and O'Flaherty, M., (2021) 'Multimorbidity: the case for prevention', J Epidemiol Community Health, 75(3), pp. 242-4.

Health Innovation Wessex (n.d.) Using Soft Signs to Identify early indications of Physical Deterioration. Available from https://healthinnovationwessex.org.uk/projects/357/using-soft-signs-to-identify-early-indications-of-physical-deterioration [Accessed 07 Jan. 2025]

Hex, N., MacDonald, R., Pocock, J., Uzdzinska, B., Taylor, M., Atkin, M., et al. (2024). Estimation of the direct health and indirect societal costs of diabetes in the UK using a cost of illness model. Diabetic Medicine, 41(9), e15326.

Hickey, D.A. and Beecroft, S. (2018) 'Hospital Admissions for Heart Failure in England', Value Health, 21, p. S113.

Jacobs, A., Wu, R., Tomini, F., De Simoni, A. and Mihaylova, B. (2023). Strong and graded associations between level of asthma severity and all-cause hospital care use and costs in the UK. BMJ Open Respiratory Research, 10(1), e002003.

Johns Hopkins (n.d.) *Patient need groups*. Available from: https://www.hopkinsacg.org/wp-content/uploads/2022/08/Johns-Hopkins-ACG-System_v13.0_PNG-Overview-v080322.pdf (Accessed 09 Dec. 2024).

Katikireddi, S.V., Skivington, K., Leyland, A.H., Hunt, K. and Mercer, S.W. (2017) 'The contribution of risk factors to socioeconomic inequalities in multimorbidity across the lifecourse: a longitudinal analysis of the Twenty-07 cohort', BMC Med, 15(1), p. 152.

Keith, J., Grimm,F., Steventon, A. (2022). How better use of data can help address key challenges facing the NHS. Available from: https://www.health.org.uk/sites/default/files/pdf/2022-01/2022%20-%20Data%20policy%20landscape_0.pdf (Accessed 07 Jan. 2025).

The King's Fund (2025) 'Key facts and figures about the NHS', *The King's Fund*. Available at: https://www.kingsfund.org.uk/insight-and-analysis/data-and-charts/key-facts-figures-nhs?utm_source=chatgpt.com

Lane, C. (2022) Asthma attacks may be cut by half with digital tools. UCL News. Available from: https://www.ucl.ac.uk/news/2022/jun/asthma-attacks-may-be-cut-half-digital-tools (Accessed 28 Nov. 2024).

Leicester, Leicestershire and Rutland Health and Wellbeing Partnership [LLRHWP] (2025) "Our population" , Available from: https://leicesterleicestershireandrutlandhwp.uk/about/our-population/ (Accessed 07 Jan. 2025).

Leicester-Shire & Rutland Statistics & Research [LSR] (2021). "Leicestershire Joint Strategic Needs Assessment 2018-2021", Available from: https://www.lsr-online.org/uploads/demography-report-(2021-update).pdf?v=1642586120 (Accessed 07 Jan. 2025).

Linker, N. (2022) Managing Heart Failure @home: An opportunity for excellence. NHS England. Available from: https://www.england.nhs.uk/blog/managing-heart-failure-home-an-opportunity-for-excellence/ (Accessed 2 Dec. 2024).

Lipkin and McKane, (2021). Renal Medicine- GIRFT Programme National Specialty Report. Available from: https://gettingitrightfirsttime.co.uk/wp-content/uploads/2021/09/Renal-Medicine-Sept21k.pdf [Accessed 2 Dec. 2024]

Lourenço, L. B. A., Meszaros, M. J., Silva, M. F. N., & São-João, T. M. (2023). Nursing Training for Early Clinical Deterioration Risk Assessment: Protocol for an Implementation Study. JMIR research protocols, 12, e47293. https://doi.org/10.2196/47293

Maida, C.D., Daidone, M., Pacinella, G., Norrito, R.L., Pinto, A. and Tuttolomondo, A. (2022) 'Diabetes and Ischemic Stroke: An Old and New Relationship an Overview of the Close Interaction between These Diseases', Int J Mol Sci, 23(4), p. 2397.

McLaurin, C., Stibbs, M. (2022) Tackling the challenges of sharing data effectively in the NHS, and why it matters for NHS leaders. Available from: https://nhsproviders.org/news-blogs/blogs/tackling-the-challenges-of-sharing-data-effectively-in-the-nhs-and-why-it-matters-for-nhs-leaders (Accessed 07 Jan. 2025).

National Institute for Health and Care Excellence [NICE] (2016) Multimorbidity: clinical assessment and management. Available from: https://www.nice.org.uk/guidance/ng56/chapter/Context (Accessed 21 Nov. 2024).

