

Introducing telemedicine Artificial Intelligence in the cataract pathway within the South East – A scoping review to understand the benefits, enablers and learning from senior leaders.

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Introduction

The NHS is constantly evolving, and as it does, it is faced with multiple challenges and opportunities. Workforce innovation is one area that could support some of the current challenges. By adopting new technologies and streamlined processes, healthcare providers may reduce administrative burdens, allowing more time and resources to be dedicated to direct patient care. As healthcare systems grapple with issues like staff shortages and increased patient activity, workforce innovation becomes a strategic necessity. Implementing novel training programs, flexible work arrangements, and introducing time saving technology may help to mitigate these challenges and ensure a resilient and adaptable healthcare workforce. The [NHS Long Term Workforce Plan](#) [2023] highlights the need to reform the workforce through working in different ways to provide more effective and efficient patient care.

[Ufonia](#), a medical technology company, have developed an Artificial Intelligence [AI] product which can support the workforce to work differently. Their telemedicine product called “Dora” has been programmed to undertake routine telephone calls with patients. It has been designed to make care more convenient, reliable, and consistent for patients, increase hospital capacity and release clinicians to spend more time meeting patients’ needs. This work focused on Dora’s use in the cataract pathway. Dora automates clinical conversations previously had by clinicians for pre-assessment as well as postoperative follow up. After Dora’s assessment if no clinical concerns are identified the patient does not require routine clinician review.

Background

Guidance [[Priorities and Operational Planning 2022/2023](#)] published by NHSE highlighted the need to improve overall productivity. It stated that organisations should focus on reducing outpatient appointments by 25%. The intention being to redirect clinical resources to tackle waiting lists and priority high risk cohorts. In response to this, NHS England South East [NHSE, SE] analysed waiting list data which identified six high-volume specialties: ophthalmology being one. Within this specialty, baseline data demonstrated that a large proportion of eye care activity and waits related to cataracts. Following cataract surgery, a high proportion of patients in the South East were offered a follow up. Depending on organisational pathways this was done either via the telephone or face to face. NHSE South East had already established a Community of Practice for ophthalmology where Buckinghamshire NHS Foundation Trust shared that 70% of patients after cataract surgery did not require a clinician led follow up when using Dora. Aiming to reduce outpatient appointments, NHSE SE secured national funding to roll Dora out to other organisations.

The funding was to deliver a one-year collaboration with six organisations in the South East region of England. All South East hospitals providing cataract follow-up were offered the opportunity to adopt this innovation. Invitation to participate was offered via electronic mailing, Integrated Care System [ICS] level presentations, NHS contacts and professional connections. Sites were chosen by the NHSE SE team and selected to be both geographically representative of the region, and to be maximally able to benefit from the technology e.g. those sites with high patient volumes or high outpatient waiting lists who could benefit from

automation. The funding offering for this work had high level support from NHSE SE who established engagement with system elective leads and sought permission to approach clinical leads at each site. Having done this, they purposefully stepped back to allow clinicians and operational managers to own and lead the implementation. NHSE SE set up governance meetings with Ufonia to track progress and offer support where any blockages were identified. A user group was established once they had a critical mass of sites wishing to take up the Dora offer.

Methodology

This scoping review involved extended interviews with senior clinicians and operational managers across South East England between January 2023 and October 2023. The aim was to understand the perceptions of senior staff, including successes and barriers around the introduction of AI telemedicine Dora in the post cataract surgery pathway.

The methodology including interview questions was co-designed and agreed by Health Innovation Oxford and Thames Valley, NHS England South East and Ufonia.

Population: Six organisations in the South East of England agreed to take part. Senior clinicians and senior managers were identified at each site by Ufonia, and introductions were made via project meetings and/or electronic mailing. All identified were offered to participate in interviews.

Interviews: Data was collected through semi-structured interviews with the clinical lead and/or senior operational manager of the service. We aimed to undertake one interview with each person prior to the listing of Dora patients [“go live”] in the organisation [Appendix One] and one follow up interview three months post Dora going live [Appendix Two]. Interviews took place virtually and were conducted by four individual interviewers.

