



Royal College  
of Surgeons  
of England  
ADVANCING SURGICAL CARE



Royal College of  
General Practitioners



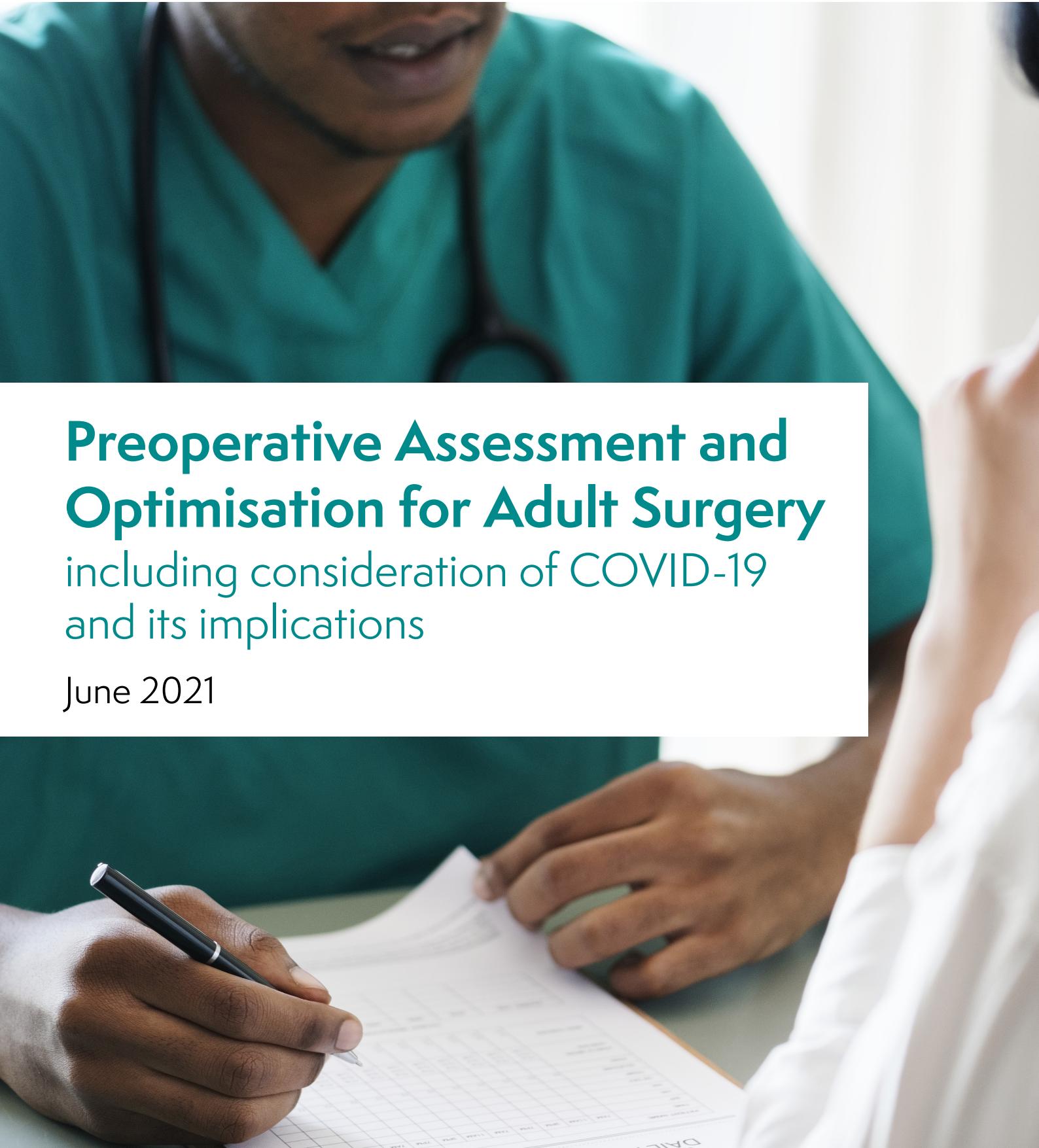
Centre for  
Perioperative Care



# Preoperative Assessment and Optimisation for Adult Surgery

including consideration of COVID-19 and its implications

June 2021



<b>Contributing organisations: (listed alphabetically)</b>	<b>Representative and author</b>
Association of Anaesthetists	Dr Kariem El-Boghdadly
Association of Surgeons of Great Britain and Ireland	Ms Sonia Lockwood
British Thoracic Society	Dr Anjali Crawshaw
Centre for Perioperative Care	Mrs Scarlett McNally
Federation of Surgical Specialty Associations	Professor Duncan Summerton Mr Nigel Mercer
Peri-Operative Exercise Testing and Training Society	Professor Denny Levett Professor Sandy Jack
Preoperative Association	Ms Jo Mahoney RN Mrs Claire Badger RN Dr Robert Hill
Royal College of Anaesthetists	Professor Tim Cook OBE
Royal College of General Practitioners	Dr Gary Howsam Dr Jonathan Leach OBE
Royal College of Surgeons of England	Mr Tim Goodacre
Society for Cardiothoracic Surgery	Mr Simon Kendall
Coordinator and PhD Student	Dr Justin Kua
Chair	Professor Ramani Moonesinghe OBE

#### **Endorsing Organisations:**

British Geriatric Society

Centre for Perioperative Care

Federation of Surgical Specialist Associations

Intensive Care Society

International Prehabilitation Society

Preoperative Association Peri-Operative Exercise Testing and Training Society

Royal College of General Practitioners

Royal College of Surgeons of England

#### **Supporting Organisations**

Faculty of Intensive Care Medicine

Faculty of Pain Medicine

Independent Age

**The authors wish to acknowledge the advice of the following individuals and groups:**

Dr Alf Collins

Ms Imogen Fecher-Jones RN

Dr Chloe Grimmett

Dr Andrew Hartle

Dr Alex King

Dr Lewis Matthews

Dr John Moore

Mr Lawrence Mudford

Dr Ramai Santhirapala

Dr Dev Srivastava

Dr Mike Swart

Dr Judit Varkonyi-Sepp

Dr Alex West

Dr Paul Wilkinson

The Lay Committee of the Royal College of Anaesthetists

## Contents

Key recommendations and executive summary .....	5
Introduction.....	9
1.                Shared decision making and consent .....	10
2.                Patient self-screening health questionnaires and electronic ePOA systems.....	13
3.                Preoperative assessment clinic .....	14
4.                Risk scoring and patient selection for enhanced care, critical care and surgical hubs .....	17
5.                Specific conditions: COVID-19 .....	19
6.                Specific conditions: Other comorbidities .....	22
7.                Functional capacity assessment .....	24
8.                Exercise interventions.....	25
9.                Mental health and cognition assessment and preparation.....	27
10.               Nutritional assessment and optimisation .....	28
11.               Preoperative Group Education – Surgery School .....	30
12.               Clinical surveillance and support of patients on waiting lists for surgery.	32
13.               Preoperative Assessment and Optimisation in emergency surgery .....	35
Appendix 1: Template for ‘business card’ for patients on surgical waiting lists.....	36
Appendix 2: Template for information leaflet for patients awaiting surgery .....	37
Appendix 3: Training resources and examples of best practice for healthcare professionals.	41
Appendix 4: Screening tools recommended in this guidance.....	41
References .....	42

## Definitions

**Perioperative Service:** the multi-disciplinary, multi-professional team which plans and delivers care for patients contemplating or having surgery.

**Preoperative Assessment (POA) service:** the team responsible for preoperative assessment of patients who are contemplating or have been booked for surgery. Usually nurse-led with medical support from anaesthetists, physicians (particularly geriatricians), surgeons, pharmacists, pain management teams and where required, medical specialists.

# Key recommendations and executive summary

## For Commissioners

1. **Investment should be provided to:**
  - a. **establish prehabilitation services** to support patients who would benefit from optimisation of comorbidities, nutritional status, psychological preparedness or functional capacity (fitness), thereby helping them to 'wait well' for surgery. This should include comprehensive geriatric assessment and optimisation in older patients (sections 3, 8, 9, 10).
  - b. **enable integrated Care Systems (England), Health Boards (Wales), Regional Health Boards (Scotland) and Health and Social Care Trusts (NI)** to provide surgery schools to support patients preparing for major surgery; (section 11)
  - c. **expand perioperative services** to support active clinical surveillance and support for patients on waiting lists for surgery (section 12).

## For NHS X

2. **Ongoing work to bridge the Primary - secondary care interface should be accelerated** to ensure that read-only access to primary care notes by secondary care clinicians is available in every NHS Trust and Health Board (sections 3 and 12).