National Institute for Health and Care Excellence [NICE]. (2023). Two technologies to provide digital services for people with COPD. Available at: https://www.nice.org.uk/news/articles/two-technologies-to-provide-digital-services-for-people-with-copd [Accessed 29 Nov. 2024].

National Institute for Health and Care Excellence [NICE]. (2024) Digital technologies to support self-management of COPD: early value assessment. Available from: https://www.nice.org.uk/guidance/indevelopment/gid-hte10030 (Accessed 29 Nov. 2024).

National Institute for Health and Care Research [NIHR]. (2021). Multiple long-term conditions (multimorbidity): making sense of the evidence. Available at: https://evidence.nihr.ac.uk/collection/making-sense-of-the-evidence-multiple-long-term-conditions-multimorbidity/ [Accessed 21 Nov. 2024].

NHS (2021a). Asthma. Available at: https://www.nhs.uk/conditions/asthma/ [Accessed 27 Nov. 2024].

NHS (2021b). Atrial fibrillation. Available from: https://www.nhs.uk/conditions/atrial-fibrillation/ [Accessed 28 Nov. 2024].

NHS (2023). Diabetes. Available at: https://www.nhs.uk/conditions/diabetes/ [Accessed 21 Nov. 2024].

NHS (2024). Frailty resources. Available from: https://www.england.nhs.uk/ourwork/clinical-policy/older-people/frailty/frailty-resources/ (Accessed 28 Nov. 2024).

NHS England [NHSE]. (2024a). Digital service to manage high-risk chronic obstructive pulmonary disease (COPD) patients. Available from: https://transform.england.nhs.uk/key-tools-and-info/digital-playbooks/respiratory-digital-playbook/digital-service-to-manage-high-risk-chronic-obstructive-pulmonary-disease-copd-patients/ [Accessed 29 Nov. 2024].

NHS England (2023) *Monthly operational statistics – December 2023*. Available from: https://www.england.nhs.uk/long-read/monthly-operational-statistics-december-2023/

NHS England [NHSE]. (2024b). Managing acute physical deterioration through the 'prevention, identification, escalation, response' (PIER) approach. Available from https://www.england.nhs.uk/patient-safety/managing-acute-physical-deterioration-through-the-prevention-identification-escalation-response-pier-approach/ [Accessed 07 Jan. 2025]

NHS England [NHSE]. (2024c). NHS Diabetes Prevention Programme (NHS DPP). Available from: https://www.england.nhs.uk/diabetes/diabetes-prevention/ (Accessed 21 Nov. 2024).

NHS Professionals (2019) Understanding the key success factors in collaborative working. Available from: https://www.nhsprofessionals.nhs.uk/-/media/corporate/partners/publications/nhsp-thought-leadership-paper_web.pdf (Accessed 07 Jan. 2025).

NHS Transformation Directorate (2024). Remote monitoring for patients with chronic conditions in the Midlands. Available from: https://transform.england.nhs.uk/covid-19-response/technology-nhs/remote-monitoring-for-patients-with-chronic-conditions-in-the-midlands/ (Accessed 27 Nov. 2024).

Nuffield Trust (2017) *NHS 111 sending increasing number of callers to A&E and ambulances*. Available from https://www.nuffieldtrust.org.uk/news-item/nhs-111-sending-increasing-number-of-callers-to-a-e-and-ambulances [Accessed 21 Aug. 2025].

North West Leicestershire District Council. (2024) Steady Steps. Available from: https://www.nwleics.gov.uk/pages/steady_steps (Accessed 2 Dec. 2024).

Parris, B.A., O'Farrell, H.E., Fong, K.M. and Yang, I.A. (2019) 'Chronic obstructive pulmonary disease (COPD) and lung cancer: common pathways for pathogenesis', J Thorac Dis, 11(Suppl 17), pp. S2155-72.

Pearson-Stuttard, J., Holloway, S., Polya, R., Sloan, R., Zhang, L. and Gregg, E.W., et al., (2022) 'Variations in comorbidity burden in people with type 2 diabetes over disease duration: A population-based analysis of real world evidence', eClinicalMedicine, 52. Available from: https://www.thelancet.com/journals/eclinm/article/PIIS2589-5370(22)00314-5/fulltext (Accessed 3 Dec. 2024).

Philpotts, E. (2023). LMC highlights 'dire' GP shortage and urges local MPs to act. Available from: https://www.gponline.com/lmc-highlights-dire-gp-shortage-urges-local-mps-act/article/1820691 (Accessed 9 Jan, 2024).

Polus, M., Keikhosrokiani, P., Korhonen, O., Behutiye, W. and Isomursu, M. (2024) 'Impact of Digital Interventions on the Treatment Burden of Patients With Chronic Conditions: Protocol for a Systematic Review', JMIR Res Protoc, 13, p. e54833.

