

Appendix A: Operational opportunities

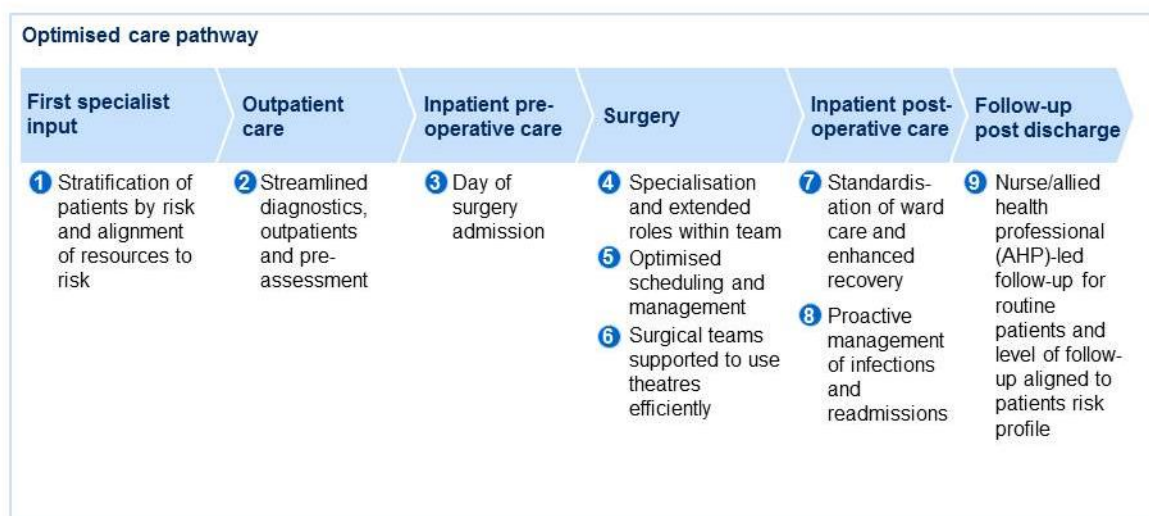
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Our work has focused on improving productivity in elective care and specifically the secondary care providers' role in improving productivity. Both UK and international hospitals described nine operational levers that enabled them to improve efficiency at each step of the patient pathway, from first specialist input to postoperative care (Figure 1). These levers or good practices are well known and provide a useful framework for comparing providers' performance and ways of working. But despite their familiarity, we found the NHS varies greatly in the extent to which it adopts these improvements in the two focus specialties, orthopaedics and ophthalmology. The nature of these operational levers means they can be applied well beyond these focus specialties.¹

Figure 1: Nine areas of operational improvement



This appendix examines each of these nine operational levers that make up an optimised patient care pathway, setting out the key areas of good practice, how the co-development sites varied in implementing them and the expected benefit from implementing them to patient experience and efficient use of resources.

The optimised care pathway is summarised in Figure 1. Patients with complex medical problems will need a more tailored approach.

1. Stratification of patients by risk

1.1. What do we mean?

Stratifying patients by risk means defining a procedure's medical and surgical risk for each patient so they can be directed to the most appropriate provider and the most appropriate pathway within that provider.

¹ We acknowledge the implementation of these levers will involve challenges and risks. Change must be implemented through specialty-led quality assurance/improvement at trust level with assistance from supportive management.

Patients can be stratified into three broad categories:

- patients with few medical problems needing **simple** elective surgical procedures
- patients with multiple medical problems needing **simple** elective surgical procedures
- patients with or without multiple medical problems needing **complex** elective surgical procedures.

Each local health economy needs clear guidance on which providers are responsible for the care of these three types of patient. For example, patients needing complex elective surgery may be referred to a regional specialist centre whereas patients needing a simple elective surgical procedure may be referred to a local hospital.

The hospital itself should also perform risk stratification, with different pathways for high- and low-risk patients. Most clinical teams assess the medical and surgical risks of each elective surgical patient attending hospital outpatients. But the most efficient services create less complex, less resource-intensive pathways for low-risk patients – in particular, modifying the type of preassessment, anaesthesia and postoperative care these patients receive. For example, at the Royal Orthopaedic Hospital, a band 5 nurse preassesses low-risk patients before surgery; previously, an anaesthetist undertook the preassessment for all patients. This change has reduced the number of anaesthetic physician assistants required for preassessment.