Twenty-two senior leaders were contacted over the year through project meetings and repeated emails offering multiple scenarios to connect. Several members of staff left the organisation and in these instances their replacement was invited to interview. Seventeen interviews were undertaken across six organisations [17/22, 77% response rate]. Eight interviews took place before Dora “go live” and nine afterwards. Of the seventeen interviews nine were with senior managers, four nurse practitioners/managers and four clinical consultants. Two interviews were conducted within the programme team including NHSE SE and Ufonia.

An additional focus group for nursing staff was held to include data from a different perspective. One organisation had not gone live with Dora at the time the report was written [Table One].

Table One: Breakdown of interviews and focus group by organisations

Organisation	Interviews Pre Go Live	Interviews Post Go Live	Focus Group	Other
Organisation 1	1	0		
Organisation 2	2	2	6	
Organisation 3	3	2		
Organisation 4	2	0		
Organisation 5	NA	3		
Organisation 6	NA	2		
Programme team	NA	NA		2
Total number of interviews				19
Total nurses interviewed in group sessions				6

Analysis: Interviews were transcribed and reviewed using thematic analysis.

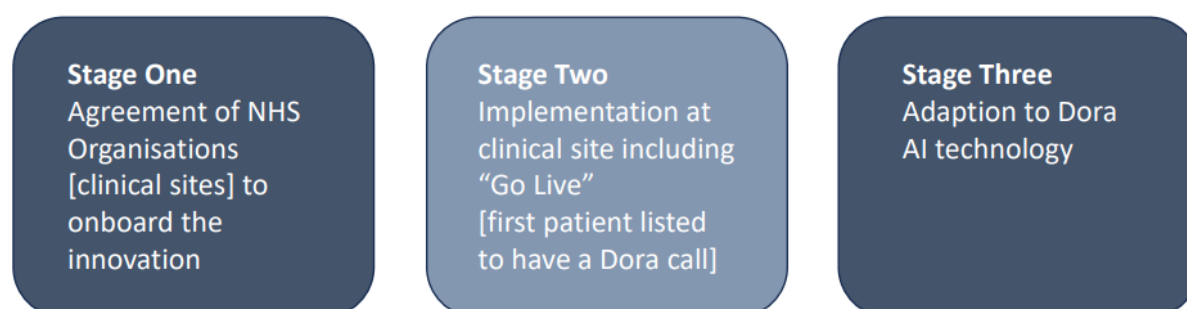
Data sharing: All interviews were confidential. All transcripts were anonymous, stored on a secure drive and deleted after the report agreed. A data protection impact assessment and data sharing agreement were signed between Health Innovation Oxford and Thames Valley and Ufonia.

Funding: This work was commissioned by NHS England. Each individual site was initially offered funding to support the use of Dora for post operative review and to collect patient reported outcome measures [PROMS]. This offering was later expanded as Ufonia developed further AI conversations for the cataract pathway to include funding for pre-assessment and surgical confirmation reminders.

Findings

The introduction of Dora within the cataract pathway was developed as a collaboration between NHS England South East and Ufonia. It was delivered by Ufonia, clinicians and operational managers in six organisations within the South East. Once the dissemination of the offering was undertaken the processes of innovation adoption are broken down into three stages [Figure One].

Figure One: Stages of innovation adoption of AI technology Dora



Stage One: Agreement of NHS organisations to onboard the innovation

Most sites heard about the offer to use Dora via their clinical or executive teams. Two found out directly via a presentation from Ufonia. For sites interested in taking up the offer, there was wide variation in terms of organisational, technical, and clinical readiness to adopt a new technology into standard workflows.

The funding was initially for the post-operative pathway including Patient Reported Outcome Measures (PROMs). This evolved to include both pre and post operative cataract pathways, which supported one organisation who already had a post-operative pathway in place and wished to trial the pre-operative pathway.

Whilst organisations recognised the benefit that this project was fully funded for the year, there were clear concerns about future funding. The majority felt it would have been easier for them to onboard if they fully understood the ongoing organisational cost of Dora post the pilot phase. They agreed a future funding proposal from Ufonia at point of sign up would assist them in early decision making and business planning. Senior managers could see how this innovation may release nursing time, which would be welcome against the current pressures in their service. However, there was some unease around agreeing to a short-term pilot which required a significant time input.

