

Cutting the Covid-19 Surgical Backlog through Digital Innovations

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About

The severe impact of Covid-19 on elective care in the UK has resulted in an unprecedented surgical backlog which is now a critical concern for the NHS.

NHS England's activity data for April and May 2021 showed that five million people in England are waiting for hospital treatment and more than 400,000 patients have had their surgery delayed for at least a year. Now more than ever, health and social care need innovative approaches to tackle the increasing surgical demand and shorten hospital waiting lists. Covid-19 has catalysed a technological revolution in healthcare, in which a growing reliance on technology has resulted in a digital boom of transformative virtual tools. As a global leader in healthcare, the NHS must harness this momentum and support service redesign in elective care recovery to tackle the immense challenges that lie ahead.

The Health Innovation Network and DigitalHealth.London are keen to help our NHS stakeholders and innovators make the most of this opportunity through insights and opinions collected from senior stakeholders and policy makers on ways to address the recovery of elective care services. This paper intends to stimulate the debate whilst setting out the key opportunities and challenges if the NHS is to make the most of the potential for streamlining and making efficiency improvements in surgery offered by digital tools.

Digital innovations to tackling the Covid-19 surgical backlog

Pre-pandemic, [around 10 million patients underwent surgery each year in the NHS](#). Any healthcare pathway supporting a population of this size must be simple, safe and efficient, which is why the perioperative care pathway incorporates multiple stages to deliver the best possible care for patients before, during and after major surgery. The pathway is led by a multi-disciplinary team of anaesthesiologists, surgeons, preop and recovery nurses and Allied Health Professionals (AHP), all of whom play a significant role in supporting the patient during each stage. The process can be broken down into three main stages: preoperative (before surgery), intraoperative (during surgery), and postoperative (after surgery).

The Perioperative Pathway ([Centre for Perioperative Care](#))



The past year has seen a remarkable global boom in digital innovations across multiple industries. Healthcare has been no exception to this transformation, as innovative technologies have transformed many clinical areas through the adoption of techniques such as remote and virtual consultations that allow clinicians to “meet” with patients in their own homes.

Specialty areas such as perioperative medicine have also been transformed in ways never thought possible in such a short space of time. For example, we have seen the digitisation of the preoperative assessment process to further asynchronous care, where healthcare communication between the patient and clinician does not occur at the same time (such as through an SMS text message or an online questionnaire). An example of asynchronous care delivery can be seen in virtual preop assessment tools where patients can complete their assessment anytime and without a hospital appointment. Another example of digital innovation along the perioperative pathway is the use of interactive online consent tools that enhance shared decision-making between clinician and patient whilst saving valuable time. These tools have proved extremely beneficial during periods of social distancing, and they have the potential to continue to be used to support the reduction of the surgical backlog if adopted at scale across the NHS.

The Health Innovation Network hosted a roundtable event in July 2021 on “Cutting the Covid-19 Backlog through Digital Innovations”, where senior leaders in the NHS from across London were invited to discuss the digital opportunities to tackle this immense challenge. We had 14 senior NHS representatives from a variety of clinical and digital transformation backgrounds, as well as two digital innovators in the perioperative field. This report summarises the areas of opportunities that were discussed by the participants.

Digital, face-to-face or hybrid?

Traditionally, the preoperative and postoperative interactions between the clinician and patients have been done face to face at a clinical site. Since the beginning of Covid-19, these stages in the perioperative pathway have moved online through the form of teleconsultations (e.g. preop assessments being conducted via telephone or video call). Most senior NHS leaders would agree that digital models of care and their associated benefits around “[reduced cancellation rates, improved staff utilisation, increased patient throughput, reduced unnecessary preoperative testing and reduced risk from litigation](#)” for patients should not be lost post-pandemic, but instead be blended with the reintroduction of face-to-face interactions for complex patients. The benefits of virtual consultations for preoperative assessments and gaining patient consent for the procedure cannot be understated in the perioperative field, as these innovations can be attributed to a dramatic improvement in operational efficiencies and the empowerment of patients to take control of their own health.

The [American Society of Anaesthesiologists \(ASA\) physical status classification system](#) is used by anaesthetists and nurses before every surgical procedure to categorise a patient’s physiological status and help predict operative risk. ASA grading ranges from ASA 1 (a normal healthy patient) through to ASA 6 (a declared braindead patient). Clinicians and senior stakeholders report that the redesign of clinical pathways to virtually assess and streamline preop patients with lower ASA grades (1 or 2) has been adopted by several NHS trusts, which has helped services to efficiently streamline these less complex patients through the system and help alleviate the bottlenecks. However, clinicians at the roundtable reported challenges with capturing the same quality of care when conducting a virtual preop assessments for more complex patients at ASA grade 3 or above. A hybrid approach could be taken to streamlining patients with fewer complexities through a virtual preop model. This could help to focus upon the more complex patients through a mixture of virtual and face-to-face interactions (depending upon the diagnostics requirements, the complexity of the surgical procedure and the comorbidities of the patient). This could also help to manage clinical resource allocation more efficiently and ultimately reduce surgical waiting lists.