## For primary care providers, surgeons, anaesthetists and multidisciplinary teams

3. **Shared Decision Making (SDM) should be embedded throughout perioperative pathways. beginning at the earliest point where surgery is contemplated, and involving discussion between patient, surgeon, and the broader multidisciplinary team (section 1).**

Patients should be encouraged to express what is important to them and be supported to ask questions (e.g. BRAN, the Benefits, Risks, Alternatives and doing Nothing) with prompts as required.

4. **At the earliest possible point in the surgical pathway (e.g. at the point of referral from primary care, or at the first review in surgical clinic) patients should complete a screening self-assessment health questionnaire, to help shared decision making, risk prediction and optimisation (section 2).**

Patients identified as very high risk on screening may benefit from early preoperative assessment in a high-risk clinic, to inform shared decision making and optimisation even before the surgical approach is decided.

**5. Referrals from primary care to surgeons and from surgeons to Preoperative Assessment (POA) Services should detail significant medical comorbidities using a “fitness for surgery” process to enable early optimisation and review (section 3).**

This should highlight key diagnoses, medication, recent results, COVID-19 status, history and vaccination history, and any other considerations including work considerations and opportunities for optimisation (e.g. smoking, obesity and high alcohol intake).

## **For preoperative assessment services**

**6. Every patient requiring surgery and/or anaesthesia/anaesthesia-led sedation should undergo formal preoperative assessment before the day of admission (section 3).**

The majority of patients will require “face to face” nurse-led consultation, however telephone and / or video consultations may be used to complete preoperative assessment for low-risk patients to reduce the risk of COVID transmission. If remote consultation is necessary, video consultations are preferred as these enable visual cues to be picked up. Criteria should be established by the local POA clinical leadership (anaesthetics/perioperative medicine) to determine the cohorts of patients that are suitable for video consultations.

**7. Patients should be assessed for impact of comorbid conditions on functional capacity, perioperative pathways and surgical outcome (section 6).**

A number of common conditions (e.g. diabetes, anaemia, heart disease) will require specific evaluation to ensure that they are optimised and appropriate plans are made for the perioperative pathway.

**8. Patients should be screened for cognitive impairment, psychological distress and risk of malnutrition using validated tools (sections 9, 10).**

Cognitive impairment may impact on the ability of the patient to participate in shared decision making processes. Psychological factors impact postoperative physical and psychological patient outcomes and preoperative interventions may improve surgical outcomes. Patients identified as having psychological support needs should be referred to a speciality specific clinical health psychologist. If this is not available, the patient should be referred to their general practitioner for assessment and signposting to general community services and third sector organisations.

Patients identified by screening as being at risk of malnutrition should undergo a diagnostic assessment of unintentional weight loss, body mass index, muscle mass, dietary intake and disease burden. This assessment should be undertaken by those with experience and expertise, such as a registered dietitian or physician with an interest in clinical nutrition.

## **For surgeons, anaesthetists and perioperative multidisciplinary teams**

- 9. All patients being considered for surgical intervention should have their individualised risk assessed using objective measures, combined with senior, experienced clinical judgement (section 4).**

A risk model which provides an estimate of mortality is recommended: for example, the Surgical Outcome Risk Tool (SORT) and SORT-clinical judgement models ([www.sortsurgery.com](http://www.sortsurgery.com)) which have been validated for **inpatient** surgical procedures.

Patients undergoing inpatient surgery with >1% predicted risk of 30-day mortality should be considered for postoperative enhanced care, and with >5% risk should be considered for postoperative critical care admission.

Patients undergoing inpatient or ambulatory surgery who have a predicted 30-day mortality risk of <1% may be considered for a surgical hub undertaking high-volume low-acuity surgery. Patients with mortality risk >1% undergoing inpatient surgery (rather than ambulatory) should only be considered for surgical hubs if enhanced care services and access to critical care is available on site.

- 10. Where possible, surgery should be avoided for 7 weeks after COVID-19 infection, or until symptoms have resolved, to avoid the higher risk of postoperative complications and death associated with earlier surgery (section 5).**

Decision making on whether to defer surgery because of acute COVID-19 infection or persistent symptoms should be informed by multidisciplinary discussion including the patient, surgeon, anaesthetist and/or perioperative physician and a physician with expertise in COVID-19 and/or long COVID as appropriate

A number of medicines which are used to treat patients with moderate or severe COVID-19 have implications for immune function and therefore recovery from surgery. A full medicines reconciliation of COVID-19 therapies is required from primary care or the treating hospital if surgery is taking place within 3 months of COVID-19 diagnosis.

- 11. All patients who are being considered for a surgical intervention should be screened for reduced functional capacity/physical fitness using a validated tool such as the Duke Activity Status Index (DASI) (section 7).**

Patients with reduced fitness/functional capacity on screening should undergo an objective assessment: the gold standard is cardiopulmonary exercise testing; where this is unavailable, simpler alternative methods of functional testing may be more practical and help goal-setting.

- 12. All patients should be advised that improving fitness before surgery reduces risk of complications after surgery, and improves length of hospital stay, speed of recovery and quality of life. All healthcare professionals should be competent to deliver universal exercise advice to all patients following UK CMO (WHO) guidance (section 8).**

Exercise should be distinguished from physical activity. Aerobic exercise should be prioritised preoperatively as aerobic exercise capacity specifically is associated with surgical outcome. Preoperative exercise interventions should be determined by baseline fitness (needs-based). Interventions can be categorised as universal (for all), targeted (for intermediate fitness/risk) or specialist (for low fitness/high-risk). Very unfit patients should be advised to build up slowly with appropriate short-term goals as it is counterproductive to set a level that feels unattainable.

**13. All patients considered for a major or inpatient elective surgical intervention should be invited to attend a group 'surgery school', which may be in-person, via remote access or hybrid (section 11).**

Topics which should be covered include: what to expect coming into hospital, expectations for Drinking Easing and Mobilising (DrEaMing) after surgery, post discharge recovery and types of complications; principles of prehabilitation (exercise, nutrition and mental health), alcohol moderation and smoking cessation; and skills development including the active cycle of breathing and how to achieve behaviour change.

**14. All surgical / perioperative services should have a system for active clinical surveillance of patients on waiting lists, particularly those who have been waiting for longer than 3 months (section 12).**

The system should be tailored to the nature of the surgery intended and the patient's individual needs and at a minimum must provide a point of contact for the patient in the perioperative / surgical service, and a prompt for them or other health professionals to notify perioperative services of significant changes in their health.

**15. Prompt preoperative assessment and optimisation, supported by agreed local pathways based on national recommendations, should be prioritised in emergency surgery. This will ensure efficient and safe care which will benefit best use of hospital resources, creating more capacity for both emergency and elective work (section 13).**

Services involved in emergency surgery should have agreed pathways to anticipate care needs and reduce delay to time-critical surgery. Individual care should include risk assessment, Shared Decision Making and treatment escalation plans. Some emergency pathways should be planned on a day case basis maximising use of 'hot clinics'.

## Introduction

Surgery is lifesaving or life-enhancing for millions of patients every year. However, the operation is not in itself an isolated 'event': it is part of a process which includes preparation and recovery. Ensuring the quality of the entire perioperative pathway is important to achieving the best possible outcome for every patient.

Most of the 10 million procedures which take place in the UK each year are uncomplicated.<sup>1</sup> However, an increasing number of individuals are at risk of adverse outcomes because of comorbid conditions and poor functional capacity. At age 65, 50% of the UK population have multi-morbidity (two or more long-term conditions), and this proportion rises with age and deprivation.<sup>2</sup> Complications which prolong length of stay occur after approximately 15% of inpatient operations<sup>3</sup> and a similar proportion of patients express regret.<sup>4</sup> Perioperative complications are independently associated with reduced long-term survival<sup>5–7</sup>. However, many of the risks of surgery can be mitigated, and the foundation of this mitigation is preoperative assessment and optimisation.

COVID-19 has had a profound impact both on all of us individually, and also on NHS services. People who have previously had COVID-19 and not fully recovered and those who have deconditioned through reduced activity during lockdowns are both at higher risk of poor postoperative outcomes than pre-pandemic. Waiting lists for non-urgent procedures will be prolonged for some time. Preoperative assessment must be used as the starting point for a process of optimisation and prehabilitation to ensure each patient attending for surgery is in the best health possible. The notion that waiting lists should be considered 'preparation' lists has never been more apposite.

This guidance is intended to be used by primary care, surgeons, anaesthetists, perioperative teams and preoperative assessment (POA) services. It applies to all patients who are being considered for surgery, or are on a waiting list for surgery in the non-emergency setting, irrespective of the magnitude of procedure or the type of anaesthesia contemplated. Its recommendations will support the care of individual patients, the recovery of elective services, and achieving key goals of the NHS Long Term Plan including reducing health inequalities and preventing serious health deterioration.