1.2. What happens at our co-development sites?

Our co-development sites vary greatly in the extent to which they have developed lower-intensity pathways for low-risk patients, for example:

- a 20-fold variation in the percentage of patients preassessed by anaesthetists rather than nurses before undergoing primary knee or hip replacement
- in only one of six ophthalmology units is topical anaesthesia administered by nurses for low-risk patients undergoing cataract surgery; the rest provide only local blocks, and occasionally a general anaesthetic is administered by an anaesthetist.

1.3. What is needed to support implementation?

Adequate risk assessment is crucial to the pathway, as incorrectly performed it could lead to numerous intraoperative and postoperative complications. Teams that have successfully developed risk stratification coupled with a low-complexity pathway for low-risk patients describe the key requirements as:

- a rigorous protocol to guide risk assessment, co-developed by anaesthetists, surgeons and nurses

- training nurses to undertake extended roles and regularly audit decisions and complications
- speedy access to specialist support when required – for example, preassessment nurses can call anaesthetic colleagues for advice or nurses administering local anaesthetic drops have access to an anaesthetist in an adjacent theatre should complications arise
- for patients on an enhanced recovery pathway (level 7) this would also be the point at which to begin patient education and manage expectations.

1.4. What are the benefits?

Risk stratification coupled with low-complexity pathways:

- benefits patients by minimising unnecessary interventions and reducing time in hospital
- enables effective use of resources by:
 - reducing the cost of preassessment
 - reducing the cost of anaesthesia
 - identifying cohorts of patients who can have substantially shorter postoperative length of stays (eg through managing patients' expectations or mobilising them early after surgery).

2. Streamlined outpatients and diagnostics

2.1. What do we mean?

Streamlining outpatients and diagnostics makes possible one-stop assessment and preparation for surgery.

In many elective surgical pathways, patients must attend hospital on three or more occasions before a 'decision to treat': once for their initial assessment, once for further diagnostics and once for a follow-up discussion and the decision to treat. In the UK and internationally, the most efficient hospitals provide a one-stop assessment **during a single outpatient visit** that includes:

- initial surgical assessment
- further diagnostics if required
- decision on type of anaesthesia and type of prosthesis, if required
- assessment of anaesthetic risk and referral to risk-stratified preassessment

- booking of procedure within the next two to 18 weeks
- brief education on preparing for surgery and what to expect postoperatively, including signposting to group or online preoperative education.

For example, the Alfred Centre (see [Appendix B](#)), a multispecialty elective centre in Australia, uses a one-stop shop approach for all preadmission activities. Patients referred for elective surgery are scheduled for a single outpatient attendance where all consultations, diagnostic tests, consents and assessments are carried out. This includes scheduling postoperative appointments and tasks (for example, ordering equipment that will be needed post surgery). It is supported by standardised care protocols/pathways for all standard procedures (168 currently). These detail exactly what tests, tasks and processes need to be performed at each patient encounter and the staff role responsible for performing and recording each task. In addition, the centre has appointed perioperative co-ordinators to oversee the full pathway and act as the patient's main point of contact, or navigator, ensuring all processes are completed and any issues followed up.

The Coxa Hospital for Joint Replacement in Finland (see [Appendix B](#)) also uses a one-stop shop approach for routine joint replacement patients from its main catchment area. It works closely with local community-based providers of diagnostics to ensure patients are referred with a complete set of diagnostic X-rays that meet its own specification. Coxa ensures the quality of this process by training and auditing the diagnostics providers, as well as specifying the images required. In addition, patients complete a standard form recording their personal information and medical history before their first outpatient appointment. The patient has a consultation with the surgeon and a specialist nurse, and a full preassessment, during a single attendance at the hospital. A network of community-based physiotherapists, trained (twice yearly) and supported by Coxa, provides further patient education and preparation in group classes.

This process can be streamlined further for outpatient procedures, with initial consultation and treatment on the same day. For example, The Newcastle Upon Tyne Hospitals NHS Foundation Trust operates a one-stop clinic for wet age-related macular degeneration (AMD). It undertakes initial assessment and treatment in a single day, performing 25 injections during a single four-hour outpatient clinic on patients assessed that morning.

2.2. What happens at our co-development sites?

In orthopaedics our co-development sites vary greatly in the extent to which they have developed one-stop clinics, and only one in four UK sites with orthopaedic outpatients has a one-stop assessment and decision-to-treat process.