Opportunity – Virtual patient triaging and pre-assessment
During the preop process, trusts can provide patients with online forms that asks questions based on local surgical pre-assessment guidelines. Tools such as [Ultramed’s MyPreop](#) or [Definition Health’s Lifebox](#) e-triage platforms can streamline less complex patients through the preop pathway by delivering an asynchronous model of care, and ultimately free up time for preop nurses to focus on more complex patients.

Clinicians and patients co-designing technological solutions

The successful mobilisation of digital health solutions can only be achieved through the co-design of new technologies alongside the clinicians, operational staff and patients that use them. Nurses, doctors and AHPs have been confronted with challenging circumstances during the pandemic including staffing shortages, burnout, and extreme stress, alongside having to mobilise new technology at great speed and significant service redesigns to pivot quickly how they deliver care.

The consensus from the roundtable was that this situation has highlighted the urgent need for nurses, doctors, AHPs and patients to become more involved in the design and testing of new perioperative technology from start to finish. The entire premise of co-design is including those who will be affected by the decision, as they are the experts in the field and know the perioperative landscape better than anyone else. Creating these dynamic relationships with clinicians, as well as an open dialogue during the design and testing phase, will ensure that digital solutions are fit for purpose and enable clinician and patient buy-in once the solution is implemented.

At the roundtable event, an Enhanced Recovery Clinical Nurse Specialist highlighted how the theatre nurses had helped to co-design perioperative technology including a digital platform to more accurately measure and monitor patient flow through the department. This was done using virtual dashboards for caseload and workforce planning to better manage patient flow and allocate the right staffing levels.

Opportunity – Digital preop passports

Patients with multiple comorbidities often require multidisciplinary support – some of which is provided by several different NHS trusts. Clinicians at the roundtable event acknowledged that the duplication of preop assessments between NHS organisations could be reduced through the means of a digital preop passport. A passport of this nature can be shared between NHS trusts and hold essential information about a patient’s preop status, including diagnostics, comorbidities, allergies, medications, drug and alcohol intake, and ASA grade. The implementation of preop passports can also empower patients to contribute towards their own preop assessment by having the ability to add information regarding their health status while waiting for their procedure.

Shared decision making is key

Clinicians at the roundtable event reported that [pre-operative consultations are often time-constrained](#), which means that anaesthetists and surgeons focus on giving essential information with little opportunity for discussion on the procedure. This can make some patients feel as though the clinician doesn’t see them as an individual or particularly care about their needs. In addition, there is at times a lack of communication with patients between consultations and prior to surgery. [Anecdotal feedback](#) from patients that had used one digital consent platform was that previously they had felt that the clinical teams did not help them to understand their surgical journey, allow time to ask questions, and reflect on their shared decision making outside of their allocated consultation appointment. In some cases, this led to them feeling unprepared and disempowered.

[Clinicians can find it challenging](#) to get their patients to engage with decision-making and their surgical journey. Trusts such as Imperial College Healthcare NHS Trust and Chelsea and Westminster Hospital NHS Foundation Trust are using [Concentric Health](#), an interactive digital consent platform for surgical procedures, to address these challenges by encouraging shared decision-making. [Digital consent tools can also help to improve documentation](#) along the consent process by reducing omissions, medicolegal risk, and other consent form errors.

Opportunity – Digital consent platforms

Digital consent platforms, such as DigitalHealth, London Accelerator company, [Concentric Health](#), can better engage patients throughout the preoperative pathway and help provide access to appropriate evidence-based information about their procedure and care. It can also offer the patient an opportunity to ask questions and invite reflection on the anticipated procedure in a safe space and at a suitable time.

Proactively engage patients through digital tools

[Last-minute cancellations and no-shows for surgical procedures are a major cause of inefficient use of elective care time and an enormous waste of resources](#). Not only do surgical cancellations adversely impact patient outcomes, but they can result in the under-utilisation of theatres: [with an average cost of £1,200 per hour to run an operating theatre, the financial implications are significant](#). A [2018 prospective epidemiological study](#) over a 1-week period in NHS hospitals suggested a cancellation rate of between 10% and 14%, and that only one-third of these were for clinical reasons. The roundtable discussion highlighted that many of the cancellations caused by administrative and clinical errors are avoidable, and proactive digital communication and shared decision-making can help to prevent such occurrences. For example, NHSX recently published a playbook on “[Telehealth to manage pre-operative hypertension to avoid surgical cancellations](#)”, where remote patient monitoring technology has been used to improve engagement and adherence to self-management prior to surgery using a digital tool by [psHealth](#) called [Florence](#). Sherwood Forest Hospital deployed Florence within their pre-operative assessment pathway to reduce the number of avoidable cancelled operations and shorten the pathway to surgery for patients with white-coat hypertension. Alongside a robust preop assessment process, tailored digital capabilities can both inform patients about enhanced safety measures in place for Covid-19 as well as reduce anxieties and help lower last-minute cancellations and no-shows.