If implemented in full, our aspiration is that by the time a patient has surgery they should:

- have shared in the decision to proceed to surgery, feel empowered to ask questions, and engage in their perioperative healthcare;
- be fully informed of the risks and benefits of surgery vs. other treatment options (including doing nothing), as applied to them, and including their individualised risk assessment of adverse outcomes in accordance with the principles laid out by the Montgomery ruling;
- have had significant comorbidities which could potentially impact on perioperative care and outcomes identified and optimised where possible, with a perioperative plan of care in place;
- have started to improve modifiable risk factors, including smoking, reduced physical activity, excess alcohol and poor nutrition, and improved their psychological preparedness, following general and targeted advice;
- be entered into a system of active clinical surveillance to ensure that significant changes in health and fitness while on a waiting list are made known to the perioperative team.

# 1. Shared decision making and consent

## Recommendations

- Based on guidance from the General Medical Council (GMC),<sup>8</sup> and the rights of patients in the NHS Constitution,<sup>9</sup> Shared Decision Making (SDM) should be embedded throughout perioperative pathways.
- The SDM process should begin at the earliest point where surgery is contemplated, and involve discussion between the patient, and the multi-professional, multidisciplinary team.
- Patients should be encouraged to express what is important to them and be supported to ask questions (e.g. BRAN, the Benefits, Risks, Alternatives and doing Nothing<sup>10</sup>) with prompts as required.
- Clinicians involved in consulting patients should understand and use the principles of SDM, motivational interviewing, and risk communication. This should include an understanding of ‘team talk’, options talk’, and ‘decision talk’ (defined below).<sup>11</sup>
- SDM assumes that the patient has capacity to make decisions. If any member of the perioperative team has concerns that the patient lacks capacity, they must apply the principles set out in the Mental Capacity Act 2005. Objective assessment of cognition and capacity should form part of the preoperative assessment process (see Section 9).
- If a patient wishes someone close to them, or a carer, to be included in an SDM consultation, this should be facilitated.
- SDM consultations should be recorded in the medical notes, in order that other teams can find them easily.

## Supporting Information

Shared Decision Making (SDM) is the process whereby patients and clinicians work together to decide the best treatment option based on evidence and the patient’s wishes and values. Better conversations have been described as the new healthcare innovation.<sup>12</sup>

The GMC’s new guidance on consent enshrines SDM principles and came into effect in 2020.<sup>13</sup> This emphasises listening to patients, being open and maintaining trust (Table 1). NICE guidance on Shared Decision Making was published in June 2021.<sup>14</sup> The NICE evidence reviews suggest that a key barrier is difficulty in changing practitioners’ behaviour and that “most clinicians work in quite routine ways... practitioners develop a certain style early in their career that requires conscious change... communication skills are taught during training, but this tends to focus on the part of the consultation that didn’t involve decision-making”.<sup>15</sup>

It is evident, therefore, that developing an understanding of what SDM involves, and how to make decisions with patients, requires tools, skills and may require attitudinal change.<sup>16</sup> A three-stage model can be useful, with ‘team talk’ about the need to provide support to patients about decision making and to elicit their goals; ‘option talk’ for comparing alternatives, using risk communication principles; and ‘decision talk’ to arrive at decisions using the informed preferences of patients, guided by the experience and expertise of health professionals.<sup>11</sup> Many resources are available at [www.choosingwisely.co.uk](http://www.choosingwisely.co.uk). The

Personalised Care Institute<sup>17</sup> also has substantial e-learning resources on motivational interviewing, SDM and risk communication and incorporates learning from the Winton Centre.<sup>18</sup> Communication of risk is a core component of SDM and one which clinicians may not be intuitively good at – competence can be improved through training.<sup>19</sup>

1	All patients have the right to be involved in decisions about their treatment and care and be supported to make informed decisions if they are able.
2	Decision making is an ongoing process focused on meaningful dialogue: the exchange of relevant information specific to the individual patient.
3	All patients have the right to be listened to, and to be given the information they need to make a decision and the time and support they need to understand it.
4	Doctors must try to find out what matters to patients so they can share relevant information about the benefits and harms of proposed options and reasonable alternatives, including the option to take no action.
5	Doctors must start from the presumption that all adult patients have capacity to make decisions about their treatment and care. A patient can only be judged to lack capacity to make a specific decision at a specific time, and only after assessment in line with legal requirements.
6	The choice of treatment or care for patients who lack capacity must be of overall benefit to them, and decisions should be made in consultation with those who are close to them or advocating for them.
7	Patients whose right to consent is affected by law should be supported to be involved in the decision-making process, and to exercise choice if possible.

TABLE 1. THE GMC SEVEN PRINCIPLES OF DECISION MAKING AND CONSENT

Discussion should include:

- Patient's values, lifestyle and expectations;
- General risks, including those related to COVID-19;
- Risks specific to the patient (either because of their comorbidities or because of their individual circumstances – e.g. surgery on a professional opera singer may require specific discussion about anaesthetic airway management; older, more frail patients living alone may be less able to manage a stoma which may therefore lead to them losing their independence)
- Specific aspects of the perioperative pathway which are likely to be important to patients, for example, requirement for critical care admission
- Modifiable risks (e.g. physical inactivity, smoking, poor nutrition, excess alcohol, obesity, comorbidities)
- Psychological preparedness

SDM is a process which may take place over several consultations with different healthcare professionals. Trans-disciplinary working, where team members share skills and a common goal, should maximise efficiency of the process, giving the patient many points of contact and enabling their individual views to be taken into account.<sup>20</sup>

Where the patient needs more time, this should be encouraged as long as the patient's clinical condition allows. Patients are legally allowed to make unwise decisions so long as they have been made aware of all the 'material risks', but the doctor does not have to deliver the treatment they decide upon if they genuinely believe it will not be of benefit. Patients must not be persuaded to undergo treatments they do not want or that they feel are inferior to their chosen option.

Well documented, full and appropriate SDM is particularly important in the recovery phase of the COVID-19 pandemic, because patients may be treated in a different institution, or by a team other than the one who made the diagnosis, worked the patient up for surgery and took part in the SDM process. The treating team should have confidence that the SDM process has been full, accurate and appropriately recorded.

## 2. Patient self-screening health questionnaires and electronic ePOA systems

### **Recommendations**

- At the earliest possible point in the surgical pathway (e.g. at the point of referral from primary care, or at the first review in surgical clinic) patients should complete a screening self-assessment health questionnaire, to help shared decision making, risk prediction and optimisation.
- Ideally an electronic (online) self-assessment questionnaire should be adopted to provide standardisation and efficiency. Alternative provision must be made to support patients who do not understand written English or who are unable to use electronic devices for any reason.
- Patients identified as very high risk on screening may benefit from early preoperative assessment in a high-risk clinic, to help inform shared decision making and optimisation even before the surgical approach is decided.

### **Supporting Information**

Digital solutions are key enablers in the restoration and recovery of elective surgical activity, through release of clinical time with improvements in clinical governance and audit.<sup>21</sup> An electronic pre-operative assessment (ePOA) system supports good quality preoperative assessment (POA)<sup>21</sup> and provides remote accessibility to the patient record for the multidisciplinary team.<sup>22</sup> The ePOA system should provide the surgeon, anaesthetist and multi-disciplinary team with an accurate view of the level of risk for each patient to support the preoperative plan of care or treatment.<sup>21</sup>

Where screening questionnaires are used, the surgeon, anaesthetist or registered nurse or other practitioner skilled in POA should validate the information provided by the patient. This screening questionnaire will form the basis of clinical triage which will determine which patients are suitable for later remote or video consultation, which patients need to attend for nurse-led POA and which patients may be high-risk and require additional physician assessment.

