

# Preoperative assessment and optimisation: the key to good outcomes after the pandemic

Complications following surgery are common, predictable and often preventable. New preoperative assessment and optimisation guidance recommends clear pathways with triggers for interventions, patient involvement, shared decision making and team education, to help both patients and service efficiency.

## Introduction

The COVID-19 pandemic hampered the delivery of routine surgical care. There is now a global backlog, with 4.7 million people on a waiting list for surgery in the UK alone (Carr et al, 2021). New preoperative assessment and optimisation guidelines have been launched (Moonesinghe et al, 2021) that may improve both individual patient outcomes and efficiency.

Ten million operations are performed in the UK each year (Hospital Episode Statistics, 2012), with most completed successfully. Yet 15% of operations result in complications (Bolliger et al, 2018) and 14% of patients express regret at having their surgery (Wilson et al, 2017). Complications are often predictable and commonly preventable. Postoperative complications are associated with reduced quality of life and increased healthcare costs that persist over future years (Moonesinghe et al, 2014). COVID-19 highlighted the impact of pre-existing health and social factors on outcome from infection (Soltan et al, 2021).

Patients needing surgery are increasingly medically complex. At 65 years of age, half the UK population has two or more medical conditions (Barnett et al, 2012), and 27% of UK adults are classed as physically inactive (achieving less than 30 minutes total exercise per week), rising to over 55% across a range of ethnicities and ages (Gov.uk, 2019). This is likely to have worsened during the pandemic (Clemmensen et al, 2020). Being physically inactive is independently associated with at least a four-fold higher complication rate (Tatematsu et al, 2013), and being frail is associated with a five-fold increase in complications (Hewitt et al, 2018). Intervention studies show that increasing exercise preoperatively may reduce complication rates by 40% (Moran et al, 2016). With fitter patients and new day-surgery guidance, the number of patients requiring an overnight stay could halve (Centre for Perioperative Care et al, 2020).

Perioperative care starts from the moment of contemplation of surgery to full recovery afterwards. The new preoperative assessment and optimisation guidelines highlight areas that need to be improved (Table 1). Standardisation of pathways and protocols is needed; oxymoronically, this flags up areas where care should be individualised. Preassessment services have evolved in most UK hospitals. They should now focus on identifying opportunities to optimise care at this 'teachable moment'.

Multidisciplinary teams can perversely increase silo thinking; a 'transdisciplinary' approach is therefore needed (Academy of Medical Royal Colleges, 2020). This involves every team member learning basic skills in motivational interviewing and assessment, and being able to anticipate critical steps when specialist staff are unavailable.

Shared decision making is essential. Patients who are more empowered show higher satisfaction and are less likely to proceed with less beneficial surgery. Patients should be encouraged to ask about the benefits, risks, alternatives and what would happen if they did nothing (Santhirapala et al, 2019). Fixed and modifiable risk factors should be assessed early, so they are discussed and, where possible, optimised. Risk prediction tools such as [www.sortsurgery.com](http://www.sortsurgery.com) and relevant apps should be used (National Confidential Enquiry into Patient Outcome and Death, 2020). 'One-stop shop' services may not allow sufficient time for complex patients. No multidisciplinary team meeting should opine without having sought the patient's view.

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**Table 1. Summary of recommendations for preoperative assessment and optimisation**