In ophthalmology, this lever is far more advanced at our co-development sites:

- all UK sites operate a one-stop assessment and decision-to-treat clinic for cataracts, with many incorporating preassessment in this single clinic visit
- half of UK sites provide initial assessment and same-day treatment for AMD.

2.3. What is needed to support implementation?

Teams that have implemented one-stop assessment describe as key requirements:

- access to same-day simple diagnostics (eg plain X-rays) for patients attending new outpatient appointments
- building strong links between outpatients, preoperative and theatre by, for example, placing schedulers for specialty-level theatre lists in outpatient clinics to book procedures at a time that suits the patient. This booking information is shared with the theatre supplies team, which can then make sure the appropriate surgical kit is available when needed
- ensuring a consultant is available for advice during a nurse-led clinic.

2.4. What are the benefits?

One-stop assessment:

- benefits patients by minimising visits to hospital and reducing waiting times
- enables effective use of resources by:
 - reducing the number of appointments per procedure
 - reducing the overhead cost per patient for each appointment.

3. Day-of-surgery admission

3.1. What do we mean?

‘Day-of-surgery admission’ refers to admitting patients on the day of their surgery to a preoperative lounge near the theatres rather than to a ward bed. The preoperative lounge minimises use of trolleys and wheelchairs, with patients encouraged to walk from the lounge to theatres if they can.

Some of the international sites we studied (see [Appendix B](#)) use staggered arrival times with patients arriving 40 to 90 minutes before surgery, rather than all patients on a list being asked to arrive at 7am on the day of surgery. This may not be possible or desirable in the NHS given existing surgical safety processes and standards.

Navigators, who can be volunteers, administrative staff, nurses or extended-role practitioners, can be used to support patients through their preoperative journey.

Their role is to make sure their cohort of patients is where it needs to be in the preoperative, surgery or postoperative process and alert the theatre manager, surgeon or anaesthetist if issues emerge. Some navigators accompany patients throughout their entire surgical pathway (eg extended practice arthroplasty practitioners); others hand over to the theatre team once the patient is in the anaesthetic room.

3.2. What happens at our co-development sites?

Our co-development sites have implemented day-of-surgery admission to a preoperative lounge or ward relatively widely in day case and standard elective surgery (eg arthroplasties):

- mean preoperative length of stay was zero days in all units undertaking cataract surgery and in three of five orthopaedic units
- five of six UK ophthalmology units and all orthopaedic units admitted patients undergoing cataract surgery or arthroplasty to a preoperative lounge near the theatres on the day of surgery.

However, in complex surgery (eg revision of knee or hip replacement) we observed variable practice. Three of five orthopaedic units admitted less than 80% of patients on the day of surgery, while the other two sites managed day-of-surgery admission for more than 95% of patients. Experts suggested the main reason for admission before the day of surgery should be clinical: for example, a patient with a mechanical heart valve requiring management of anti-coagulation.

3.3. What is needed to support implementation?

Hospitals that successfully implement day-of-surgery admission for all types of surgery report key factors are the hospital's physical layout, ring-fenced elective surgical beds and mechanisms that help patients arrive on time.

In terms of physical layout, a preoperative lounge needs to be provided that is close to the theatres and contains only chairs or trolleys so that it does not become an 'overflow ward'. Ring-fenced elective surgical beds ensure that patients do not need to be admitted the day before surgery to 'block' their bed.

3.4. What are the benefits?

Day-of-surgery admission to a preoperative lounge:

- benefits patients by minimising time in hospital and preoperative waiting times
- enables effective use of resources by reducing preoperative length of stay.

4. Specialisation and extended roles in theatre or outpatient procedure teams

4.1. What do we mean?

Specialisation and extended roles incorporate:

- dedicated specialty-specific theatre teams
- extended-role practitioners undertaking routine tasks.

Dedicated specialty-specific theatre teams are an important element of high-throughput theatres delivering high quality care with minimal intraoperative and postoperative complications. Within the specialty, theatre teams cover a variety of procedures, or in ophthalmology can cover both outpatients and theatre as this enables cross-cover if theatre lists overrun or staff are absent.