Powell, M. (2024) . Frailty: research shows how to improve care. NIHR Evidence. Available from: https://evidence.nihr.ac.uk/collection/frailty-research-shows-how-to-improve-care/ [Accessed 28 Nov. 2024].

Raymond, A., Watt, T., Douglas, H.R., Head, A., Kypridemos, C., Rachet-Jacquet, L. (2024). Health inequalities in 2040: current and projected patterns of illness by deprivation in England, Available from: https://www.health.org.uk/sites/default/files/upload/publications/2024/Health%20inequalities%20in%202040.pdf (Accessed 07 Jan. 2025).

Roche Diagnostics Limited. (2020) Heart Failure: The Hidden Costs of Late Diagnosis. Available from: https://hfreport.roche.com/image/6721401/Roche%20HF%20report%20portrait%20final.pdf (Accessed 2 Dec. 2024).

Schofield, C. (2020) 'This is how much it costs the NHS every time someone calls an ambulance or goes to A&E', *Banbury Guardian*, 6 February. Available at: https://www.banburyguardian.co.uk/read-this/this-is-how-much-it-costs-the-nhs-every-time-someone-calls-an-ambulance-or-goes-to-ae-1387271 [Accessed 21 August 2025].

Sinclair, D.R., Maharani, A., Chandola, T., Bower, P., Hanratty, B. and Nazroo, J., et al. (2022). Frailty among Older Adults and Its Distribution in England. Journal of Frailty and Aging, 11(2), pp.163–168.

Soley-Bori, M., Ashworth, M., Bisquera, A., Dodhia, H., Lynch, R., Wang, Y., & Fox-Rushby, J. (2020). Impact of multimorbidity on healthcare costs and utilisation: a systematic review of the UK literature. The British journal of general practice : the journal of the Royal College of General Practitioners, 71(702), e39–e46. https://doi.org/10.3399/bjgp20X713897

The Lancet (2018) 'UK COPD treatment: failing to progress', The Lancet, 391(10130), pp. 1550.

The Patients Association. (2020). Long term conditions. Available at: https://www.patients-association.org.uk/long-term-conditions [Accessed 21 Nov. 2024].

Vincent, J. L., Einav, S., Pearse, R., Jaber, S., Kranke, P., Overdyk, F. J., Whitaker, D. K., Gordo, F., Dahan, A., & Hoeft, A. (2018). Improving detection of patient deterioration in the general hospital ward environment. *European journal of anaesthesiology*, *35*(5), 325–333. https://doi.org/10.1097/EJA.0000000000000798

Wain, R. and Miller, B. (2023) Moving From Cure to Prevention Could Save the NHS Billions: A Plan to Protect Britain. Tony Blair Institute for Global Change. Available from: https://institute.global/insights/public-services/moving-from-cure-to-prevention-could-save-the-nhs-billions-a-plan-to-protect-britain [Accessed 21 Nov. 2024].

Whitty C J M, MacEwen C, Goddard A, Alderson D, Marshall M, Calderwood C et al. (2020) Rising to the challenge of multimorbidity *BMJ*; 368 :l6964 doi:10.1136/bmj.l6964

Williams, N.H. and Law, R.J. (2018). Putting function first: redesigning the primary care management of long-term conditions. British Journal of General Practice, 68(673), pp. 388-389.

Wolters, A., Santos, F., Lloyd, T., Lilburne, C., Steventon, A. (2019) Emergency admissions to hospital from care homes: how often and what for?. Available from https://www.health.org.uk/sites/default/files/upload/publications/2019/Emergency-admissions-from-care-homes-IAU-Q02.pdf [Accessed 07 Jan. 2025]

Young, J. (2013). Frailty – what it means and how to keep well over the winter months. NHS England. Available from: https://www.england.nhs.uk/blog/frailty/ [Accessed 28 Nov. 2024].

Appendix

Appendix 1– Full List of Participating Practices

PCN	Practice Name
Charnwood GP Network	Barrow Health Centre
	Birstall Medical Centre
	Campus View Medical Centre
	Charnwood Surgery
	Dishley Grange Medical Practice
	Highgate Medical Centre
	Severn Surgery
	Silverdale Medical Centre
Salutem PCN	East Leicester Medical Practice
	Humberstone Medical Centre
	Johnson Medical Practice
Willows Health PCN	Clarendon Park Medical Centre
	DeMontfort Surgery
	Heatherbrook Surgery
	Pasley Road Health Centre
	Sayeed Medical Centre
	Springfield Rd Health Centre
	The Willows Medical Centre
	Willowbrook Medical Centre
	Willows Evington

Appendix 2 – HRG codes for each hospital admission (EL – elective, NEL – non-elective)