### 3. Preoperative assessment clinic

#### Recommendations

- Every patient requiring surgery and/or anaesthesia/anaesthesia-led sedation should undergo formal preoperative assessment before the day of admission.
- Referrals from primary care to surgeons and from surgeons to Preoperative Assessment (POA) services should detail significant medical comorbidities using a "fitness for surgery" process to enable early optimisation and review. This should highlight key diagnoses, medication, recent results and any other considerations including work considerations and opportunities for optimisation (e.g. smoking, obesity and high alcohol intake)
- Referrals to POAS should detail the COVID-19 status of the patient and their vaccination history. COVID-19 status should include whether and if the patient has had COVID-19 infection, severity of illness, what treatments they received, extent of recovery, sequelae including long-COVID, and vaccination status.
- Screening tools should be implemented in POAS to detect previously undiagnosed clinically important conditions including:
  - Sleep-disordered breathing (using the STOP-BANG questionnaire (i.e. Snoring-Tired-Observed-Pressure-Body mass index-Age-Neck size-Gender)).
  - In patients aged over 65, frailty, using the Clinical Frailty Scale<sup>23</sup> (see Appendix 4)
- A screening tool used in combination with direct questioning should also be adopted to help identify patients with cognitive impairment and therefore increased risk of delirium.<sup>24</sup>
- All patients should be provided with easily understood information materials covering their operation, anaesthesia, recovery and risk.<sup>25</sup> The information should meet the patients' language requirements, meet their 'information and communication support needs'<sup>26</sup> and include materials to support lifestyle changes and long-term health gains. Patients should also be provided with written information on how to access further information after the consultation, e.g. signposting to NHS Choices.
- Nurse-led POAS should have protocols to identify high-risk patients requiring referral to a pre-operative clinic or multidisciplinary team.
- Patients should be evaluated for the risk of difficult to manage perioperative pain. Patients at risk include those with chronic and/or complex pain, on long-term or high dose opiates. Such patients may benefit from referral to a pain management service and/or the acute pain team to plan a perioperative pain management approach.<sup>27</sup>
- In older patients, Comprehensive Geriatric Assessment and optimisation, supported by collaborative working between physicians, surgeons and anaesthetists, should be considered and is cost effective.<sup>28-31</sup> The NHS Elect Peri-operative care of Older People undergoing Surgery (POPS) programme has been established to support adoption.<sup>32</sup>
- Suitability for day case (ambulatory) surgery should be considered. Where possible, non-clinical reasons for hospital admission (e.g. distance to hospital, social support at home) should be addressed from POA, to enable a medically suitable patient to have ambulatory surgery.
- All patients should have a full social history taken, including evaluation of their social and care responsibilities to others.

- Changes to the operation date following POA should be avoided. Where necessary there should be an alert system in place to identify high-risk patients and those on high-risk medicines, to ensure clinical oversight in the revised plan of care, and patient safety.
- The POA service should have agreed service measures and a programme of audit to support service improvements and reduce on the day cancellations attributable to failure of the POA process.<sup>33</sup>

### **Supporting information**

The POA service is an essential component of the surgical pathway, with assessment and preparation commencing at the point of referral from primary care.<sup>25</sup> The Royal College of Anaesthetists has provided guidance for the provision of POA services which should be adopted.<sup>25</sup> The POA service should identify clinical concerns and provide an opportunity for early intervention, optimisation and patient education.<sup>34</sup>

All surgical patients must undergo a nurse-led POA. The majority of patients will require "face to face" nurse-led consultation, however telephone and / or video consultations may be used to complete preoperative assessment for low-risk patients to reduce the risk of COVID transmission. Telephone/Video consultation should "*only (be) used when there is low risk to patient safety and outcome*"<sup>35</sup> noting the limitation of such remote consultations in pre-operative testing and examination. Criteria should be established by the local POA clinical leadership (anaesthetics / perioperative medicine) to determine the cohorts of patients that are suitable for POA video consultations. Video consultation can provide additional visual information and diagnostic clues in the assessment of patients,<sup>36</sup> and should therefore be adopted in preference to telephone POA. The adoption of a uniform software platform within each hospital is recommended to enable effective video consultations with provision for staff training.<sup>36</sup> Remote clinics may take place at a time more suitable for patients.

Screening tools should be embedded in the POA pathway to support the identification of specific health problems, including poor nutritional status, frailty, sleep disordered breathing, and hard to manage perioperative pain. The Faculty of Pain Medicine and British Pain Society will soon jointly publish a leaflet on analgesia after surgery which can be provided to support patients.

Preoperative investigations should be completed in accordance with NICE guidance aligned with patient comorbidities and the grade and complexity of surgery,<sup>37</sup> with audit providing assurance of compliance.

By the end of the preoperative assessment process, patients should be fully informed about all intended interventions. They should also understand their individualised risk of important outcomes to help them to make an informed decision on whether to proceed to surgery.<sup>38</sup> Digital solutions can support informed consent and the optimisation of health status, for example by provision of electronic patient information, advice on prehabilitation and signposting to surgery school where this is available.<sup>24</sup>

Other outputs of the preoperative assessment process should include:

- identification of high-risk patients requiring further assessment.<sup>25</sup> Referral criteria should be established locally to support nurse-led referrals for assessment by an anaesthetist/perioperative physician.
- evaluation and documentation of the need for postoperative enhanced or critical care, the anticipated length of stay, and the plan for discharge.<sup>38</sup>

## 4. Risk scoring and patient selection for enhanced care, critical care and surgical hubs

### Recommendations

- All patients who are being considered for a surgical intervention should have their individualised risk assessed using objective measures, combined with senior, experienced clinical judgement.
- A risk model which provides an estimate of mortality (rather than simply a score), which has been validated on UK patients and which combines patient health with magnitude and urgency of surgery is recommended: for example, the Surgical Outcome Risk Tool (SORT) and SORT-clinical judgement models ([www.sortsurgery.com](http://www.sortsurgery.com))
- Patients with >1% predicted risk of 30-day mortality should be considered for postoperative enhanced care,<sup>39</sup> and with >5% risk should be considered for postoperative critical care admission.<sup>40</sup> If no enhanced care facility is available on site, a surgical Level 2 or 3 admission should be considered.
- Very high risk patients (predicted mortality >10%) should be discussed with a Consultant in intensive care medicine as part of the preoperative work-up.
- Patients who are planned for critical care admission should be provided with a specific education programme and offered the opportunity to meet the critical care team and/or visit the Unit.
- Patients undergoing inpatient surgery who have an ASA grade of 1 or 2, and a predicted 30-day mortality risk of <1% may be considered for a surgical hub undertaking high-volume low-acuity surgery. ASA 3 patients may be considered for hubs for specific low risk treatments (e.g. ophthalmic surgery) depending on local arrangements. Patients with >1% mortality risk should only be considered for surgical hubs if enhanced care facilities and access to critical care and/or perioperative medicine services are available on site.
- Surgeons should be updated if patients seen in the POA are identified as high-risk so that further review, shared decision making discussion and/or optimisation may occur.

### Supporting information

Individualised risk assessment forms an important part of shared decision making and patient selection for surgery. It is the foundation of understanding what optimisation might be required before, during and after surgery in order to reduce risk of complications and death.

The Surgical Outcome Risk Tool (SORT, [www.sortsurgery.com](http://www.sortsurgery.com))<sup>41-43</sup> is a simple risk model which provides an estimate of 30-day mortality risk for inpatient surgery. It requires no specific investigations and therefore can be used in preoperative assessment clinics or by surgeons/multidisciplinary teams (MDTs) when considering and comparing the risk of specific procedures for an individual patient. Recent evaluation found it to out-perform P-POSSUM and other generic models, and to perform well in individual surgical specialties.<sup>42</sup> If a clinical estimate of risk can be provided by an experienced senior clinician or (ideally) an MDT including surgeons and anaesthetists, then the SORT-clinical judgement model should be used.<sup>42</sup> If not, the original SORT model should be used.<sup>41</sup> Both are available at [www.sortsurgery.com](http://www.sortsurgery.com).

High-risk patients benefit from closer physiological monitoring and MDT input in the immediate postoperative period. These patients should therefore be admitted to enhanced or critical care.

High-volume low-acuity surgical hubs are being established to support rapid restoration of elective activity. Patients considered for treatment in such hubs should be at low risk of postoperative complications or death and likely to adhere fully to enhanced recovery pathways. Individualised risk assessment is therefore an essential part of patient selection for these hubs.

## 5. Specific conditions: COVID-19

### Recommendations

- Where possible, surgery should be avoided for 7 weeks after COVID-19 infection. If at 7 weeks, the patient remains symptomatic from acute infection, ideally surgery should be delayed until symptoms have been resolved. These measures aim to avoid the higher risk of postoperative complications and death associated with earlier surgery.<sup>44,45</sup>
- Decision making on whether to defer surgery because of acute COVID-19 infection or persistent symptoms should be informed by multidisciplinary discussion including the patient, surgeon, anaesthetist and/or perioperative physician and a physician with expertise in COVID-19 and/or long COVID as appropriate.
- If a patient presents for consideration of surgery with persistent symptoms or signs of COVID-19 infection, if their condition allows, they should be referred to a long/post COVID-19 clinic prior to undergoing surgery. Indications for referral include patients who are beyond 6 weeks of acute infection and have:
  - persistent shortness of breath
  - cognitive impairment
  - persistent changes on CXR/CT
  - persistent hypoxia or desaturation with exercise
  - persistent tachycardia or symptoms of autonomic dysreflexia
- Patients presenting for surgery who have a persistent cough of >12 weeks duration should be referred onto a diagnostic pathway to exclude lung cancer, and should not be referred to a long/post COVID-19 clinic as this may introduce unacceptable diagnostic delay.
- A number of medicines which are used to treat patients with moderate or severe COVID-19 have implications for immune function and therefore recovery from surgery. A full medicines' review of COVID-19 therapies is required from primary care or the treating hospital if surgery is taking place within 3 months of COVID-19 diagnosis.