Physician assistants, anaesthetic nurses and extended-role nurses are able to undertake routine tasks that a consultant usually performs, both theatre and outpatient procedures. Many international centres have developed registered nurse anaesthetist roles, with a nurse practitioner level of training and experience. In ophthalmology, the specialist nurse anaesthetist may be the sole anaesthesia provider for some surgical lists. In orthopaedics, at the Coxa Hospital for Joint Replacement in Finland (see [Appendix B](#)) an anaesthesia team consisting of a consultant anaesthetist and two specialist nurse anaesthetists provides anaesthetic services for two theatres and the preoperative induction area on the routine joint replacement surgery pathway. In the NHS, at Moorfields Eye Hospital (see [Appendix C](#)) and many other ophthalmology units, senior nurses are trained to deliver injectable treatments for wet AMD.

4.2. What happens at our co-development sites?

Most of our co-development sites have dedicated specialty-specific theatre teams in place in both ophthalmology and orthopaedics.

In terms of physician assistants, extended-role nurses and registered nurse anaesthetists:

- use of extended-role nurses is well-developed in ophthalmology units, with nurses in all our co-development sites administering injections for wet AMD; however, extent of use varies, with nurses performing 50% of all injections in some units and 95% in others
- our co-development sites' ophthalmology and orthopaedic units do not use physician assistants and registered nurse anaesthetists.

4.3. What is needed to support implementation?

Dedicated, specialty-specific theatre teams must have adequate numbers of theatre staff, which can be an issue in many parts of the country where recruiting theatre nurses is difficult.

Extended-role practitioners are typically trained in individual trusts, which must develop a training programme and assessment framework. Many of the trusts we spoke to borrowed a training programme and assessment framework for the same role from another trust, so it needed only minimal tailoring before implementation.

4.4. What are the benefits?

Specialisation and extended roles:

- benefit patients by minimising intraoperative and postoperative complications
- enable effective use of resources by reducing staff costs and the cost of complications.

5. Optimised theatre scheduling and management

5.1. What do we mean?

Optimising theatre scheduling and management relies on comprehensive annual planning, effective booking of lists two to 12 weeks before surgery and tight management of efficiency on the day of surgery:

- **Annually – lists structured to allow booking of the optimal number of procedures.** This allows for the separation of teaching lists (low volume of cases) from service lists (high volume of cases); for parallel lists (single surgeon between two theatres) or ‘super-lists’ (single surgeon with two theatre teams). Policies on pooled lists may be reviewed at this time, and bottlenecks (recovery, intensive care unit, beds) can be addressed to alleviate imbalances in capacity.
- **Two to 12 weeks before surgery – procedures booked to ensure full lists.** Many sites offer pooled lists for at least some patients, with surgeons able to indicate on a pro forma in outpatients which type of surgeon (eg fellow, another consultant) could perform the surgery. This means some patients are booked into the next available appointment rather than waiting for a specific surgeon. The time slots for operations are adjusted for individual surgeons based on their average time for specific procedures in the preceding year. Patients capable of arriving early in the morning are identified at the time of booking. Six weeks before a list, if no surgeon is confirmed for the list or no procedures are booked, the list is offered to other specialties and/or not

staffed with a theatre team. Theatre scheduling should not occur so far ahead that preassessment tests need repeating.

- **Day of surgery – minimise late starts and turnaround time.** Patient navigators or surgical co-ordinators in the preoperative lounge alert surgeons to delays and help to address issues. A single staff member (eg a primary nurse) may be responsible for a patient from preoperative through surgery to postoperative, minimising handovers and reducing turnaround time. A list of patients for short-notice admissions ready for surgery is available to fill slots at short notice.

Emory University Orthopaedics and Spine Hospital in Atlanta in the United States (see [Appendix B](#)) provides an example of optimised scheduling and management. The surgical list is finalised at midday on the previous day. Patients are confirmed to go ahead only if all relevant information is present and verified, and relevant supplies/equipment (eg prostheses) are available. No preadmission testing is conducted on the day of surgery, which had previously caused 15% of start-time delays. In the last 12 months, Emory has been able to increase on-time starts from 88% to 96%. In addition, the surgical team meets twice daily to review performance and discuss issues (eg late starts, overruns and any unexpected problems during surgery) to decide how it can improve its practice the following day. This is supported by a weekly leadership meeting, which reviews and discusses a full range of efficiency and quality-related metrics (including benchmarks to other organisations), and takes decisions to address underperformance.

In the UK, Sunderland Eye Infirmary (see [Appendix C](#)) uses an annual plan aimed at delivering eight cataract surgeries per four-hour list. Lists are tailored according to individual surgeons' speeds, and service and training lists are scheduled to achieve the required throughput. Primary nurses accompany patients from admission through surgery to discharge, reducing turnaround times to five minutes. Sunderland manages up to 12 cataracts per four-hour list, with an average of eight per list once teaching lists and complex lists are taken into account.

