Medical Consulting Group

Innovation in the Surgical Pathway

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Introduction

The surgical pathway is one of the core organising structures of acute hospital care, influencing how capacity, staffing, and risk are managed across the hospital.

It intersects with:

- Outpatient Services
- Theatre
- Diagnostics
- Critical Care
- Inpatient Flow
- Post-Operative Follow Up

As a result, many digital and operational tools introduced into acute settings ultimately interact with this pathway in practice.

This whitepaper sets out to understand where clinicians working within the surgical pathway see the greatest challenges and the most meaningful opportunities for innovation. Through a series of interviews with NHS clinicians across surgery, anaesthetics, perioperative care, and clinical digital leadership, we explored where bottlenecks occur, the opportunities for innovation, and which constraints most strongly shape adoption and impact. Rather than attempting to map the full landscape of surgical technologies, we focused on capturing lived clinical experience from those delivering care day to day.

Collectively, these findings demonstrate that the most significant challenges in the surgical pathway are rooted in everyday clinical practice, reinforcing the need for innovation that is shaped by direct clinical insight.

Why the Surgical Pathway is Key to Innovators

Surgical pathways have become a central measure of health system performance. In England, 7.4 million referral-to-treatment (RTT) pathways were waiting to start consultant-led treatment as of October 2025, corresponding to approximately 6.24 million unique patients, according to data published by NHS England and analysed by The King's Fund. Despite sustained policy focus through national elective recovery programmes, waiting times for planned surgery remain historically high.

> **These data show that cancellations remain a persistent feature of surgical care delivery**

These pressures are compounded by workforce constraints across surgical, anaesthetic, perioperative, and nursing roles. National workforce analyses, including the Surgical Workforce Census, published by the Royal College of Surgeons of England, have highlighted ongoing shortages and uneven distribution of staff, limiting the system's ability to expand activity at pace.

While elective backlogs are often framed as a problem of insufficient capacity, national data suggest that pathway inefficiencies also play a material role. NHS England publishes quarterly statistics on cancelled elective operations, including procedures cancelled at the last minute for non-clinical reasons. These data show that cancellations remain a persistent feature of surgical care delivery, representing lost capacity that cannot easily be recovered elsewhere in the system.