### Supporting information

The global impact of COVID-19 is substantial: since the first reported case in December 2019,<sup>46</sup> as of 17<sup>th</sup> June 2021, there have been over 176 million cases confirmed worldwide, with 3.8 million deaths.<sup>47</sup> In the same time frame, the UK has reported over 4.6 million people testing positive for SARS-CoV2 infection and over 127,000 deaths within 28 days of testing positive.<sup>48</sup> Despite ongoing efforts to ensure global vaccination,<sup>49</sup> it is likely that we will continue to see the emergence of variants of concern, with a requirement to update existing vaccines in order to maintain protection against COVID-19.<sup>50</sup> As such, SARS-CoV2 infection is likely to become endemic and will be a constant threat in the foreseeable future.

The clinical course of COVID-19 has been widely studied and is well-described (Table 2).<sup>51-57</sup> Following an incubation period of four to seven days, acute infection lasts up to four weeks and ranges from asymptomatic or mild disease to critical illness and death.<sup>51,53,54,56</sup> It is a multi-system disorder primarily targeting the pulmonary system in the form of a viral pneumonia; common symptoms include fever, cough, dyspnoea, loss of sense of smell and/or taste, and myalgia/fatigue. Although most patients recover from milder symptoms, progression to severe and critical illness is heralded by the need for increasing respiratory

support due to worsening pneumonia and development of acute respiratory distress syndrome (ARDS). Progressive multi-organ complications include impacts on the cardiovascular (myocardial injury, hypovolaemia, and thromboembolic events) and renal systems (acute kidney injury and renal failure), as well as endocrine involvement (poor glycaemic control).<sup>54,55,57</sup>

Acute COVID-19	Symptoms and signs of COVID-19 for up to 4 weeks after infection
Ongoing symptomatic COVID-19	Symptoms and signs of COVID-19 from 4 weeks up to 12 weeks after infection
Post-COVID-19 syndrome	Symptoms and signs that develop during or after an infection consistent with COVID-19, continue for more than 12 weeks and are not explained by an alternative diagnosis. It usually presents with clusters of symptoms, often overlapping, which can fluctuate and change over time and can affect any system in the body. Post-COVID-19 syndrome may be considered before 12 weeks while the possibility of an alternative underlying disease is also being assessed.
Long COVID	Symptoms and signs that continue or develop after acute COVID-19, which includes both ongoing symptomatic COVID-19 (from 4 to 12 weeks) and post-COVID-19 syndrome ( $\geq 12$ weeks)

*Table 2: NICE definitions of COVID-19 related conditions*

Beyond acute infection, a proportion of patients develop a prolongation of symptoms, termed 'long COVID'.<sup>58–65</sup> At the current time there is no agreed definition of long COVID, nor guide as to how long the symptoms may last. Patients experience a wide variety of symptoms that may fluctuate, relapse and remit, or overlap over time.<sup>64,65</sup> Pulmonary issues (e.g. dyspnoea, reduced lung function, and residual lung imaging changes) are a feature, along with common reports of fatigue, muscle weakness, and cognitive dysfunction ('brain fog').<sup>58,61–63,66,67</sup> Data from the UK COVID-19 Infection Survey estimated that 1 in 10 COVID-19 positive respondents had symptoms lasting more than 12 weeks<sup>68</sup> and more recent estimates have revealed over one million people self-reporting symptoms of long COVID within the UK.<sup>69</sup> Women are disproportionately affected.<sup>69</sup> Many patients affected by long COVID will not have consulted medical services either at the time of their acute illness, or subsequently - this group will therefore be more difficult to identify.

When considering those with previous acute infection, it is important to differentiate between the long-term sequelae of a severe acute episode (post-ICU syndrome and the effects of prolonged ventilation), deconditioning, and long COVID. The first group are readily identified at screening. Differentiating between deconditioning and long COVID is more challenging. Deconditioning is associated with less favourable surgical outcomes, but the implications of long COVID may depend on the individual features. How either of these impact on the timing of surgery of this distinction is unclear. The type and urgency of the surgery remain the most important considerations.

Evidence-based treatments for severe COVID-19 (i.e. requiring at least oxygen therapy and/or hospitalisation) include low-dose steroids (e.g. 6mg daily dexamethasone for 10 days); IL-6 inhibitors (tocilizumab or sarilumab) and anti-virals (remdesivir). Experimental therapies being evaluated in clinical trials at the moment include JAK-inhibitors (e.g. Baricitinib). For up-to-date information on all medicines management in the perioperative setting, please refer to the UKCPA Handbook of Perioperative Medicines (<https://www.ukcpa-periophandbook.co.uk/>).

### Biologics

Biologics such as IL-6 inhibitors and JAK-inhibitors may increase the risk of infection. When used for patients with rheumatological disorders, decisions regarding timing of surgery (and discontinuing drugs) have to balance the benefit of reducing the risk of post-operative infections and impaired wound healing against the risk of a perioperative disease flare up.<sup>70</sup> The latter does not apply to patients after COVID-19. However, the principles applied in the above decision making may be usefully extrapolated to surgical care after use of IL-6 inhibitors. Of note it is uncertain if the biological effect of the monoclonal antibodies stops when serum levels fall, but this is the pragmatic approach recommended by rheumatologists. IL-6 inhibitors are potent suppressors of the acute phase reaction. This may lead to an absent or attenuated rise in temperature or C-reactive protein (CRP) during infection.<sup>70</sup> Impact of tocilizumab on CRP (i.e. CRP suppression) peaks at 1-3 weeks and then recovers slowly.<sup>70</sup> Tocilizumab may also cause a neutropaenia in up to 20% of those taking it regularly.<sup>71</sup> This drop usually reaches its nadir at two weeks,<sup>72</sup> is due to peripheral margination and is not associated with an increase in infection frequency.<sup>70</sup> Taken together, these factors increase risk of both infection and diagnostic delay. The impact on wound healing is likely to be modest.

Based on British Rheumatological Society recommendations,<sup>70</sup> surgery should not take place for 4 weeks after intravenous tocilizumab. For other biologicals, the society recommend that “surgery should be arranged for the week after the next scheduled dose of anti-TNF, and longer still (preferably five half-lives) if the surgery is deemed to be of especially high infection risk by the surgical team”<sup>70</sup>. The dosing interval for sarilumab is 2 weeks. It has a half-life of 21 days and for surgery where risk of infection is high, expert advice is recommended. Tocilizumab also commonly causes a transient rise in transaminases. This is usually modest (up to 3x upper limit of reference range) and self-limiting.<sup>70</sup>

### Steroids

Many patients hospitalised with COVID-19 and administered oxygen therapy will have been prescribed a short course of low-dose steroid (e.g. dexamethasone 6mg for 10 days). Some hospitals are also using high-dose steroid regimes for patients with severe COVID-19, usually restricted to those requiring mechanical ventilation. In all such patients, both steroid withdrawal and impaired wound healing may be a risk in the short- to medium-term. Guidelines for perioperative steroid replacement have recently been published and should be followed.<sup>73</sup> Consultation with endocrine specialists is advised if a patient treated with high-dose steroids presents for surgery while still on a tapering dose or within 6 weeks of treatment.