Type	HRG	HRG Description	Trim Point	HRG	HRG Description	Trim Point

EL	EY41D	Standard Percutaneous Transluminal Coronary Angioplasty with CC Score 0-3	5	EY41A	Standard Percutaneous Transluminal Coronary Angioplasty with CC Score 12+	20
NEL	DZ09Q	Pulmonary Embolus without Interventions, with CC Score 0-2	5	DZ09J	Pulmonary Embolus with Interventions, with CC Score 9+	52
NEL	GA13B	Minor, Hepatobiliary or Pancreatic Procedures, with CC Score 0	18	YG07A	Other Percutaneous Therapeutic, Hepatobiliary or Pancreatic Procedures, with CC Score 3+	64
NEL	DZ15R	Asthma without Interventions, with CC Score 0-2	8	DZ15M	Asthma with Interventions	25
NEL	DZ15R	Asthma without Interventions, with CC Score 0-2	8	DZ15M	Asthma with Interventions	25
NEL	DZ15R	Asthma without Interventions, with CC Score 0-2	8	DZ15M	Asthma with Interventions	25

NEL	DZ15R	Asthma without Interventions, with CC Score 0-2	8	DZ15 M	Asthma with Interventions	25
NEL	DZ09Q	Pulmonary Embolus without Interventions, with CC Score 0-2	5	DZ09J	Pulmonary Embolus with Interventions, with CC Score 9+	52
NEL	FD05B	Abdominal Pain without Interventions	5	FD05 A	Abdominal Pain with Interventions	15
NEL	YR11D	Percutaneous Transluminal Angioplasty of Single Blood Vessel with CC Score 0-2	16	YR10A	Percutaneous Transluminal Angioplasty of Multiple Blood Vessels with CC Score 6+	53
NEL	EB12C	Unspecified Chest Pain with CC Score 0-4	5	EB12A	Unspecified Chest Pain with CC Score 11+	5
EL	HN14E	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 0	5	HN14A	Intermediate Hip Procedures for Non-Trauma, 19 years and over, with CC Score 6+	39

EL	HN43B	Major Hand Procedures for Non-Trauma, 19 years and over, with CC Score 0-1	5	HN43 A	Major Hand Procedures for Non-Trauma, 19 years and over, with CC Score 2+	5
EL	LB18Z	Attention to Suprapubic Bladder Catheter	5	LB18Z	Attention to Suprapubic Bladder Catheter	5
EL	EY21B	Transcatheter Aortic Valve Implantation (TAVI) using Transfemoral Approach, with CC Score 0-7	7	EY21A	Transcatheter Aortic Valve Implantation (TAVI) using Transfemoral Approach, with CC Score 8+	16
NEL	DZ19N	Other Respiratory Disorders without Interventions, with CC Score 0-4	5	DZ19L	Other Respiratory Disorders without Interventions, with CC Score 11+	10
EL	YH31A	Percutaneous Biopsy of Lesion of Bone, 19 years and over	5	YH31A	Percutaneous Biopsy of Lesion of Bone, 19 years and over	5
NEL	AA32Z	Neuropsychology Tests	5	AA32Z	Neuropsychology Tests	5
NEL	DZ15R	Asthma without Interventions, with CC Score 0-2	8	DZ15 M	Asthma with Interventions	25

NEL	DZ22Q	Unspecified Acute Lower Respiratory Infection without Interventions, with CC Score 0-4	5	DZ22K	Unspecified Acute Lower Respiratory Infection with Interventions, with CC Score 9+	40
NEL	DZ12F	Bronchiectasis with CC Score 0-1	10	DZ12C	Bronchiectasis with CC Score 8+	29
NEL	EB08E	Syncope or Collapse, with CC Score 0-3	5	EB08A	Syncope or Collapse, with CC Score 13+	26
EL	NA	Planned outpatient appointment	0	NA	Planned outpatient appointment	0
NEL	NA	NA – Mental Health	No impact	NA	NA – Mental Health	No impact
NEL	NA	NA – Mental Health	No impact	NA	NA – Mental Health	No impact

Appendix 3 – LLR ICB Internal Roles

Project Lead			
	Months	**Time/WTE**	**Total cost £**
April to Sept 24 Mobilisation stage	6	0.6	£25,097
Oct 24 to Feb 25	4	0.2	£5,577
Mar 25 to Aug	6	0.1	£4,334
			£35,008
Project Administrator			
	Months	**Time/WTE**	**Total cost £**
April to Sept 24 Mobilisation stage	6	0.6	£11,148
Oct 24 to Feb 25	4	0.2	£2,477
Mar 25 to Aug	6	0.1	£2,081
			£15,706
Clinical Lead			
	Months	**Time/WTE**	**Total cost £**
April to Sept 24 Mobilisation stage	6	0.2	£9,800
Oct 24 to Feb 25	4	0.1	£3,267
Mar 25 to Aug	6	0.05	£2,450
		2.15	**£15,517**

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