7.4 MILLION REFERRAL-TO-TREATMENT PATHWAYS

6.24 MILLION UNIQUE PATIENTS

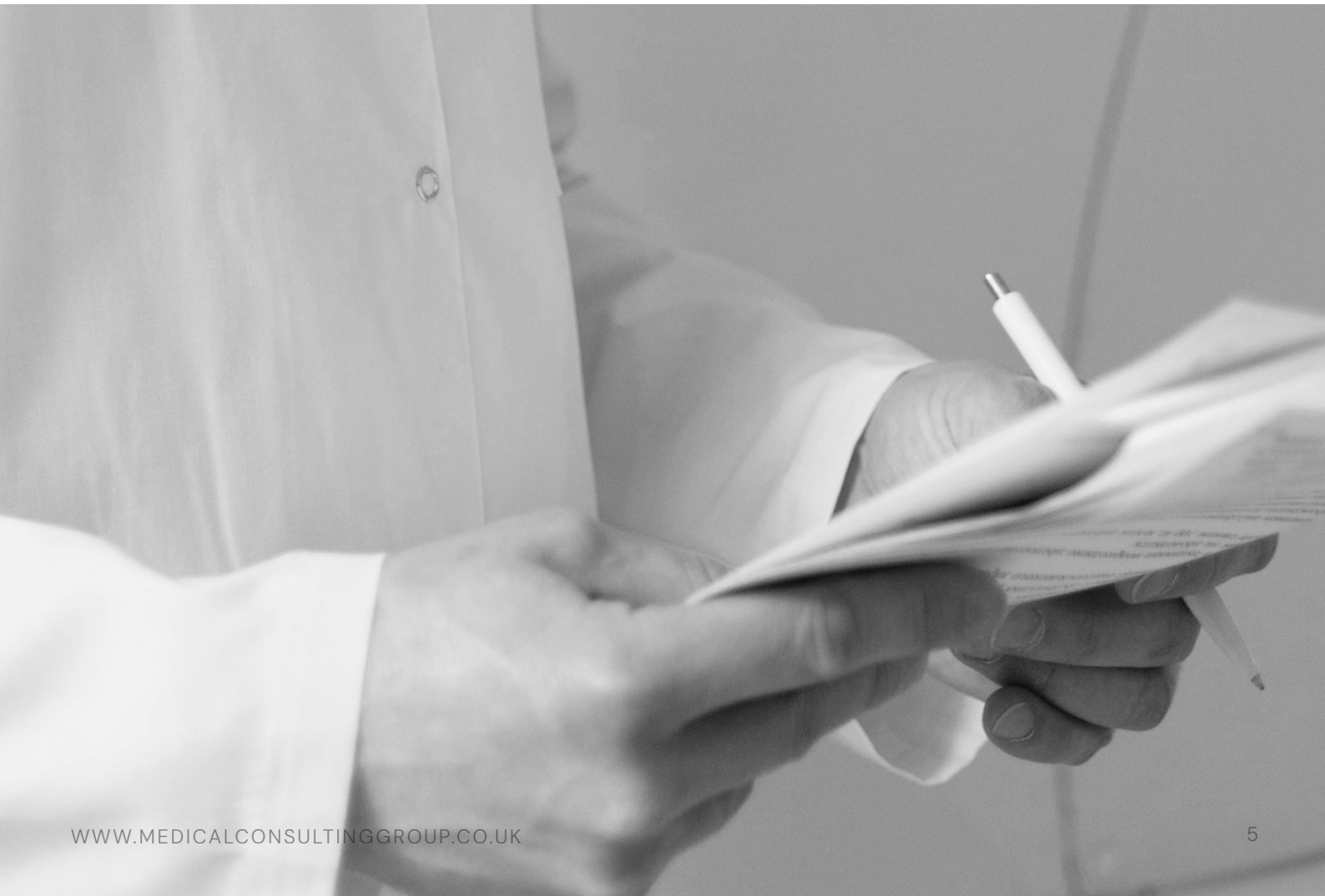
Surgical care is particularly sensitive to such inefficiencies because it concentrates cost, risk, and coordination into tightly coupled sequences of events. The pathway spans referral, outpatient assessment, diagnostics, pre-operative assessment and optimisation, theatre scheduling, post-operative care, and follow-up - frequently across multiple teams, organisations, and digital systems. The National Audit Office has repeatedly highlighted how fragmentation across each of these stages contributes to delays, variation in productivity, and challenges in delivering elective recovery at scale.

Improving surgical performance therefore depends not only on increasing activity, but on how reliably patients progress through the pathway. This is reflected in national improvement initiatives such as Getting It Right First Time (GIRFT), whose theatre productivity work focuses on booking processes, scheduling, theatre flow, and staffing - areas where small upstream failures can have disproportionate downstream effects.

Methodology: Capturing Clinical Insight

This whitepaper draws on a series of semi-structured interviews conducted with NHS clinicians working across the surgical pathway, including consultant surgeons, consultant anaesthetists and clinical digital leaders. Interviews focused on day-to-day workflow, operational constraints, and points where care delivery is delayed, disrupted, or fails to scale.

The insights were analysed thematically to identify recurring challenges across roles and specialties. This approach was chosen to surface on-the-ground clinical experience, which may be missed by desk research alone. Findings reflect the perspectives of the clinicians interviewed and are not intended as a comprehensive review of all surgical pathways or technologies.



What Clinicians Told Us: Key Insight Themes

Pre-Operative Assessment

Too often completed too late, this stage drives cancellations - yet earlier risk stratification could turn delay into deliberate preparation.

Theatre Scheduling

Still reliant on fragmented manual systems, scheduling limits visibility and prioritisation, even though shared real-time oversight could unlock smarter list management.

Bed Management

Post-operative capacity remains unpredictable and manually coordinated, but with clear opportunities to forecast demand and stabilise surgical flow.

Data Utilisation

Critical clinical data is routinely captured but rarely activated in context, leaving significant scope to surface insight where decisions are made.

Pre-operative assessment

Pre-operative assessment checks a patient's fitness for surgery by reviewing their health, medications and test results to identify risks, and plan safe anaesthesia and peri-operative care. This often needs to be completed within a certain timeframe of surgery to ensure the information remains clinically valid and reflects the patient's most up-to-date health status.

This crucial stage was consistently called out as a significant bottleneck for surgery by clinicians interviewed. According to one clinician, problems with pre-assessment currently caused "90% of same-day cancellations".