## 6. Specific conditions: Other comorbidities

### Recommendations

- Patients should be assessed for the impact of comorbid conditions on functional capacity, as well as evaluating, and where necessary, optimising, control of these conditions.
- Patients with the following conditions will require specific evaluation to ensure that they are optimised and appropriate plans are made for the perioperative pathway:
  - Diabetes mellitus
  - Other significant endocrine disease including thyroid disease
  - Poorly controlled hypertension, coronary artery disease or arrhythmia
  - Anaemia
  - Heart failure
  - Lung disease leading to functional impairment
  - Renal impairment
  - Liver impairment
  - Sleep disordered breathing
  - Implantable pacemakers and/or defibrillators
  - Patients treated with high dose opioids and/or other dependency forming drugs (DFDs)
  - Patients with learning disabilities or autism
  - Vulnerable adults (this should include safeguarding evaluation)
  - Severe mental health problems
- Individuals with chronic pain, especially with complex chronic pain and who are on long-term or high dose medication regimes, are at higher risk of poor perioperative pain control, and should therefore be referred to a pain management team for care planning before surgery.
- All patients should be evaluated for conditions which may affect their perioperative decision-making, including dementia and/or cognitive impairment of any aetiology.
- Patients should be advised that prehabilitation measures (balanced diet, weight management, exercise and smoking cessation) also improve function and fitness.<sup>74</sup>

### Supporting information

- Comorbidities usually impact on surgical outcome as a function of reduced fitness/functional capacity and deconditioning. However, some specific comorbidities may carry specific perioperative risks. Patients under the care of medical specialty teams may require specific review prior to surgery.
- Patients living with multi-morbidity may benefit from a general medical or geriatric medicine review by a multidisciplinary service. This may include clinical pharmacists to address polypharmacy and the management of high-risk medications such as anticoagulants.
- Condition-specific guidance includes:
  - Dementia and older people
    - <https://associationofanaesthetists-publications.onlinelibrary.wiley.com/doi/10.1111/anae.14530>
  - Diabetes mellitus:

- [www.cpac.org.uk/guidelines-resources-guidelines-resources/guideline-diabetes](http://www.cpac.org.uk/guidelines-resources-guidelines-resources/guideline-diabetes)
  - Cardiovascular disease including hypertension:
    - [academic.oup.com/eurheartj/article/35/35/2383/425095](https://academic.oup.com/eurheartj/article/35/35/2383/425095)
    - [www.ahajournals.org/doi/full/10.1161/CIR.0000000000000105](https://www.ahajournals.org/doi/full/10.1161/CIR.0000000000000105)
  - Anaemia:
    - <https://cpac.org.uk/guidelines-resources-guidelines-resources/addressing-preoperative-anaemia>
  - Sleep disordered breathing:
    - <https://pubs.asahq.org/anesthesiology/article/120/2/268/11781/Practice-Guidelines-for-the-Perioperative>
  - Surgery and Opioids
    - [https://fpm.ac.uk/sites/fpm/files/documents/2021-03/surgery-and-opioids-2021\\_4.pdf](https://fpm.ac.uk/sites/fpm/files/documents/2021-03/surgery-and-opioids-2021_4.pdf)
- Frailty guidance will be published by the Centre for Perioperative Care ([www.cpac.org.uk](http://www.cpac.org.uk)) in September 2021.

## 7. Functional capacity assessment

### Recommendations

- All patients who are being considered for a surgical intervention should be screened for reduced functional capacity/physical fitness using a validated tool such as the Duke Activity Status Index (DASI) physical activity score,<sup>75</sup> Godin-Shephard Leisure Time Exercise Questionnaire,<sup>76</sup> or the International Physical Activity Questionnaire (IPAQ).<sup>77-80</sup>
- Patients with reduced fitness/functional capacity on screening should undergo an objective assessment. Where available, cardiopulmonary exercise testing (CPET) using an incremental ramp to the limit of tolerance is the gold standard objective assessment of functional capacity. CPET may be used to differentiate deconditioning from primary respiratory or cardiac causes of reduced exercise capacity.<sup>81,82</sup>
- Where CPET is not available or impractical, a simpler objective assessment of functional capacity may be used. These can be used in clinic and help set patient goals. These include:
  - The incremental shuttle walk test (ISWT)<sup>83,84</sup>
  - The 6-minute walk test (6MWT)<sup>85,86</sup>
  - The one-minute sit-to-stand test (STS)<sup>87</sup>
  - The Timed Up-and-Go test (TUG)<sup>88</sup>
- Desaturation of more than 3% on a 6MWT or STS suggests impaired gas exchange (Interstitial lung disease, pulmonary fibrosis, pulmonary hypertension). After COVID-19 infection, this should prompt referral to a COVID-19 follow-up clinic or respiratory review for further investigation.<sup>89,90</sup>

### Supporting information

The assessment of functional capacity reflects the ability to perform activities of daily living that require sustained aerobic metabolism.<sup>91</sup> It therefore evaluates the impact of comorbidities on physical fitness and the patient's functional status. When combined with information about the magnitude and type of surgery, this helps to generate an individualised risk assessment. Dynamic tests are more predictive of performance under physiological stress (i.e. during surgery) than resting tests.<sup>92</sup> Desaturation during a functional test implies gas exchange inefficiency which may have a variety of causes including COPD, interstitial lung disease or pulmonary hypertension as well as ongoing complications of COVID-19.<sup>90,93</sup>

Reduced physical fitness is associated with increased risk of post-operative complications and death, a slower recovery from surgery,<sup>94</sup> and poorer long term health outcomes (increased risk of cancer, dementia, falls, frailty fractures, cardiovascular disease, stroke, mental health & mortality).<sup>74</sup>

## 8. Exercise interventions

### Recommendations

- All patients should be advised that improving fitness before surgery reduces their risk of complications after surgery,<sup>95</sup> their length of hospital stay, their speed of recovery from surgery and their quality of life.<sup>96,97</sup>
- They should be advised that fitness can be improved within two to three weeks and that the least fit individuals gain fitness most rapidly.<sup>96</sup>
- Preoperative exercise interventions should be determined by baseline fitness (needs-based). Interventions can be categorised as universal (for all), targeted (for intermediate fitness/risk) or specialist (for low fitness/high-risk).<sup>35,98</sup> Very unfit patients should be advised to build up slowly with appropriate short-term goals as it is counterproductive to set a level that feels unattainable.<sup>99</sup>
- All healthcare professionals should be competent to deliver universal exercise advice to all patients following UK CMO (WHO) guidance<sup>100</sup> aiming for patients to *build up to*:
  - Aerobic Exercise: At least 75 minutes' vigorous activity or 150 minutes moderate activity per week; spread over the week e.g. 5 sessions of 30 minutes AND
  - Strength/Resistance Exercise: at least twice a week exercising all major muscle groups; at least one set of 8–12 repetitions using weights (can use household items eg canned food, large water bottles, rice) or resistance bands AND
  - Balance and Flexibility: at least twice a week in over 65's (e.g. dance, yoga, Tai Chi)
- Aerobic exercise should be prioritised preoperatively as aerobic exercise capacity specifically is associated with surgical outcome.<sup>101,102</sup>
- Patients should be encouraged to choose their preferred exercise, set exercise goals (e.g. what type, how often), consider rewards for achieving their goals, identify barriers to exercise (what will stop them) and keep a diary of their exercise in keeping with behavioural change evidence.<sup>98,103,104</sup>
- Targeted/Specialist Exercise Prehabilitation Prescriptions: Patients screened as having low physical fitness should be assessed using an objective tool (see functional capacity assessment) to allow prescription of an individualised exercise programme appropriate for their baseline fitness. This assessment should include the evaluation of co-morbidities and be undertaken by a professional qualified in exercise prescription with relevant experience.<sup>98</sup>
- Where such expertise is not available, universal exercise advice should be given (see above) and local solutions should be sought which make the best use of available resources across primary and secondary care.
- Exercise prescription should include: the frequency, intensity, duration and modality of exercise and how to progress exercise (frequency/intensity/duration).<sup>105</sup>
- Supervised exercise programmes are preferred using either face to face or remote/virtual supervision, as their adherence is greater than non-supervised interventions.<sup>106</sup>
- Moderate to high intensity interval exercise programmes are recommended.<sup>101,102</sup>
- Patients with current or recent viral infection should not exercise whilst febrile or symptomatic and in the case of COVID-19, for at least two weeks after a diagnosis is made, to reduce the risk of myocarditis. Once the illness has resolved exercise can be re-introduced and built up as tolerated.<sup>107</sup>

## **Supporting information**

Exercise should be distinguished from physical activity. Although physical activity is important for long-term health outcomes, there is limited evidence of its impact on short-term surgical outcomes.<sup>102,108</sup> Preoperative aerobic exercise training (particularly interval training at moderate- or high-intensity), rather than resistance training has been demonstrated to reduce complications and length of stay and improve quality of life after surgery<sup>101,102</sup> without increasing costs.<sup>96,109</sup> Aerobic exercise may also promote tumour regression.<sup>110</sup> Fitness will be attained more quickly with interval aerobic training rather than continuous exercise of the same intensity. Interval training involves short bursts of vigorous intensity exercise (e.g. 2-3 minutes of very brisk hill walking where one is out of breath) interspersed with low-intensity exercise (e.g. 3 minutes slow walk on the flat).<sup>111</sup>

### *Exercise Intensity*

Self-monitoring exercise intensity will enable patients to adjust their effort to the appropriate target range (see Table 3): moderate-intensity exercise involves getting out of breath. For patients on beta-blockers or other medication that modifies heart rate, avoid using heart rate as an intensity target.