“I’m hoping the difference is to change the footfall that is coming in. We just want to change the feet that are coming in”
Specialty Manager

“Dora may help with screening calls which will be completely invaluable”
Nurse

“Whilst Dora may decrease the number of post op visits for the 2nd eye, it will increase nurse capacity to review more patients reducing the initial wait”
Nurse Practitioner

Key finding: Senior leaders all appreciated how using Dora to automate routine clinical activity could release nursing time to deliver care to more complex patients or increase the numbers of patients followed up. They also perceived key challenges to implementing and sustaining the technology in their department in the context of other service pressures and future funding.

Stage Two: Implementation at clinical site

At the start it was labour intensive for Ufonia to introduce themselves to the organisations and find the appropriate personnel to move things forward. Once they had these contacts regular progress meetings were organised. All organisations were united that Ufonia worked hard to make the transition as smooth as possible.

For successful implementation of the technology this typically involved direct work with the local ophthalmology department, but also input from Information Governance [data protection agreements], IT [focusing on data exchange and integration], Clinical Safety and in some cases executive sign off.

During the implementation stage, sites had short weekly meetings with Ufonia to ensure the smooth and timely running of the project. Some sites found it difficult to deliver actions within

that timeframe and asked for meetings every two weeks. At times this delayed progress. Organisations with dedicated project management support [e.g. Digital Transformation team] enabled the implementation to move more quickly rather than relying on clinical leads doing this in addition to their usual role. Also, when key decision makers were present in the meetings it supported the deployment to move forward. During the implementation stage there were many coexistent challenges in the wider service e.g. strike action, sickness, and winter pressures.

Timeframes from sign up to implementation were variable depending on multiple factors. Early adopter sites had more input into the AI Dora conversation development, whilst later sites benefitted from more expertise from Ufonia. This included a more proactive approach to hospital required documentation e.g. clinical safety sign off. An example of the importance of key stakeholder involvement was one organisation delayed the “go live” of Dora by two months awaiting IG and clinical safety sign off. Another organisation did this in a matter of days.

There were mixed views around who should contribute to the design of the pathway. One organisation included a representative from all areas of the pathway, whereas others felt that involving too many people complicated the process. Two organisations agreed that theatres should be in the pathway design as the follow up is arranged post-surgery. One organisation noted that Dora had its own pathway and the system just needed to adapt it.

The successful implementation of Dora relies on clear interdepartmental communications. Delays to implementation in some organisations were due to high workloads and competing priorities within the Information Technology [IT] and Information Governance [IG] teams. Both are essential to support the successful “go live” of Dora. One organisation shared that it took six months of hard work to pull their IG and IT together. This was primarily trying to get the right people to agree. To help expedite the sign off process through IT and IG, Ufonia composed site packs, including questions for IT/IG.

“You need someone on the “inside” wanting to do the project and executive support. If the lead clinician says yes, everyone gets on board”
Director of Operations

“We provide the opportunity, get the ingredients in the room but for success it has to be clinically led”
Senior Director NHSE

“We want change management that sticks, [for this] you need to build relationships, change the pathway, and have executive support”
Director of Operations

Key finding: Timely implementation was initially honed down to four key drivers.

- Engagement of all key stakeholders from the outset of the programme, including executive sponsor, IG, and clinical safety leads
- A site project manager [rather than relying on a clinician] can speed up the implementation of the technology
- A timely “push” from within the organisation to get agreements signed off promptly
- Cadence of project meetings – all key personnel attending weekly short updates.

Stage Three: Adaption to Dora AI technology

Once Dora was live for patients in the post operative cataract pathway, there was an intensive support phase for each clinical site with Ufonia. This meant that any operational issues could be identified and acted upon. This ensured the smoothest delivery of the service.

Following the introduction of Dora, one organisation demonstrated that their waiting list for post operative telephone follow up reduced from five weeks to zero within an eight-month period [Appendix Three]. One organisation tested the pre-operative Dora calls to validate the information for conversations. It demonstrated that there was 90% agreement when comparing Dora to the expert call reviewer. Staff were finding it easy to use and confidence was growing in their use of the AI. One organisation introduced Dora for second eye operations only and felt that they would see more impact when they moved Dora to all cataract operations.

Some staff did not completely “trust” Dora so continued with paper records to double check processes. This could be either the concept of trusting AI or some organisations not having full integration of the software. Ufonia are supportive of full integration where Dora populates the information gleaned, directly into the patient record. This takes both time and full support from organisations who are nervous to proceed until they are reassured around the sustainability of the funding. NHSE have responded to this through supporting the development of business cases and ensuring ease of procurement.