Capacity and timing constraints at this stage were frequently mentioned across specialities, with one clinician describing instances where patients were only seen three days before a major operation. This leaves insufficient time to investigate findings or escalate concerns before the planned surgery date, resulting in cancellation despite existing theatre capacity. This is particularly acute for higher-risk patients with known complex comorbidities who are not identified early enough and often booked into standard pre-assessment shortly before surgery.

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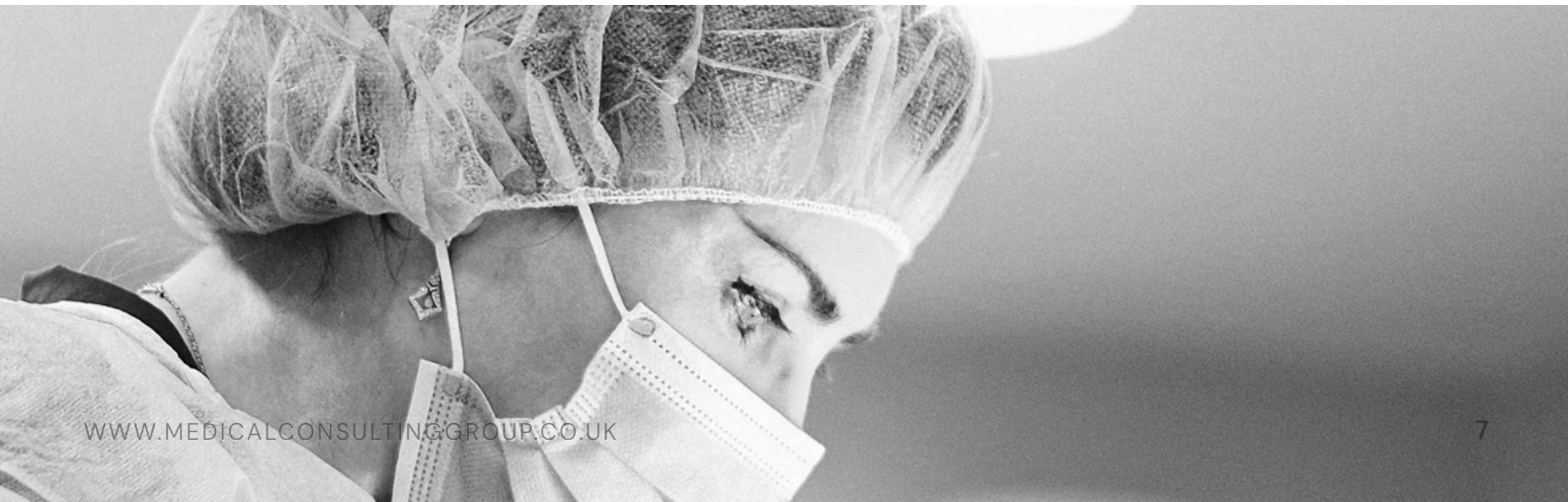
Beyond timing and triage, clinicians described structural inefficiencies in how pre-operative assessment is operationalised. In one Trust, pre-assessment relies on nurse-led telephone reviews triggered by digital questionnaires, meaning patients unable to complete forms – particularly older groups – experience delayed or missed assessment and late risk identification. Furthermore, one clinician described the absence of a streamlined pathway for higher-risk patients, meaning those requiring anaesthetist review and additional investigations often face multiple, uncoordinated hospital visits that further delay pre-assessment.



One fundamental challenge that emerged was a lack of longitudinal visibility into a patient's pre-operative journey, with no clear record of what optimisation has already been completed, what remains outstanding, or why a patient is still waiting. As a result, investigations and correspondence must be manually reassembled across systems.

Amongst the challenges mentioned, clinicians pointed to opportunities such as summarising patient history for pre-assessment, enabling voice-based questionnaires for patients who struggle with digital forms, and supporting earlier risk stratification to route higher-risk patients to appropriate review. Existing tools were highlighted that are working to implement change in this space - for example, ProMap in orthopaedics, which supports earlier risk stratification at the point of listing. Others stressed the need for better visibility into optimisation over time, including what has been addressed, why patients are still waiting, and when information becomes outdated. Together, these insights reflect an aim to turn waiting time into preparation time, so surgical capacity is usable in practice.

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Opportunities

- Summarising patient history for pre-assessment.
- Supporting earlier risk stratification to route higher-risk patients to appropriate review.
- Enabling voice-based questionnaires for patients who struggle with digital forms.
- Providing better visibility into optimisation over time.