Evaluating Exercise Intensity	Low Intensity	Moderate Intensity	Vigorous Intensity
Borg Scale 0-10 rest - maximal	0-3 Rest-Moderate	5-7 Somewhat hard - hard	8-10 Very hard-maximal
Talk test	Speak comfortably	Talk but can't sing	Few words only
Breathing/ speaking	Easy to breathe and carry on a conversation	Breathing more heavily Can only complete 1-2 sentences	Breathing very hard Can only say a few words
Heart rate range (Est max HR=220-age)	<55% of maximum heart rate	55-75% of maximum heart rate	>75% of maximum heart rate
Example Exercise	Slow walk	Ballroom dancing Brisk walk Cycle < 10 miles/hour General gardening Dancing	Aerobic dancing Running Cycle > 10 miles/hour Soccer Heavy gardening Climbing stairs Swimming freestyle laps

*Table 3: Self-monitoring for exercise intensity*

Evidence suggests that setting exercise goals (e.g. what type, how often), considering rewards for achieving goals, identifying barriers to exercise (what will stop them) and keeping an exercise diary all support positive behaviour change.<sup>103,104</sup> Patients can be signposted to appropriate resources to support them to increase their fitness (e.g. local exercise classes, videos, apps and other online exercise resources - see Appendix 2), and encouraged to find an exercise that suits them. Resources on [www.movingmedicine.ac.uk](http://www.movingmedicine.ac.uk) may also help.

## 9. Mental health and cognition assessment and preparation

### Recommendations

- All patients with abnormalities on cognitive screening, or in whom cognitive concerns are raised during assessment or on collateral history, should go on to undergo cognitive assessment using the Montreal Cognitive Assessment (MOCA),<sup>112</sup> and referred for further assessment as appropriate.
- All patients considered for a surgical intervention should be screened for psychological distress using validated tools e.g. Patient-Health Questionnaire 9 (PHQ9) depression test questionnaire<sup>113</sup>; Generalised Anxiety Disorder 7 (GAD7) questionnaire (for anxiety & PTSD)<sup>114</sup>; or Hospital Anxiety and Depression Scale (HADS) (anxiety and depression)<sup>115</sup>
- A history should be taken to identify any hospital or health-related traumatic experiences<sup>114</sup> and specific procedural phobias or fears.
- Assessment should include exploration of mental health history including recent or relevant psychological disorders or difficulties, e.g. bereavement, harassment, divorce, diagnosis of a long-term condition, chronic loneliness or caring responsibilities.
- Patients identified as at risk should be offered referral to a speciality specific clinical health psychologist. If this is not available, the patient should be referred to their general practitioner for assessment and signposting to general community services and third sector organisations (see below).
- Behaviour change strategies, e.g. using the principles of Healthy Conversation skills, should be used to support patient behaviour change (diet, exercise, smoking cessation) and self-management.<sup>103,104,116</sup>
- Consideration should be given to evaluating the knowledge, skills and confidence a person has in managing their treatment and recovery using a validated tool (e.g. Patient Activation Measure, PAM),<sup>35,117</sup> as well as sufficiency of practical and emotional support.

### Supporting information

Cognitive impairment may impact on the ability of the patient to participate in shared decision making processes. Psychological factors impact postoperative physical and psychological patient outcomes and preoperative interventions may improve surgical outcomes.<sup>118</sup> There are NICE guidelines available which should be followed for the assessment and management of psychological conditions.<sup>119-123</sup> Clinicians should consider the potential impact of the pandemic on mental health,<sup>124</sup> including increased risk of PTSD.<sup>125</sup> SARS-CoV-2 infection may also lead to cognitive impairment (see Section 5).<sup>126</sup>

## 10. Nutritional assessment and optimisation

### Recommendations

- All patients who are being considered for a surgical intervention should be screened for risk of malnutrition using a validated tool.<sup>127</sup> Examples include the Nutritional Risk Screening 2002 (NRS 2002)<sup>128,129</sup> and the Malnutrition Universal Screening Tool (MUST).<sup>130</sup>
- Malnutrition screening should take place as early as possible in the perioperative pathway, ideally as soon as surgical intervention is contemplated. Preoperative pathways should be mapped to facilitate this.<sup>131</sup>
- Patients identified by screening as being at risk of malnutrition should undergo a diagnostic assessment of unintentional weight loss, body mass index, muscle mass, dietary intake and disease burden.<sup>132</sup> This assessment should be undertaken by those with experience and expertise, such as a registered dietitian or physician with an interest in clinical nutrition.
- All patients, regardless of risk of malnutrition, should receive universal dietary advice following the NHS Eatwell principles.<sup>133</sup>
- Nutritional interventions should be dictated by the severity of malnutrition and the urgency of surgery. These interventions could be modelled around the NIHR-RCoA-Macmillan prehabilitation guidance.<sup>98</sup>
- Where increased dietary intake is required, dietary advice should follow the “Food First” food fortification approach to increase energy and protein intake.<sup>134</sup>
- Oral nutritional supplements (ONS) should be considered for all patients not achieving adequate intake through normal diet,<sup>127,135</sup> particularly if there is a delay before assessment by a dietitian, or a limited time before surgery.<sup>136</sup>
- Oral nutritional supplements should be given preoperatively to all malnourished cancer patients and high-risk patients undergoing major abdominal surgery.<sup>135–137</sup>
- Decisions regarding specialist interventions, for example preoperative enteral tube feeding, should be based on multi-disciplinary discussion in conjunction with published guidance.<sup>127,135,137</sup>
- Obese patients should not be assumed to be well-nourished; their assessment and management should take a multi-disciplinary approach.<sup>127,135</sup> Weight management support may be beneficial for some patients.

### Supporting information

Perioperative malnutrition is a major risk factor for increased postoperative morbidity, mortality and hospital length of stay.<sup>135,138</sup> Preoperative optimisation of nutrition has been shown to improve outcomes after surgery.<sup>97,139</sup> Patients having surgery for cancer or gastro-intestinal disease are at particular risk due to inadequate oral intake, cancer cachexia, muscle depletion and systemic inflammation.

The aim of preoperative nutritional support is to restore energy deficit, avoid weight loss, improve functional performance and preserve the gut microbiome. A normocaloric diet with a protein intake of 1.2g/kg is sufficient to achieve this.<sup>137</sup> Preoperative nutritional interventions should be needs-based and the enteral route is preferred where feasible. All patients should receive dietary counselling and food fortification advice ('food first').<sup>137</sup> Food First is an approach to treating poor dietary intake and unintentional weight loss by increasing the

energy density of meals and thus increasing total caloric intake. This is achieved by applying the following principles:

- Eat little and often: advise patients to have three small meals plus two to three nourishing snacks in between (eating every 2-3 hours)
- Choose full fat and sugar products
- Choose nourishing drinks – such as milkshakes
- Food enrichment: Involves using everyday food items to enrich the diet with energy and protein, such as adding butter, cream, cheese, full-fat milk, skimmed milk powder, oils, or crème fraîche to foods to boost their energy and protein.

Dietetic counselling involves the assessment of a patient's nutritional status and the delivery of individualised dietary advice. There is limited evidence to support improvement in surgical outcomes with counselling.<sup>140,141</sup>

Oral nutritional supplements (ONS) (e.g. Ensure or Fortisip) are sterile liquids, semi-solids or powders, which provide both macro- and micro-nutrients. They are widely used within the acute and community health settings for individuals who are unable to meet their nutritional requirements through oral diet alone. A meta-analysis of RCTs confirms that preoperative ONS reduces complications (35% reduction), length of stay (approx. 2 days) and mortality (0.65 Risk ratio).<sup>142</sup> Furthermore, economic analysis of these RCTs confirms that ONS reduces hospital costs and is cost-effective.<sup>142</sup> There is also RCT evidence that ONS has additional benefit when compared with dietetic counselling alone.<sup>143,144</sup> Current NICE guidance recommends ONS should be considered in all patients at risk of malnutrition or with established malnutrition.<sup>127</sup> ESPEN (European Society for clinical nutrition and metabolism) recommends ONS for all patients not meeting their energy needs from normal food preoperatively, irrespective of their nutritional status.<sup>137</sup> Furthermore, ESPEN recommend that ONS is obligatory for malnourished patients with cancer and high-risk patients undergoing major abdominal surgery.<sup>135</sup>

## 11. Preoperative Group Education – Surgery School

### **Recommendations:**

- All patients considered for a major or inpatient elective surgical intervention should be invited to attend a group 'surgery school', which may be in-person, via remote access or hybrid.
- The content should include knowledge about the likely course of the planned admission, the benefits of preparing for surgery, and support development of skills empowering behaviour change.