Before Dora was introduced, Seven out of eight senior managers felt that the nursing staff were open to change and adaptive to new processes. However, nurses in one organisation shared that they have had multiple digital changes [other than Dora] during the implementation of Dora and found it overwhelming. They recognised that their current workload was stretching them to the limits so hoped that Dora might be a solution to change the way they work. Generally, they were open minded but felt that their work was “hitting them from all angles”.

“You’ve got so many bits to bring together, difficult to learn, do I know my job anymore”? Nurse

One organisation who undertook a pilot of Dora in the pre-operative cataract pathway demonstrated that it reduced clinical assessment time by around 20 minutes. These saved minutes have potential to scale, theoretically releasing staff to focus on more complex services.

Three interviewees shared that when the introduction of Dora was discussed more widely, there were mixed responses from clinicians. Whilst one clinician did not like losing the personal aspect of patient follow up, they appreciated that due to the increase in demand for the service, new ways of working needed to be explored. This included the use of new technologies. As Dora integrated into one site, they grew to see the value of it in the post cataract pathway and were keen to deploy across the pre-assessment pathway.

There were varied opinions about how the patient would respond to the change. Some felt that patients would be happy about avoiding an additional hospital visit, whereas others wondered if patients would miss the human contact. All interviewees agreed that the generic exclusion criteria for the Dora pathway ensured that patients who required a clinician call or face to face visit would still be able to have this.

Key finding: Change management is complex and requires engagement from all key players. Most staff are open to change and including them from the start is important. Competing changes in a department should be avoided when introducing new technology. Full integration of the software would reduce burden on staff. Future funding needs to be secure for organisations to be confident of the return on investment of time and finance.

Discussion

Artificial Intelligence [AI] is a part of our daily life: it is already operating in technology such as face recognition and speech recognition in virtual assistants such as Amazon Alexa. It is also a prominent contributor to innovation in healthcare [Drukker et al, 2020] from decision support e.g., assisting interpretation of scan images in stroke pathways [Nagaratnam et al, 2020] to the support of mental health and wellbeing through digital Cognitive Behavioural Therapy [Morrison, 2022].

Many advocate the use of chatbots to free up overworked professionals [Topol 2019]. Dora has the capacity to contribute to this agenda. It is recognised that in some cases chatbots may decrease healthcare professional hours, however, their deployment can require a great deal of human resources in the form of data analysts and information governance specialists [Parvianen and Rantala, 2021].

Introducing technology into existing clinical pathways is complex and certain issues are thought to be crucial to the smooth introduction within organisations. These may involve sustainable funding, culture of an organisation, staff ownership and compassionate leadership. (Collins, 2018; Wells et al, 2017; Kelly, 2017)). Five common ingredients for improved adoption of innovation observed in this review is in keeping with the current literature.

Understanding the local context is key to ensuring the right technology is implemented into the correct pathway. Dora was commissioned for the post operative cataract pathway whereas some organisations felt it was more beneficial locally within the pre-operative pathway.

Relationships between the technology provider and organisations are critical. For external companies it can be difficult to initiate key contacts within the NHS. Whilst it is important for clinicians to own the change, NHS England can act as a bridge for these initial contacts and companies. Once these contacts are secured then technology companies can build established relationships to support the organisation through the change in the least disruptive way.

Involving **senior decision makers** [clinical, operational, and executive] from the earliest stage of new technology implementation is vital to facilitate timely decision making and smooth access to other departments [e.g. IT/IG]. This supports the continuous flow of the project.

Open communication between companies and NHS organisations ensures the smoothest introduction of technology. Communication to staff affected by the change in the pathway is paramount to ensure they are brought on board at the beginning and supported to contribute to the new pathway. Short [15-20 minute] regular [weekly] project action updates should be prioritised by both parties to maintain momentum.

Sustainability of the technology in the clinical pathway through business planning should be addressed before the organisation commits to the change in pathway. Technology companies need to be prepared to cost the annual subscription of software so that the NHS can visualise the return on investment prior to installation. This investment is not only monetary but the time and resources of those supporting the change.

This review has highlighted that change management is complex, and AI implementation is not immune to these complexities. Hospital systems are multi-layered with many decision makers and structures. These layers complicate change management. However, senior leaders are often able to see the bigger picture of how technology can support the service and have the influence to expedite change.