Theatre Scheduling

Theatre scheduling is a key process through which surgical plans are translated into theatre lists, staffing decisions, and patient flow across the pathway. Across interviews, it was frequently referenced as an outdated element of how surgical care is organised.

The scheduling approach across several Trusts spoken to remained surprisingly manual, with Excel spreadsheets being a frequent method used creating significant vulnerabilities where patients get "lost…waiting for medical checks with no joined-up link" and no indication of who had waited the longest. The current system also lacked any sophisticated prioritisation or optimisation capabilities, with the process being described as "purely someone ordering an Excel spreadsheet based on length of time and whether they're fit and then populating an operating list." In one Trust, emergency theatre booking remains "on a single A5 yellow sheet".

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Another clinician described a scheduling landscape spread across multiple parallel systems, with outpatient booking, theatre scheduling, theatre productivity tools, and performance dashboards all optimising for different metrics creating operational silos that prevent holistic resource management.

Another challenge highlighted was the way scheduling decisions are operationalised across teams. This process involves handoffs between clinical decision-making and non-clinical execution – with procedure details, timing assumptions, and equipment requirements vulnerable to information loss, increasing the risk of errors as lists are built, revised, and finalised.

Alongside these challenges, clinicians highlighted opportunities to improve scheduling by extending approaches already used in emergency care, such as digital boards that provide a shared, visual view of patients awaiting surgery, including wait time, procedure, and readiness. Applying similar traffic-light style visual management to elective pathways could support clearer prioritisation at scale and improve operational oversight.

Clinicians also referenced the introduction of tools designed to bring breach and waiting-time information into a single view, but highlighted that their impact is greatest when such systems replace, rather than sit alongside, existing booking and scheduling workflows. Together, these perspectives highlight opportunities centred on shared visibility, simple visual management, and clearer signals of patient readiness to support safer and more effective scheduling.

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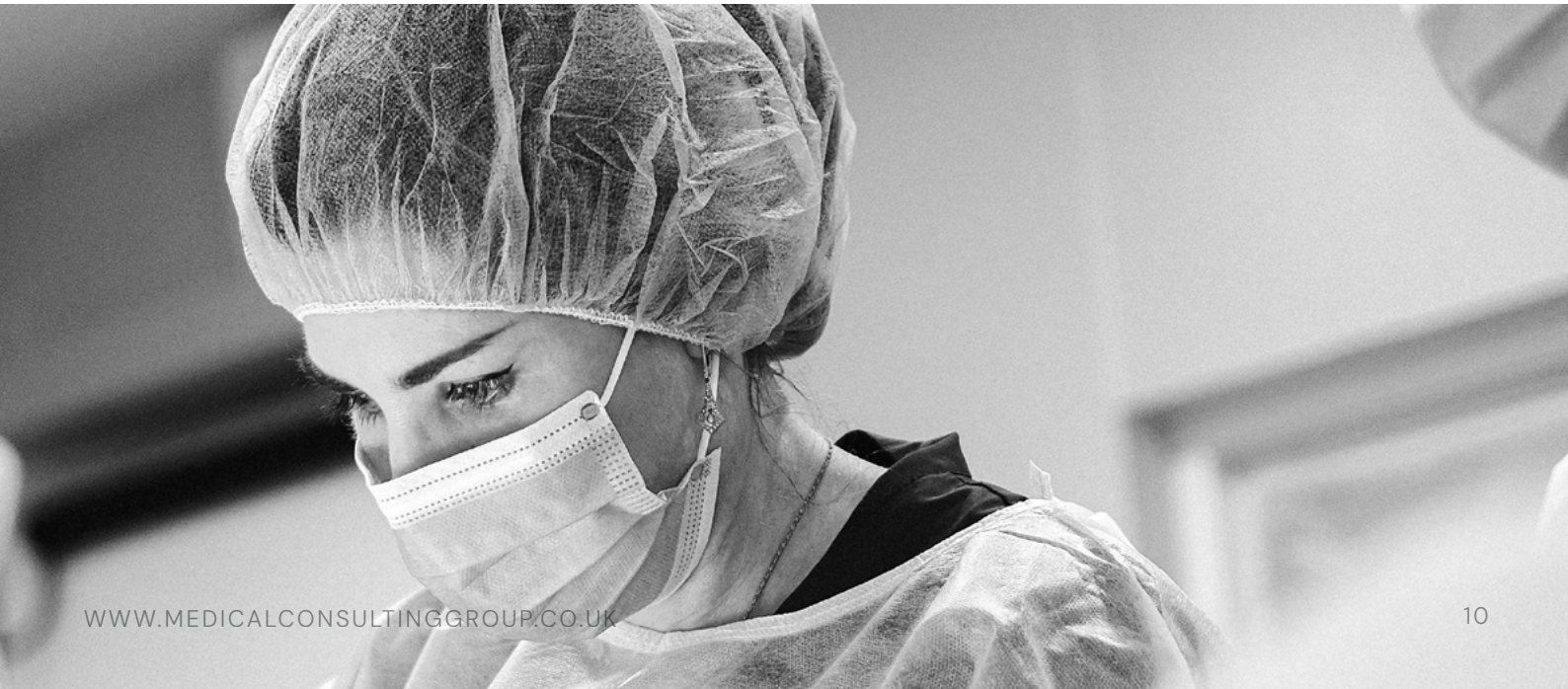