Concept	Assessment	Optimisation
Shared decision making	Support patient to ask benefits, risks, alternatives and doing nothing	Provide an opportunity for patients to take their time considering their options
Risk scoring	Use an objective method of risk scoring, combined if appropriate with clinical judgement, eg <a href="http://www.sortsurgery.com">www.sortsurgery.com</a>	<p>Improve discussions with patients by sharing information on risk</p> <p>Guide informed consent (Montgomery principles)</p> <p>Plan perioperative care</p>
Specific conditions: COVID-19	Caution in first 7 weeks or when treated with steroids or biological agents	<p>Review urgency of surgery and balance risks and benefits of proceeding before 7 weeks or if patient still has acute symptoms</p> <p>Consider need to refer to long COVID-19 clinic if fulfils diagnostic criteria</p>
Specific conditions: other comorbidities	Early identification – ideally through digital screening	<p>Optimisation of all long-term conditions</p> <p>Medication review</p> <p>Specialist input if required: anaesthesia, perioperative or geriatric medicine</p>
Functional capacity assessment	<p>Evaluate what the patient can do. Simple tools include:</p> <ul style="list-style-type: none"> <li>■ Duke Activity Status Index</li> <li>■ 6-minute walk test</li> <li>■ Sit-To-Stand in 1 minute</li> </ul>	<p>Ideally patient practices for the test</p> <p>Set a goal to improve</p>
Exercise interventions	Encourage exercise diary	Increase frequency, intensity, time and type of exercise
Mental health and cognition	<p>Screen using (for example) Montreal Cognitive Assessment</p> <p>Consider mental capacity</p> <p>Prompt for common difficulties</p>	<p>Support psychological preparation</p> <p>Refer for capacity assessment and/or safeguarding assessment if required</p>
Nutrition	Screen using Malnutrition Universal Screening Tool	<p>General advice on healthy eating</p> <p>‘Food first’ approach for patients who are malnourished</p> <p>Specialist dietician input if required</p>

*Adapted from Moonesinghe et al (2021)*

## Preoperative assessment

Preoperative patients should complete a self-assessment questionnaire, ideally digitally. A preassessment nurse should then validate the information provided and assess cognition, nutrition and, in all patients over 65 years, frailty. They should also screen for specific conditions that may impact on anaesthetic or surgical safety, such as sleep-disordered breathing or poor functional capacity. Functional assessment can be done in clinic and can give the patient a target to train towards. Examples include the Duke Activity Status Index, which is self-completed (Hlatky et al, 1989), the 6-minute walk test (Chetta et al, 2006) or the 1-minute sit-to-stand test (Morita et al, 2018). Poor functional capacity may warrant further referral for evaluation and intervention, but even if this is not required, the opportunity to provide advice on activity, exercise and living well should be taken.

Management of specific conditions such as diabetes should be planned according to guidelines (Centre for Perioperative Care, 2021). Surgery should be delayed for at least 7 weeks after COVID-19 infection (El-Boghdadly et al, 2021). Patients who have recently been treated with steroids or biological agents that might interfere with the immune response need an approach that balances risks against benefits.

## Optimisation

There is a finite number of areas where optimisation improves results, including smoking cessation, exercise, nutrition, psychological preparedness and medication review. Smoking is associated with significantly higher postoperative complications, with double the confounder-adjusted relative risk of poor wound healing and of pulmonary complications (World Health Organization, 2020). The association between quitting smoking approximately 3–4 weeks before surgery and reduced postoperative complications has been consistently reported in systematic reviews of randomised controlled trials (World Health Organization, 2020). There is an increasing number of randomised controlled trials reporting on the effect of exercise interventions on postoperative complications (Centre for Perioperative Care, 2020). Some report small to moderate effect sizes and there is a variety of interventions (aerobic, resistance and breathing training) but several report up to 50% fewer complications in exercise intervention groups (Centre for Perioperative Care, 2020). All patients should receive general dietary, exercise and lifestyle advice. Complex patients should receive individualised or specialist input.

Surgery schools teach patients in groups about expectations, nutrition, exercise and breathing skills. Evaluations of surgery schools report promising results: for example, in one study, over half of patients improved behavioural parameters, and participation was associated with a 1-day average reduction in length of stay (Fecher-Jones et al, 2021). The waiting list should be seen as a ‘preparation list’. During this time, active surveillance is warranted, assessing for changes in condition and, where required, further discussion to ensure that surgery remains the right choice for the patient and short notice cancellations are less likely.