To future-proof the smooth introduction of technology in the NHS would involve a variety of ingredients from the initial assessment of service, to senior board engagement and clear project management. As the NHS grows in familiarity with introducing technology into pathways there needs to be a shift in bureaucracy. This shift is to enable a faster deployment of the service whilst supporting staff and protecting the integrity of patient data.

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Appendix One – Interviews with senior managers/clinicians

Introduction to interviews

Thank you for taking the time to talk to me about the introduction of Dora AI technology to your clinical area. Your feedback is very valuable, and it will help us to understand how it may benefit your department and patients. The Oxford AHSN evaluation team will review your feedback and use it towards a report that will inform NHS England around the overall enablers and challenges to this innovation.

There are a few things I would like to go over with you about the interview, final report, and confidentiality of your interview.

- Your response will be completely anonymous
- I would like to take notes during our conversation to ensure accuracy, these will be deleted at completion of the evaluation
- The content of our conversation will only be seen anonymously by other members in the Oxford AHSN evaluation team
- We will not name anyone interviewed in the report – we will refer to the number and type of staff interviewed
- The interviews will be themed, and the thematic analysis will be included in the final report. We may use quotes from the interviews, but these would remain anonymous.

Questions within the interview prior to the introduction of “Dora”

1. Can you tell me a little bit about your clinical/managerial role?
2. How did you find out about the Dora project?
3. What were your first thoughts when you heard about Dora?
4. What difference are you hoping Dora will make to your service/team/patients as a whole?
 - Draw out how/if Dora will/will not change
 - Think about change to pathway change
5. Do you have any thoughts on how staff will respond to the change?
6. Do you have any thoughts on how the patients will respond to the change?
7. What are your key thoughts around the introduction of Dora into your service?
 - Draw out positive and any concerns
 - What might affect/have an effect implementation (? Service constraints etc. barriers/enablers)
8. What initial thoughts have you around pathway re-design and who should be involved in the project design
9. Could you let me know of any current opportunities/ challenges in your department?
10. Can you tell me about how you think Dora will support current opportunities, be part of the solution to current challenges?
11. Is this project being funded? If so, how?
 - Draw out any thoughts about funding going forward post the project
12. How were you approached to be involved in the project? (asked or volunteered).

Questions within the interview post the introduction of “Dora”

These questions are subject to change and will be informed from findings in initial interviews

1. What has been your experience about Dora being introduced in the service (how embedded)
2. What has made it easier?
Assumptions on what might make it easier
 - Information Governance/data sharing (organisational factors)
 - Staff on board
3. What has made it harder?
Assumptions on what might make it harder
 - Information Governance/data sharing (organisational factors)
 - Staff resistant

Clinical/managerial lead involvement

1. What level of involvement was required of you to roll out the project?
2. How much time did you think it would involve compared to actual? (time commitment – what has it taken up, what has most of your time been spent on)
3. Did you have any project support locally from your Trust?

Staff/People factors

1. How did you introduce the concept to staff?
2. How did you communicate the change to staff?
3. How did you co-designed pathway re-design with staff?
4. Did you trial and test the pathway before the introduction to the service?
5. What training/preparation was there for staff? (timely?)
6. Were any concerns/ideas raised by staff? (how were these addressed)
7. How did you introduce this to patients?
8. How did you decide which patients were eligible?

Financial factors

1. Scale-ability – feasibility for continuing at site (post NHSE 1 year funding)

Lessons learned to overcome barriers (enablers) – use if not enough from Q1, 2 and 3

1. What have you learned along the way?
2. If you could share one piece of key information for another site looking to implement, what would it be?

Appendix Two – Interviews with nurses/junior doctors undertaking Dora follow up calls

Introduction to interviews

Thank you for taking the time to talk to me about the introduction of Dora AI technology to your clinical area. Your feedback is very valuable, and it will help us to understand how it may benefit your department and patients. The Oxford AHSN evaluation team will review your feedback and use it towards a report that will inform NHS England around the overall enablers and challenges to this innovation.

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- We will not name anyone interviewed in the report – we will refer to the number and type of staff interviewed
- The interviews will be themed, and the thematic analysis will be included in the final report. We may use quotes from the interviews, but these would remain anonymous.