Bed Management

Bed management, especially the allocation of High-Dependency Unit (HDU) and Intensive Care Unit (ICU) beds, is a key operational factor influencing surgical planning, post-operative care, and patient flow across the surgical pathway. The complexity of bed management is compounded by the intersection of clinical readiness, social factors, and resource availability.

Amongst clinicians interviewed, post-operative bed availability constituted a significant bottleneck in the surgical pathway. Despite the complexity, current processes often remained manual, with one clinician describing daily bed planning meetings conducted with printed lists, and bed numbers counted by hand.

> **For innovators, bed management represents a well-defined problem space with clinician-identified needs and metrics for success.**

The financial stakes of bed management decisions are substantial. Hospital length of stay varies dramatically from case to case, ranging from a couple of days to 6+ months, creating enormous variability in resource planning requirements. Resource-intensive post-operative care (e.g. ventilator bed provision at <£1,000/day), further shows how bed allocation decisions directly translate to significant financial impact.

The persistence of manual bed management processes in high-stakes, resource-constrained environments presents both a significant operational challenge and a substantial opportunity for health tech innovation. For innovators, bed management represents a well-defined problem space with clinician-identified needs and metrics for success. Opportunities identified by clinicians here included predicting length of stay to support forward bed planning using patient data and clinical indicators, forecasting critical care bed requirements to optimise capacity allocation, and aligning nurse staffing with anticipated bed occupancy and patient acuity.

Data Utilisation

Vast amounts of clinical data is collected throughout the surgical pathway, yet a consistent theme across surgical specialties was a disconnect between data collection and actionable utilisation.

> **Insight is often retrospective, identified through case review rather than during care, limiting its ability to influence outcomes in real time.**

An orthopaedic surgeon interviewed highlighted that well-established risk factors for post-operative complications – such as body mass index, smoking status, inflammatory markers, and comorbidities – are routinely documented but rarely brought together in a way that informs surgical planning or pre-operative optimisation. Building on this, a urologist raised a similar issue in relation to outcomes that matter most to patients. Baseline measures such as continence were described as clinically important for procedures like prostatectomy, yet rarely collected in a structured or systematic way. Where data is missing or inconsistently recorded, clinicians noted that it becomes difficult to set expectations with patients, evaluate outcomes, or learn from variation in practice.

One transplant anaesthetist described an even greater volume of available data, particularly in intensive care and intra-operative settings. They referred to pages of physiological measurements, donor variables, and peri-operative parameters being recorded, but noted the absence of triggers or summaries that would highlight emerging patterns of risk. As a result, insight is often retrospective, identified through case review rather than during care, limiting its ability to influence outcomes in real time.

The opportunity here lies in surfacing relevant information in context – making risk, readiness, and patient experience visible within clinical workflows, rather than buried across records and systems. In their accounts, actionable insight is defined not by volume or sophistication, but by whether information appears at the right time, in the right place, to support real clinical decisions.

Deploying Tools into Current Clinical Practice – the Challenge of Adoption

Interoperability

Across interviews, clinicians consistently described working within highly fragmented digital environments, where delivering even routine care requires navigating multiple disconnected systems. Rather than a single, coherent record, clinicians reported relying on six or more separate platforms to assemble a usable picture of a patient's pathway, including EPRs, imaging systems, booking tools, specialist databases, emails, and locally maintained records.