Despite shorter times for preoperative assessment and optimisation in emergency surgical patients, protocolised care may improve outcomes, as treatment delays and variation in care quality remain a challenge despite many improvements in processes and pathways (Royal College of Physicians, 2019; National Emergency Laparotomy Audit, 2020). Reducing complications and length of stay for emergency patients would also help service efficiency. For example, 42% of UK intensive care admissions follow surgery (24% elective and 18% emergency or urgent) (Intensive Care National Audit and Research Centre, 2018) and the most common reason for cancelling elective surgery is lack of a bed on a surgical ward or intensive care (Wong et al, 2018).

Emergency surgical admissions can be reduced by 25% with ‘hot clinics’ (Association of Coloproctology of Great Britain and Ireland et al, 2015), with in-person, virtual and telephone options (Dhahri et al, 2021). Emergency pathways, such as abscess drainage and simple fracture fixation, may be transformed into ‘urgent elective’ using preoperative assessment and optimisation services and day-case surgery.

## Achieving change

Good preoperative assessment and optimisation requires excellent communication, appropriate use of technology and flexible workforce models. Some aspects require ongoing funding, principally senior medical assessment of individual high-risk patients. Other aspects require education, leadership and setup costs.

Critical information assists decision making. There are multiple opportunities to optimise health (Table 2) which occur at different points in the pathway (Figure 1).

## Conclusions

Preoperative assessment and optimisation can make a substantial contribution to reducing the risk of adverse outcomes from surgery for individual patients, and can improve overall service efficiency through reducing length of hospital stay and unplanned admissions. This needs a focus on concepts (shared decision making, team-working, education and early identification of complexity) and optimisation of patient health.

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Table 2. Opportunities for optimisation	
Opportunity	Practicality
At all points	General advice for all Identify patients who need specific optimisation
Referral to surgical clinic	Include frailty score, comorbidities and patient wishes
Surgical clinic	Clear shared decision-making discussion including risks Good patient information Set expectations Use functional testing
Patient self-assessment	Digital solutions may help
Nurse-led preoperative assessment clinics	General systems review, medication review, assessment of frailty, cognition, nutrition Which medication to stop and continue
High-risk anaesthetic clinic or geriatrician consultation	Individual specialist review
Surgery school in groups	Cost-effective weekly programmes Preparation and empowerment
Clinical surveillance of patients on waiting lists	To reduce cancellations