Questions

1. Can you tell me a little bit about your role and how long Dora has been running in your department? (Draw out if they have pre or post op experience)
2. Can you briefly summarise how perioperative cataract surgery appointments worked before Dora was implemented? (Focus on pre op or post op depending on where interviewee has experience)
3. What was your role in introducing Dora into the department? If applicable to interviewee:
 - Did you feel fully equipped for the change in practice?
 - If no, what would have helped you more/how can change be better instigated?
 - If yes, what helped you and why?
4. When Dora was introduced, have you noticed a change in the number of patients requiring clinician-led appointments (for pre-op or follow up)? Can you provide examples or evidence to support your view?

BHT/Frimley

Before Dora was implemented can you estimate:

1. How many hours a week did your nursing team spend on telephone follow up for cataract surgery patients?
2. Clinical team spend seeing patients in eye casualty/ clinic after cataract surgery.

OUH

1. Before Dora was implemented can you estimate how many hours a week:
 - Nurses spent on pre-operative assessments.
 - Triage in eye casualty speaking to post op patients.
 - Doctors seeing post op patients in casualty.
 - Doctors seeing post op patients in clinic.

Generic Questions

1. Before and after Dora was implemented can you estimate the number of patients seen in the locations as described in the previous question
2. Similarly, can you describe any changes to the average length of time your team is now spending with those patients that are followed up? (e.g. are you spending more or less time with those patients who do require clinician follow up. For phone follow ups are the conversations a different length now you only speak to those in whom Dora identified concerns)
3. If there are changes what do you think has attributed to them (Dora or other factors)?
4. Do you think Dora technology is being used optimally within your clinical pathways?
5. Is there anything you feel could be improved (e.g. more patients could be listed from surgery for Dora calls)
6. How do you feel about the use of AI technology in your role?

Appendix Three – Case Study

Automating clinical conversations in the cataract pathway in South East England

Frimley Health
NHS Foundation Trust

Summary
NHS Frimley Health reduced the need for clinician-led cataract follow-up appointments by 66% (and removed their backlog in appointments) by deploying a regulated autonomous UKCA-marked clinical voice assistant in December 2022.

Contextual challenges
The trust recently opened a Cataract Surgery Hub to widen access and efficiency of cataract surgery care. It became increasingly difficult for the clinical team to deliver the 3-week telephone follow-up service due to workforce capacity, meaning backlogs built-up.

Approach
The trust used a clinical voice assistant (Dora) that increased healthcare capacity by acting as a like-for-like replacement for clinical care. The assistant telephones patients and conducts automated, high quality and clinically validated consultations. Patients have a regular voice conversation on the phone as they would with a human clinician. The voice assistant was implemented for all patients having uncomplicated cataract surgery. Any patient with concerns that can't be managed by the voice assistant is called by the clinical team.

Impact

Autonomous conversations
1291 consultations in 8-month period starting Dec 22

Significantly reduced costs

Waiting list reduced from 5 to 0 weeks

Increased clinician capacity

- Before implementing this approach patients often waited 8 weeks for follow-up vs the 3 weeks planned. Using the clinical voice assistant enabled clearing the backlog for follow ups within weeks.
- 66% of calls with the clinical voice assistant don't need any further clinician input, meaning that the nursing time could be spent on other activities. 6 follow-up sessions per week were reduced to 2.
- More time freed up for patients who require the most clinical input, reducing health inequalities and improving staff satisfaction and morale.
- Clinical voice assistant cost per patient episode is approx. 22% of the cost of an outpatient appointment.

Patient satisfaction: 1038 patients gave a score on their likelihood to recommend Dora

Score out of 10	Number of patients
1	14
2	5
3	7
4	11
5	21
6	27
7	80
8	179
9	165
10	522

Clinically Led Innovation
The trust created a Task and Finish group with the ophthalmology clinical leads, matron and the operations team from the company providing the technology to implement the approach.

Future considerations and learning
It is vital to work with the information governance, clinical safety and information technology teams from early in any project implementing digital technology into a clinical pathway. This ensures that all necessary stakeholders are aware and on board with the implementation.

The clinical voice assistant will continue to be used to automate post-op appointments and will also soon be going live for PROMs collection at Frimley (quantifying surgery impact). The technology is used across the South East region and is being evaluated regionally.

Patient feedback
Patients have given **excellent feedback** with 83% of patients giving a score of 8 or higher out of 10 when asked how likely they would be to recommend the service.

Contacts for further information
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