With the significantly increased elective surgical backlog meaning more than 400,000 patients in England have waited for surgery for more than a year, time-related administrative issues are a growing problem. Patients can easily forget or lose essential paperwork with details of their appointment during these extended waiting periods. In addition, the patient’s physical health condition may have deteriorated or have completely resolved while waiting

for surgery, rendering the procedure no longer necessary. However, hospitals are not always notified of these changes. Senior NHS leaders at the roundtable event expressed the view that digital two-way communication via SMS, email or online methods is simple but effective in this regard. It can serve to provide instructions and reminders regarding their preoperative preparation, better engage the patient while waiting for their procedure, and provide avenues for communicating a change in their health condition. An online preop platform, such as [MyPreop](#) and [LifeBox ePOA](#) can also [provide new opportunities for virtual patient engagement](#). This includes patient education, pre-appointment questionnaires, and medication check-ups. Finally, some online preop platforms can help to streamline the surgical planning process by providing patients with the option to virtually book their own appointments, thereby freeing up time for preop nurses and administrative staff to focus on more complex tasks.

Opportunity – Virtualisation of patient education and preparation

[Better informed patients lead to better prepared patients, reduced cancellations and improved post-surgical outcomes](#). Online videos and virtually animated education help to reduce the resource burden, as staff no longer need to repeatedly organise and teach prior to surgery. [This concept has been previously tested](#), where it demonstrated a reduction in preoperative anxiety, whilst better preparing patients for their procedure. [Healthcare professionals identified that online videos are more engaging and assist in increasing information retention](#). Virtualisation of patient education also has the added benefit of ensuring information delivered to patients prior to surgery is accurate and standardised.

Opportunities for automation

Current models for assessing ASA grades requires an anaesthetist to review each patient's medical record and assess a score – a clinically important but manual process that consumes the clinician's time prior to procedure. Participants at the roundtable event discussed the use of validated digital tools that use algorithms to automate the ASA grading process. A machine learning algorithm could provide the ASA grade score that predicts postoperative recovery outcomes based solely on structured patient data. A [study by the British Journal of Anaesthetists](#) reported on the use of machine learning algorithms to create a fully automated score that predicts postoperative in-hospital mortality. They found that a hybrid model which incorporates both physician judgement (via the ASA score) with machine learning produced the best results.

Opportunity – Automation of ASA grading

AI-driven algorithms can be used to automate the assessment of less complex patients, such as those that fall within ASA Grade 1 and 2. A hybrid approach for higher Grades (E.G. ASA 3 and 4) can be used to better support more complex patients while improving operational efficiencies. For example, patients graded in categories 3 and 4 by the AI-driven algorithm have their grades verified by a local preop nurse prior to surgery.

The algorithms are ready; workplace culture is not

There was strong agreement from the roundtable attendees that algorithm-based technologies presented extraordinary opportunities in streamlining and standardising preop patient assessments, including the automation of ASA grading. However, there are challenges in changing workplace culture and acceptance of these new automation tools. This scepticism when it comes to algorithms is largely attributable to concerns regarding the safety and impact of this technology. A failure to appropriately explain the many benefits from AI-driven algorithms can lead staff to question the integrity and value of this new technology, and how their role and responsibilities might change within this new way of working. Digital transformation leaders need to carefully translate the benefits of new technology for each discipline before, during and after implementation, and reiterate that health tech is here to complement, rather than replace, the role of health and care staff.

The impact of human biases on health inequalities has been well documented. Health and social care will need to grapple with just how much these biases can bleed into machine learning algorithms – with harmful results. Hence, algorithms also come with the caveat of potential risks associated with exacerbating health inequalities if the organisation fails to stringently collect accurate data that reflects the patient or community. Incorrect or poor-quality input of data to create machine learning algorithms will always produce an incorrect or faulty output, which can have serious implications for patient safety in the preop assessment process. Careful consideration and expertise must be applied to the development of these algorithms to ensure they accurately represent the community of patients for their ethical implementation in a clinical setting.

Opportunity – Vision and leadership

Having a clear vision and strong digital leadership were two common themes among recommendations to shift workplace culture on new technology. NHS organisations need a clear digital vision detailing the benefits that digital transformation will bring to the perioperative pathway, including clearly defined objectives, benchmarks to hit and future co-design opportunities. Senior digital leadership and digital champions are also essential alongside a digital vision to encourage clinician buy-in and advocate for new technology across each department and discipline.