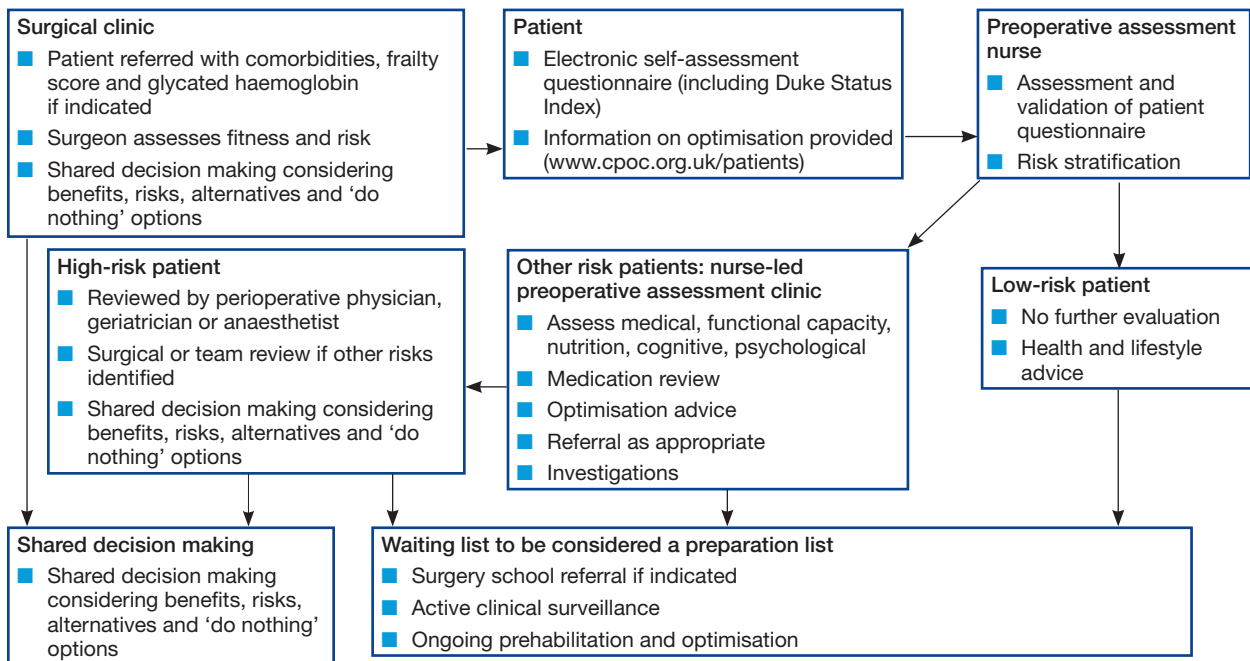


Figure 1. Flow chart for preoperative assessment and optimisation, with shared decision making and optimisation throughout.

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## Key points

- Perioperative care is everything from the moment an operation is contemplated until full recovery at home – gaps, inefficiencies and complications are common.
- A few interventions can reduce complications significantly: exercise, smoking cessation, nutrition, psychological preparedness and medication review.
- Staff should have ‘transdisciplinary’ education – understanding core skills of others across pathways, eg optimising at every opportunity and assessing with triggers for interventions.
- Patients and staff should view waiting lists as ‘preparation lists’.
- Shared decision making means prioritising the patient’s wishes and formally discussing the benefits, risks, alternatives and ‘what if nothing is done’.