5.2. What happens at our co-development sites?

Theatre use at our co-development sites varies from 86% to 99%. Theatre use at the UK sites is higher than at the international case study sites. However, it can be measured in different ways and is therefore difficult to compare directly. In our workshops, ophthalmologists and orthopaedic surgeons described theatre use as an easy measure to manipulate or 'game'. They suggested that number of procedures per four- or eight-hour theatre list was a more insightful measure of a productive list for high-volume and routine procedures.

In terms of numbers of procedures per theatre list, short procedures vary greatly (eg from 4.5 to 8 cataract surgeries per four-hour list in the UK) but longer procedures do

not (eg all UK and international sites perform between 1.9 and 2.2 knee or hip replacements per four-hour list).

5.3. What is needed to support implementation?

The most efficient units describe four elements that help achieve an optimally scheduled list:

- a clear understanding of the number of procedures per list needed to break even or make a surplus
- a process for working with surgical teams to understand the maximum number of cases possible within a time period; in some units, these surgical teams are allocated to teaching lists and in others they are invited to discuss with the medical director and senior managers how they could be helped to increase throughput
- a senior scheduler, who is a respected member of theatre management **and** surgical specialty teams, and takes responsibility for ensuring full lists
- willingness to trial new staff configurations in theatre to increase throughput, such as Sunderland's primary nurses or Newcastle's dedicated anaesthetic team (see [Appendix C](#)).

5.4. What are the benefits?

Optimised scheduling and theatre management:

- benefit patients by minimising cancellations and reducing waiting lists
- enable effective use of resources by increasing cases per theatre list and reducing the number of unused staffed theatre lists.

6. Surgical teams are informed and supported to use theatres effectively

6.1. What do we mean?

Helping teams to use theatres efficiently includes setting clear goals and expectations, measuring and sharing information about performance, and developing incentives to encourage productivity.

To set clear goals, the most productive units understand clearly the number of procedures per list they need to achieve at departmental level to break even or make a surplus. Each surgeon and surgical team's role in delivering this average number of procedures per list is clearly communicated and tailored to the speed of the surgeon and surgical team. Surgical teams themselves are involved in setting expectations and standards.

To measure and share productivity information, daily measures of theatre use, number of cases per list, cancellations, late starts and early finishes at individual theatre, team and surgeon level are published in real time and not anonymised. Teams can compare the productivity of different theatres/teams and surgeons day by day.

Incentives for individual surgeons and surgical teams also have a role. Internationally, financial and contractual incentives are more widely used, with surgeons paid per procedure or employed on annual contracts where renewal depends on care quality and/or productivity meeting expectations. Discussions with NHS clinicians and managers at workshops suggest trusts could use their powers to motivate surgical teams. Individual organisations and clinical teams should decide the types of approach that work for them, but examples may include:

- allowing a surgical team to leave theatre once it has completed its expected target volume and mix of procedures for each list
- employing staff on contracts that account for productive use of time; for example, contracts that specify the expected procedure volume and mix of surgical activity rather than the number of theatre sessions or blocks
- allowing surgeons with the best outcomes and productivity to choose the theatre team they would like to work with, or change the mix of surgery and outpatients in their job plan.

6.2. What happens at our co-development sites?

Our co-development sites use few incentives and seldom collect individual-level productivity information routinely. All teams say they have great scope to improve information and incentives for productivity, for example:

- two of eight sites collect and publish surgeon or surgical team-level productivity data regularly
- one of our six ophthalmology sites provides an incentive (the ability to go home once the list is complete) for surgical teams that have reached the required number of cases per list.

6.3. What is needed to support implementation?

Trusts that have developed clear expectations, that collect and share information and that have incentives or conversations about performance based on these data, describe four stages in the evolution of their approach:

- Senior clinicians and managers define desired productivity levels and outcomes based on a detailed understanding of the department or trust's financial position. Some sites describe challenging conversations between

clinicians, service managers and the finance department to agree satisfactory productivity and outcomes targets.