Tackling digital inequalities at the source

[In many cases, the move to digital ways of working has been welcomed](#) by patients. However, it was acknowledged at the roundtable event that careful consideration should be given to address the growing rate of digital inequalities affecting disadvantaged groups who do not have the resources, confidence, skills, knowledge, or appropriate environment to access virtual perioperative care.

For example, patients from low-income households may struggle to partake in preop assessments and online consent tools if they lack essential infrastructure, such as a smartphone, laptop or strong broadband connection. People with limited English proficiency, especially the elderly, struggle to express their needs over the phone, as they tend to rely on body language and facial expressions to communicate with their clinician. [Longstanding research has demonstrated that effective innovation for inclusion works when healthcare services and patients work together to find and develop suitable solutions](#); in other words, co-designing perioperative technology alongside patients and vulnerable groups is key to tackling digital inequalities. In order to ensure perioperative services are equitable, as well as equal, additional measures to support at-risk groups will need to be considered throughout the clinical pathway.

Opportunity – Proactive communication and action

Patients want more proactive communication from their clinicians and hospitals to keep updated and reminded on their upcoming procedure. Seek opportunities for partnership with the voluntary and community sector to offer support to vulnerable patients in accessing care. A report from [National Voices](#) contains a wide variety of case studies on community support initiatives for remote care.

Conclusion

The Covid-19 pandemic is the biggest challenge faced by the NHS in its 70-year history, and perioperative care has been one of the clinical specialties hit hardest over 2020/21. In the context of enormous pressure on the system, a rapidly accelerating health tech market presents a myriad of opportunities to cut the Covid-19 surgical backlog through new digital solutions.

Innovations such as an interactive online consent platform to promote shared decision-making, and digitised preop assessment tools to increase the use of asynchronous care, are just a few examples of digital solutions already helping to improve operational efficiencies and patient outcomes along the perioperative pathway. Digital innovations such as these can be piloted locally to demonstrate efficacy, and subsequently scaled up if the benefits to the perioperative pathway are clear and evidenced. It is also important to remember that this rapid adoption of

technology will slow down, and perhaps even reverse, if we do not harness the momentum gathered in the previous year by working closely with innovators and sharing intelligence across the NHS. Although NHS staff hold the key to driving digital transformation across the country, this must go hand-in-hand with the courage of conviction that the overall benefits of new innovations far outweigh the potential risks for both staff and patients.

While these new digital innovations present a wealth of opportunities, they also present many challenges in implementation and sustainability. Workplace culture has the potential to stand in the way of digital progress, and we risk worsening health inequalities if new solutions are not co-designed alongside the very professionals and patients that use them. Targeting these challenges in the early stages of design and testing, as opposed to them being an afterthought, will aid the implementation and sustainability of new technology that can ultimately assist in cutting the Covid-19 surgical backlog to pre-pandemic levels.

Postscript

This paper was developed following a roundtable event hosted by the Health Innovation Network (HIN) in July 2021. We saw participation from a wide variety of national and regional London stakeholders, including nurses, surgeons, anaesthetists, digital health innovators, and clinical and programme directors, and we are grateful for their contributions. The participants represented the following organisations: NHSx, NHS England & Improvement, Barts Health NHS Trust, Guy's and St Thomas' NHS Foundation Trust, North West London CCG, Homerton University Hospital Foundation Trust, Chelsea and Westminster Hospital NHS Foundation Trust, Kingston Hospital NHS Foundation Trust, St George's Hospitals NHS Foundation Trust, Concentric Health and UltraMed.

This is the start of the debate on best practice for digitising the perioperative pathway and a journey for all those involved in digital health. We are interested in the views of all the stakeholders involved in the development market both in the UK and internationally. If you feel there are other digital solutions we should consider or learning from other countries or markets, please get in touch.

About the Health Innovation Network and DigitalHealth.London

The Health Innovation Network (HIN) is the Academic Health Science Network (AHSN) for south London, one of 15 AHSNs across England. As the only bodies that connect NHS and academic organisations, local authorities, the third sector and industry, we are catalysts that create the right conditions to facilitate change across whole health and social care economies, with a clear focus on improving outcomes for patients. This means we are uniquely placed to identify and spread health innovation at pace and scale; driving the adoption and spread of innovative ideas and technologies across large populations.

We are also a founding partner of [DigitalHealth.London](#): a partnership between London's three Academic Health Science Networks - Imperial College Health Partners, the Health Innovation Network and UCLPartners - and MedCity, focusing on accelerating the adoption of digital innovation by linking health and care organisations with digital health innovators for the benefit of patients and populations. It accelerates the adoption of digital innovations across health and care to improve patient and population outcomes and experience and supports a sustainable future NHS. For more information, please see [digitalhealth.london](#).

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