## References

- Academy of Medical Royal Colleges. Developing Professional Identity in Multi-Professional Teams. 2020. [https://www.aomrc.org.uk/wp-content/uploads/2020/05/Developing\\_professional\\_identity\\_in\\_multi-professional\\_teams\\_0520.pdf](https://www.aomrc.org.uk/wp-content/uploads/2020/05/Developing_professional_identity_in_multi-professional_teams_0520.pdf) (accessed 3 June 2021)
- Association of Coloproctology of Great Britain and Ireland, Association of Upper Gastro-intestinal Surgeons, Association of Surgeons of Great Britain and Ireland. The Future of emergency general surgery. 2015. [https://www.acpgbi.org.uk/content/uploads/2016/07/Future-of-EGS-joint-document\\_Iain-Anderson\\_140915.pdf](https://www.acpgbi.org.uk/content/uploads/2016/07/Future-of-EGS-joint-document_Iain-Anderson_140915.pdf) (accessed 7 June 2021)
- Barnett B, Mercer SW, Norbury M et al. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012;380(9836):37–43. [https://doi.org/10.1016/S0140-6736\(12\)60240-2](https://doi.org/10.1016/S0140-6736(12)60240-2)
- Bolliger M, Kroehner J, Molineus F et al. Experiences with the standardized classification of surgical complications (Clavien-Dindo) in general surgery patients. *Eur Surg*. 2018;50(6):256–261. <https://doi.org/10.1007/s10353-018-0551-z>
- Carr A, Smith JA, Camaradou J, Prieto-Alhambra D. Growing backlog of planned surgery due to covid-19. *BMJ*. 2021;372:n339. <https://doi.org/10.1136/bmj.n339>
- Centre for Perioperative Care. Proving the case for perioperative care. 2020. <https://www.cpoc.org.uk/about-cpoc-cpoc-policy/proving-case-perioperative-care> (accessed 3 June 2021)
- Centre for Perioperative Care. Guideline for perioperative care of people with diabetes mellitus undergoing elective and emergency surgery. 2021. <https://www.cpoc.org.uk/sites/cpoc/files/documents/2021-03/CPOC-Guideline%20for%20Perioperative%20Care%20for%20People%20with%20Diabetes%20Mellitus%20Undergoing%20Elective%20and%20Emergency%20Surgery.pdf> (accessed 3 June 2021)
- Centre for Perioperative Care, British Association of Day Surgery, Getting it Right First Time. Day surgery delivery pack. 2020. [https://www.cpoc.org.uk/sites/cpoc/files/documents/2020-09/National%20Day%20Surgery%20Delivery%20Pack\\_Sept2020\\_final.pdf](https://www.cpoc.org.uk/sites/cpoc/files/documents/2020-09/National%20Day%20Surgery%20Delivery%20Pack_Sept2020_final.pdf) (accessed 3 June 2021)
- Chetta A, Zanini A, Pisi G et al. Reference values for the 6-min walk test in healthy subjects 20–50 years old. *Respir Med*. 2006;100(9):1573–1578. <https://doi.org/10.1016/j.rmed.2006.01.001>
- Clemmensen C, Petersen MB, Sørensen TIA. Will the COVID-19 pandemic worsen the obesity epidemic? *Nat Rev Endocrinol*. 2020;16(9):469–470. <https://doi.org/10.1038/s41574-020-0387-z>
- Dhahri AA, Ahmad R, Shaikh BF et al. Hybrid surgical hot clinic (HSHC): evaluation of surgical hot clinic services during COVID-19 lockdown. *World J Surg*. 2021;45(4):955–961. <https://doi.org/10.1007/s00268-021-05981-0>
- El-Boghdadly K, Cook TM, Goodacre T et al. SARS-CoV-2 infection, COVID-19 and timing of elective surgery: a multidisciplinary consensus statement on behalf of the Association of Anaesthetists, the Centre for Peri-operative Care, the Federation of Surgical Specialty Associations, the Royal College of Anaesthetists and the Royal College of Surgeons of England: a multidisciplinary consensus statement on behalf of the Association of Anaesthetists, the Centre for Peri-operative Care, the Federation of Surgical Specialty Associations, the Royal College of Anaesthetists and the Royal College of Surgeons of England. *Anaesthesia*. 2021;76(7):940–946. <https://doi.org/10.1111/anae.15464>
- Fecher-Jones I, Grimmett C, Edwards MR et al. Development and evaluation of a novel pre-operative surgery school and behavioural change intervention for patients undergoing elective major surgery: Fit-4-Surgery School. *Anaesthesia*. 2021. <https://doi.org/10.1111/anae.15393>