- The trust buys or develops technology to collect the desired data and publishes initial data, including data on individual clinicians or clinical teams benchmarked against peers. Clinicians typically greet the first few months or year of data with scepticism, and trusts need a process for clinicians to challenge and refine data collection (including making surgeons responsible for entering the data) and reporting.
- Once the clinical team accepts the productivity and outcomes data as valid, most sites say performance improves, perhaps driven by comparison with peers.
- The final stage is to begin conversations about performance or develop incentives for individual clinicians or clinical teams based on their productivity and outcomes data. Some trusts describe the challenge of sustaining incentives in a difficult financial environment, and once incentives have been lost, practice reverting to less productive levels.

6.4. What are the benefits?

Surgical teams informed and supported to use theatres efficiently:

- benefit patients by reducing waiting times and fostering better clinical outcomes
- enable effective use of resources by increased throughput in theatre and reduced cost of complications.

7. Standardisation of ward care and enhanced recovery

7.1. What do we mean?

Standardisation of ward care and enhanced recovery encompass three sets of actions:

- preadmission education for patients on preparing for discharge
- standardised protocols for the most frequent procedures
- action to promote and enhance early recovery.

Preadmission education for patients on preparing for discharge involves online or group education, including information on when patients will be discharged, how they will feel, what they need to do postoperatively and who they can call in an emergency. The evidence shows patients' expectations on discharge timing dramatically influence length of stay. In every consultation and encounter, patients,

their families and carers can be educated in preparing for discharge. They can be told about the benefits of earlier discharge, such as better outcomes, early mobility and reduced risk of hospital-acquired infections.

Standardised protocols for the most frequent procedures improve productivity. These protocols may include postoperative bloods and imaging, discharge medications or rehab protocols. Patients and their families should be aware of protocols where appropriate and know what to expect each day.

As for enhanced recovery programmes, the Capio Movement elective orthopaedics centre in Sweden has a holistic approach to rapid recovery in joint replacement surgery, based on a series of elements to lessen the physiological and psychological shock of surgery (see [Appendix B](#)):

- **Anaesthesia and pain relief:** The aim is to combine earliest return of muscle control with effective pain relief. Capio Movement uses spinal anaesthesia plus local infiltration analgesia with gabapentin to reduce the required dose of morphine and improve pain relief; it uses steroids to reduce the need for pain relief and nausea.
- **No catheterisation in joint replacement surgery:** Patients are encouraged to go to the bathroom immediately before surgery and as soon as anaesthesia has worn off after surgery, usually around one hour postop. Avoiding catheterisation lowers the risk of catheter-related infection and inflammation and is particularly important for patients with prostate-related co-morbidities. In addition to these clinical aspects, it contributes to the patient's experience and sense of being well and healthy rather than sick and needing to stay in bed.
- **No compression stockings used in joint replacement surgery:** Deep vein thrombosis risk is reduced through early mobilisation (usually within one hour of surgery). Patients often find compression stockings cumbersome and difficult, so avoiding their use contributes to a positive patient experience and sense of independence.
- **Early mobilisation post surgery:** All patients are encouraged to move independently as soon as anaesthesia has worn off, visit the bathroom and change into their own clothes. Physiotherapists and nurses guide and support patients, but the aim is to promote independence.
- **Promotion of 'normal activities' in the first 24 hours post-surgery:** Instead of being treated as 'sick people', patients are expected and encouraged to adopt healthy behaviour including, for example, taking meals in a shared dining room. The centre has no bedside televisions, as they encourage immobility. Early discharge – when the patient is ready and meets

all discharge criteria – reinforces this approach, as patients are more likely to undertake normal activities at home than when confined to a hospital.

- **Availability and intensity of physiotherapy:** Patients are taught about the postoperative physical exercise regime before admission. They are helped to complete their exercise plan at least three times in the hospital before discharge.

Since introducing its 'early recovery' model in late 2014, Capio Movement consistently discharges around 75% of hip and knee replacement patients on the day after surgery, with low rates of readmission. This has coincided with increases in patient satisfaction scores.

7.2. What happens at our co-development sites?

Postoperative length of stay in our co-development sites ranges from 4.3 to 6 days for primary knee and hip replacements. This is consistently longer than at our international case study sites, where postoperative length of stay is between 1.7 and 3 days for primary hip replacements and 2.3 to 2.4 days for primary knee replacements.

Only one of the five orthopaedic units has a defined 'fast track' protocol for low-risk patients undergoing primary knee replacement – patients are expected to stay for only three days postoperatively.