This fragmentation was described as a practical constraint on care delivery rather than a technical inconvenience. Clinicians highlighted examples where systems failed to communicate critical information, such as blood group checks requiring access to a separate system, drug charts not syncing reliably between anaesthetic and ward records, and scheduling or breach information sitting outside core patient records.

Several clinicians reflected on the burden created by legacy system migration. In trusts transitioning to newer EPRs, older platforms often remain in use for specific functions such as imaging, pathology, or specialty-specific data, resulting in hybrid environments that are difficult to navigate.

These accounts highlight why interoperability and migration directly shape adoption and use, with solutions favoured that recognise the reality of fragmented digital estates, minimise additional handoffs, and reduce - rather than add to - the effort required to assemble clinical insight at the point of care.

What Metrics do Clinicians Care About in the Surgical Pathway?

Across specialties, clinicians consistently prioritised outcomes that reflect whether the surgical pathway functions reliably: waiting times and breach rates, same-day cancellations, patient safety, and effective use of scarce resources such as theatres, beds, and staff. There were, however, clear differences in emphasis by stakeholder:

Surgeons focused on waiting lists, cancellation rates, and downstream clinical consequences, such as infection risk in orthopaedics or delayed cancer treatment in urology and breast surgery. They also highlighted functional recovery outcomes, such as continence and erectile function, noting that these are central to patient experience but poorly captured in routine data.

Anaesthetists emphasised risk stratification, pathway compliance (e.g. 62-day and 28-day targets), and readiness for surgery, particularly where late identification of risk leads to cancellation or escalation of care.

Critical care and transplant clinicians prioritised length of stay, use of ventilated and ICU beds, and survival-related outcomes, reflecting the high cost and risk concentration in these settings.

As demonstrated, surgical pathway efficiency is assessed through a set of core operational and clinical metrics, many of which can differ by stakeholder group. Because accountability is distributed across these groups, innovations that improve one part of the pathway without influencing the metrics that decision-makers are measured against may struggle to gain traction, even if they offer clear clinical or technical benefits. Designing solutions that directly address the specific performance indicators each stakeholder is responsible for is therefore a critical factor in both adoption and reimbursement, as it aligns product value with organisational priorities, funding mechanisms, and regulatory expectations.

Adoption Case Study – Digital Consent

Clinicians described digital consent, particularly the adoption and use of *Concentric*, as one of the few examples where adoption in practice has worked well – largely because it aligns closely with both patient behaviour and clinical workflow. Rather than compressing consent into a single interaction shortly before surgery, digital consent allows patients to engage with information at their own pace. Clinicians highlighted the ability to assign digital information leaflets, allowing patients to revisit information as needed.

Accessibility through familiar devices also played a central role. Clinicians noted that patients could review consent materials on their own phones, with QR-code-based signing working in practice. In theatre environments, the use of iPads provided per theatre was described as well received, supported by compatibility with clinicians' own devices. These design choices reduced friction at the point of use and avoided reliance on fixed workstations or complex logins.

By fitting into existing patient behaviours, working across common devices, and giving patients time rather than urgency, digital consent became easier to use than the paper processes it replaced. For innovators, this case illustrates that adoption is most likely when tools deliver immediate, visible value, integrate smoothly into everyday practice, and reduce effort for both patients and clinicians from the first interaction.

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Conclusion

Throughout interviews clinicians described a pathway shaped less by isolated technical gaps than by issues of timing, visibility, and implementation. Several themes recur.

- **Pre-operative assessment determines whether surgical capacity can be used at all, yet risk is often identified too late to act.**
- **Scheduling and theatre flow are governed by fragmented systems that obscure readiness and constrain the ability to flex lists safely.**
- **Bed availability, particularly at HDU and ICU level, limits surgery not only through scarcity but through lack of forward visibility.**
- **Digital systems hold large volumes of relevant data, yet clinicians must assemble a usable picture of risk and readiness across multiple tools.**

Taken together, these insights help explain why innovation in the surgical pathway can struggle to deliver sustained impact, even when individual technologies are well designed. Clinicians' experiences suggest that value is created when innovation moves critical decisions earlier, makes hidden constraints visible, and reduces the effort required to understand readiness and risk within existing workflows.

These realities emerge through close engagement with clinicians who navigate the pathway daily and who understand both its formal structure and its informal workarounds. By foregrounding these perspectives, this paper aims to demonstrate the role of clinical insight as a prerequisite for aligning innovation with the realities of surgical care delivery.

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