- Gov.uk. Physical inactivity. 2019. <https://www.ethnicity-facts-figures.service.gov.uk/health/diet-and-exercise/physical-inactivity/latest> (accessed 3 June 2021)
- Hewitt J, Long S, Carter B et al. The prevalence of frailty and its association with clinical outcomes in general surgery: a systematic review and meta-analysis. *Age Ageing*. 2018;47(6):793–800. <https://doi.org/10.1093/ageing/afy110>.
- Hlatky MA, Boineau RE, Higginbotham MB et al. A brief self-administered questionnaire to determine functional capacity (The Duke Activity Status Index). *Am J Cardiol*. 1989;64(10):651–654. [https://doi.org/10.1016/0002-9149\(89\)90496-7](https://doi.org/10.1016/0002-9149(89)90496-7)
- Hospital Episode Statistics. Admitted patient care - England, 2011-12. 2012. <https://digital.nhs.uk/data-and-information/publications/statistical/hospital-admitted-patient-care-activity/hospital-episode-statistics-admitted-patient-care-england-2011-12> (accessed 3 June 2021)
- Intensive Care National Audit & Research Centre. Key statistics from the Case Mix Programme — adult, general critical care units. 1 April 2017 to 31 March 2018. 2018. <https://www.icnarc.org/DataServices/Attachments/Download/979f565d-f6fd-e811-80ef-1402ec3fcd79> (accessed 3 June 2021)
- Moonesinghe SR, Harris S, Mythen MG et al. Survival after postoperative morbidity: a longitudinal observational cohort study. *Br J Anaesth*. 2014;113(6):977–984. <https://doi.org/10.1093/bja/aeu224>
- Moonesinghe SR, Badger C, Cook T et al. Preoperative assessment and optimisation with consideration of COVID-19 and its implications. 2021. <https://icmanaesthesiacovid-19.org/pre-operative-assessmentand-optimisation-poao-guidelines>
- Moran J, Guinan E, McCormick P et al. The ability of prehabilitation to influence postoperative outcome after intra-abdominal operation: A systematic review and meta-analysis. *Surgery*. 2016;160(5):1189–1201. <https://doi.org/10.1016/j.surg.2016.05.014>
- Morita AA, Bisca GW, Machado FVC et al. Best protocol for the Sit-to-Stand Test in subjects with COPD. *Respir Care*. 2018;63(8):1040–1049. <https://doi.org/10.4187/respcare.05100>
- National Confidential Enquiry into Patient Outcome and Death. The Surgical Outcome Risk Tool (SORT). 2020. <https://www.ncepod.org.uk/sort.html> (accessed 9 May 2021)
- National Emergency Laparotomy Audit. Sixth patient report of the National Emergency Laparotomy Audit. December 2018 to November 2019. 2020. <https://www.nela.org.uk/Sixth-Patient-Report#pt> (accessed 7 June 2021)
- Royal College of Physicians. National Hip Fracture Database annual report 2019. 2019. [https://www.nhfd.co.uk/files/2019ReportFiles/NHFD\\_2019\\_Annual\\_Report\\_v101.pdf](https://www.nhfd.co.uk/files/2019ReportFiles/NHFD_2019_Annual_Report_v101.pdf) (accessed 14 June 2021)
- Santhirapala R, Fleisher LA, Grocott MPW. Choosing wisely: just because we can, does it mean we should? *Br J Anaesth*. 2019;122(3):306–310. <https://doi.org/10.1016/j.bja.2018.11.025>
- Soltan M, Crowley L, Melville C et al. L12 To what extent are social determinants of health, including household overcrowding, air pollution and housing quality deprivation, modulators of presentation, ITU admission and outcomes among patients with SARS-COV-2 infection in an urban catchment area in Birmingham, United Kingdom? *Thorax* 2021;76:A237-A238. <https://doi.org/10.1136/thorax-2020-BTSabstracts.414>
- Tatematsu N, Park M, Tanaka E, Sakai Y, Tsuboyama T. Association between physical activity and postoperative complications after esophagectomy for cancer: a prospective observational study. *Asian Pac J Cancer Prev*. 2013;14(1):47–51. <https://doi.org/10.7314/apjcp.2013.14.1.47>
- Wilson A, Ronnekleiv-Kelly SM, Pawlik TM. Regret in surgical decision making: a systematic review of patient and physician perspectives. *World J Surg*. 2017;41(6):1454–1465. <https://doi.org/10.1007/s00268-017-3895-9>
- Wong DJN, Harris K, Moonesinghe SR, the SNAP-2: EPICCS collaborators. Cancelled operations: a 7-day cohort study of planned adult inpatient surgery in 245 UK National Health Service hospitals. *Br J Anaesth*. 2018;121(4):730–738. <https://doi.org/10.1016/j.bja.2018.07.002>
- World Health Organization. Tobacco and postsurgical outcomes. 2020. <https://apps.who.int/iris/bitstream/handle/10665/330485/9789240000360-eng.pdf> (accessed 7 June 2021)