7.3. What is needed to support implementation?

The following are needed:

- collaboration between anaesthetic teams, surgical teams and ward staff to agree intra- and post-operative protocols that support mobility and independence. For example, some of our co-development sites describe patients who have undergone arthroplasty as unable to mobilise more than 24 hours after surgery due to numbness following spinal anaesthesia
- anaesthetists to share responsibility with surgical specialties for postoperative length of stay to create a more direct link between the choice of anaesthesia and the subsequent duration of care required
- seven-day working or consistent care on the ward every day that patients are in hospital, such as daily physiotherapy
- nurse-led discharge based on clear protocols
- postoperative follow-up care and support arranged preoperatively; mobility aids and home-based equipment or adaptations if required, postoperative follow-up with physios and the surgical team are all organised preoperatively, so everything is ready for the patient to be safely discharged as soon as

possible after surgery. The NHS co-development sites say it is becoming increasingly difficult to book care packages for patients before admission due to some local authorities' restrictions, despite these packages being a necessary condition for reducing average length of stay.

7.4. What are the benefits?

Standardisation of care and enhanced recovery:

- benefit patients by reducing time in hospital and promoting independence
- enable effective use of resources by reducing postoperative length of stay
- help surgical teams use theatres and wards efficiently.

8. Proactive management of infections and readmissions

8.1. What do we mean?

This aspect of care encompasses all well-known and understood avoidable complications – for example, surgical site infections in orthopaedic surgery, or posterior capsule rupture following cataract surgery – that lead to suboptimal outcomes for patients. In many cases, they also lead to ongoing costs through readmissions and other follow-on care for the patient, the provider and the health system.

Proactively managing avoidable complications requires efforts at every step of the patient pathway. Specific processes will vary by procedure and the patient's risk profile, but in general will include:

- patient education preadmission – during consultations, in group classes, and in information booklets, videos, apps and other resources – to tell patients and their families about the main complications associated with the procedure and how they can help reduce and manage their own risks
- high quality preadmission risk assessment and screening by staff with specialist training in risk assessment
- standard strategies and protocols to manage patients with higher risks identified in assessment, for example:
 - treating modifiable risk factors, such as:
 - medical treatment of existing infections
 - multidisciplinary strategies for patients with weight or substance misuse risks

- specific treatment pathways for patients identified with risks that cannot be adequately reduced presurgery, such as:
 - enhanced infection control procedures
 - assigning patients to a surgeon with appropriate skill, experience and specialisation to manage the risk level
- dedicated theatre teams operating at volumes for which medical evidence demonstrates lower levels of complications/revisions/returns to theatre
- dedicated theatres and ward beds to reduce the possibility of cross-contamination from higher-risk patient cohorts (emergency patients; medical patients)
- specialist infection control nurses/teams within the hospital and regularly updated training and information on infection control for all staff
- a range of follow-up care options to help patients self-manage after discharge, for example:
 - a 24/7 phone hotline direct to a specialist clinician for patients concerned about their recovery (eg wound care, pain management, prescriptions) to call
 - high quality community services with comprehensive information/knowledge exchange between settings of care
- continuous monitoring and analysis of the relationship between aspects of care and clinical outcomes (readmission rates, complication rates, infection rates, revision rates, patient-reported outcomes) to allow early intervention when concerns are identified, for example:
 - are all staff who assess risk equally good at identifying complex patients?
 - are some surgeons/teams (and theatre teams' skill mix) associated with better outcomes?
 - is length of stay in the recovery area (post-anaesthesia care unit) and/or on the ward associated with specific outcomes?

The Coxa Hospital for Joint Replacement compensates patients financially for avoidable complications and readmissions, which is unique in Finland (see [Appendix B](#)). This focuses managers' attention on this aspect of care delivery and sets a context for staff to talk to patients about the roles the hospital and the patient play in achieving good outcomes and managing risks.

The care processes involved in achieving and maintaining low infection and complication rates affect every step in the patient pathway. At Coxa this includes:

- systematic screening and risk assessment of patients before admission, followed by medical treatment if possible, or specific safety precautions if not
- dedicated physical resources including theatres and beds
- dedicated, highly specialist, consistent surgical teams (with minimal use of temporary staff) delivering high volumes of activity
- timely, surgeon-level monitoring of outcomes including individual infections, complications and revision rates (as well as operational metrics)
- weekly knowledge-sharing meetings to review performance and discuss practice
- continuously monitoring the effects of changes in practice on quality and outcomes indicators – for example, reducing patient time in the post-anaesthesia recovery room
- a range of tools to support patients post discharge, including:
 - a 24/7 hotline they can call if concerned about any aspect of their recovery, including pain management and wound care
 - electronic prescribing to allow changes to prescriptions without returning to hospital
 - close collaboration with local primary and community care providers.

8.2. What happens currently?

Significant evidence suggests undesirable variations exist in infection and complication rates in orthopaedics and ophthalmology in the NHS. We did not design our study to look at this in detail (being neither long nor large enough), so we refer to other work focusing on this aspect of care:

- Getting It Right First Time found significant variation in levels of infections, revisions (within one and five years for hip replacements) and litigation rates in orthopaedics.²

² Professor Tim Briggs, *Getting It Right First Time: A national review of adult elective orthopaedic services in England*, British Orthopaedic Association, 2015 www.gettingitrightfirsttime.com/ Accessed 22 June 2015.

- Analysis of the cataract national database suggests significant variation in surgeon-level casemix-adjusted posterior capsule rupture rates.³

8.3. What is needed to support implementation?

A major barrier to managing avoidable complications effectively is the trust's ability to fully ring-fence resources for elective surgery. Another challenge is having sufficiently detailed information and audit systems to track and investigate what causes differences in complication rates, which in many hospitals are relatively rare.

8.4. What are the benefits?

Strategies that reduce the risk of avoidable complications:

- benefit patients by improving outcomes, minimising avoidable follow-on interventions and reducing time in hospital
- enable effective use of resources by reducing costs of treating complications in the near and long term, for both secondary care providers and the broader health system.

9. Alignment of routine follow-up intensity to patient risk profile

9.1. What do we mean?

Clinicians describe most appointments following elective surgery as routine and well within the ability of an appropriately trained nurse, physiotherapist or optometrist to manage depending on the specialty. While many consultants like to see their patients postoperatively, nurse-led follow-up clinics alongside consultant-led new outpatient appointments can facilitate informal feedback to consultants from patients without consuming consultants' time with routine tasks. Longer-term follow-up (eg one-, three- and five-year follow-up after a joint replacement) can be undertaken virtually, with patients completing questionnaires that follow-up staff can review and from which outcome data can be captured. Where concerns are identified, patients can be invited for a face-to-face consultation or X-rays.

For example, Moorfields Eye Hospital NHS Foundation Trust has in some areas contracted community optometrists to undertake post-cataract surgery follow-up appointments (see [Appendix C](#)). Most patients need to see an optometrist for new glasses after cataract surgery. Therefore, Moorfields pays optometrists £16 per

³ Johnston RL et al (2010) The cataract national dataset electronic multicentre audit of 55,567 operations: variation in posterior capsule rupture rates between surgeons. *Eye* 24, 888–893.
Sparrow JM et al (2011) The cataract national dataset electronic multicentre audit of 55,567 operations: case-mix adjusted surgeon's outcomes for posterior capsule rupture. *Eye* 25, 1010–1015.

patient to perform the postoperative assessment and submit outcomes data to it during this single patient visit. While this means the foundation trust forgoes the payment for a follow-up outpatient appointment, it frees outpatient clinic capacity for new outpatient appointments.

Some experts we consulted suggested the most efficient means to provide post-discharge follow-up care for routine elective patients is to give them comprehensive information at discharge and a 24/7 helpline number to call if they are concerned about their recovery. Urgent outpatient appointments must be available when needed, but no routine appointments need to be scheduled.

9.2. What happens at our co-development sites?

In orthopaedics our co-development sites describe great variability in nurse-led or virtual follow-up arrangements:

- two of the five UK sites have nurse- or physio-led follow-up in outpatients, with the orthopaedic surgeons managing follow-up appointments in the other sites
- one of the five sites has virtual follow-up arrangements.

In ophthalmology, this lever is far more advanced at our co-development sites:

- half the UK sites provide nurse- or optometrist-led follow-up after cataract surgery.

9.3. What is needed to support implementation?

Teams that have implemented nurse-led or virtual follow-up indicate the key requirement is making sure a consultant is available for advice during a nurse-led follow-up clinic – for example, running consultant-led new outpatient clinics alongside nurse-led clinics.

9.4. What are the benefits?

Nurse-led or virtual follow-up:

- benefits patients by minimising visits to hospital and reducing waiting times
- enables effective use of resources by:
 - reducing follow-up appointments per procedure
 - reducing the cost of delivering follow-up appointments.