### **Supporting information**

There are dozens of examples of surgery schools across the UK, including published results from Southampton, Manchester and Portsmouth.<sup>145–148</sup> Patient satisfaction scores of 95% have been noted, including with virtual schools developed during the pandemic. Other published results include:

- Reduction in length of stay<sup>145,149,150</sup>
- Lifestyle behaviour change,<sup>145,149,151</sup> including 48% to 75% patients increasing physical activity, 40% stopping smoking and 40% reducing alcohol consumption<sup>147</sup>
- Reduced complications<sup>150,152</sup>
- Positive patient experience from group interaction<sup>145,150</sup>

In general, patients prefer live presentations with the ability to answer questions in real-time. Around 20 - 40% of patients do not attend face-to-face group surgery schools; non-attendance is more likely with patients who live in more deprived areas and who have further to travel.<sup>149</sup> Surgery school sessions usually have 6-15 participants and often run once or twice per week. The median time is 2 hours, with skilled local clinical instructors using structured oral presentations, illustrated by slides and supplemented by handouts, that highlight key lessons. Patients are encouraged to bring a family member or friend and there is time to ask questions. Smaller groups result in a more interactive experience.

### Educational scope

The purpose of surgery school is to set patient expectations and empower them to prepare for their operation. Areas which should be covered include:

- What to expect coming into hospital, what to expect in terms of pain/pain management, drinking, eating, and mobilisation after surgery, other aspects of enhanced recovery, post discharge recovery and types of complications.
- Principles of prehabilitation (exercise, nutrition and mental health), alcohol moderation and smoking cessation. Smoking cessation interventions have been reported to reduce postoperative complications by more than 50% in systematic reviews of randomised controlled trials (RCTs).<sup>153</sup> Preoperative exercise interventions may also reduce postoperative complications by up to 50%.<sup>101</sup>
- Skills development including the active cycle of breathing and how to achieve behaviour change.

All content relating to potential behaviour change should be supported with validated behaviour change techniques: these include goal setting, self-monitoring, demonstrations, providing examples of what other patients have done, social support and behaviour substitutions.<sup>149</sup>

### Other practicalities

Surgery schools can be in-person, via live video conference or use a hybrid approach of live and recorded content. Patients unable to attend or log in should be contacted and sent an audio or video recording of surgery school or written information.

Many units have benefited from visiting other surgery schools before setting up theirs. Where virtual pre-assessment is used, links to videos can be given. Many units benefit from having links with local gyms, swimming pools or charities in the area. Surgery schools should be supported by online resources, such as [www.erasplus.co.uk](http://www.erasplus.co.uk) and [www.prehab4cancer.co.uk](http://www.prehab4cancer.co.uk), and signposting to local relevant support services such as Macmillan, and smoking cessation services. Sites should develop local resources, but there is a new useful new surgery school video at: <https://youtu.be/gVuF6J2nUjA> from Manchester (Figure 1).

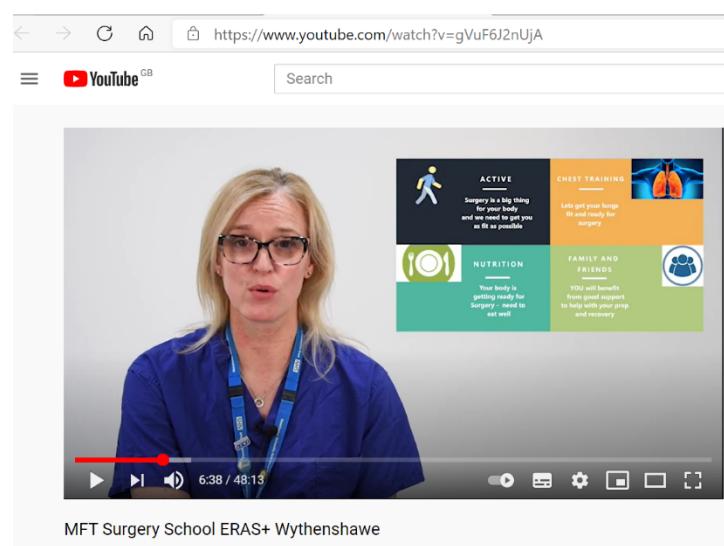


Figure 1: Still image from Manchester surgery school video

### Costs

- Staffing time per 500 patients, as a proportion of Whole Time Equivalent (WTE) on the Agenda for Change<sup>145</sup> pay Band scale: 0.2 – 0.6 WTE Band 6 nurse, 0.1 WTE Band 6 dietitian, 0.1 – 0.2 WTE Band 3/4 therapy assistant and 0.4 – 0.6 WTE Band 3 Administrator.
- Set-up costs include staff training and creating materials, videos and leaflets.
- Capital costs are reported as minimal, including incentive spirometers (approximately £3 each) or activity monitors.<sup>154</sup>

## 12. Clinical surveillance and support of patients on waiting lists for surgery

### Recommendations

- All patients should be encouraged to treat the waiting list as a preparation list. Contact with their perioperative team should be used to signpost this.
- Changes to the operation date following POA should be avoided. Where necessitated, there should be an alert system in place to identify high-risk patients and those on high-risk medicines, to ensure clinical oversight in the revised plan of care and patient safety.
- All perioperative services should have a system for active clinical surveillance of patients on waiting lists, particularly those who have been on lists for longer than 3 months for P3 or P4 surgery. This is distinct from technical validation which is an administrative task and is required to ensure that the waiting list is accurate and up to date (Figure 2)

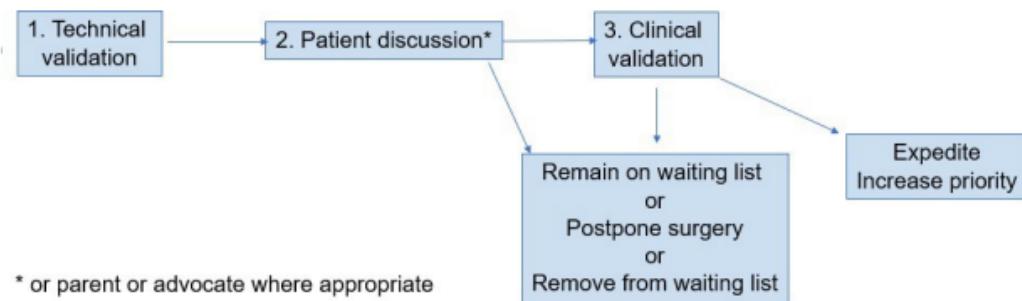


Figure 2: Process for waiting list validation<sup>155</sup>

- The system should be tailored to the nature of the surgery intended and the patient's individual needs. The key features of this system should include:
  - Provision of a point of contact in the perioperative team for all patients awaiting surgery to establish communication between the patient and that team. Patient should be able to access the point of contact by telephone or email.
  - Prompting of patients to report any significant changes in health or circumstances that may impact on the timing of planned surgery or their fitness for it. These changes may be in either the condition for which they are having surgery, or in their general health (e.g. a new diagnosis or change of medication)
  - Patients should report these changes to the point of contact in the perioperative team, and request a summary care record (SCR) from their primary care practice.
- Trusts and Integrated Care Systems should work towards ensuring read only access to GP systems (available in many hospitals already), access to Summary Care Records or similar mechanisms which broach the primary-secondary care interface. Where this

is not yet possible then an agreed local mechanism should be established within Integrated Care Systems (ICS) to enable the primary care practice administrative team to send relevant information from the GP record to secondary care (even if the secondary care provider is outside the ICS).

- When establishing local surveillance systems, consideration should be given to avoidance of widening health inequalities. Some patients, for example, with low health literacy or from more deprived communities, may require more intensive support from both primary and secondary care to ensure that significant changes in health are reported in a timely way.
- Consideration should be given to whether an individual patient might require occasional follow-up by surgical services while on the waiting list, to provide insurance against important changes in their condition going unnoticed.
- Staff members involved in patient contact should ideally be trained in optimisation for surgery, when to request a medical review or repeat POA, resources to signpost and motivational interviewing.
- A shared decision making tool, such as that previously published,<sup>155</sup> could be used to support clinical discussion.
- Local adaptation and distribution of the business card and patient information sheet templates provided in Appendix 1 and 2 is advised to support these recommendations.

### **Supporting information**

The aims of these recommendations are to:

- Reduce last-minute cancellations and postoperative complications (e.g. due to development of new comorbidities or worsening fitness whilst waiting for surgery).
- Where appropriate, to identify and re-prioritise patients with deteriorating conditions, and if possible, expedite their procedure.
- Ensure patients feel supported, empowered and ready for their surgery.
- Identify patients who would benefit from further discussion with their clinical team about the risks, benefits and alternatives (including avoiding surgery).

Increased time on waiting lists carries with it an increased risk of clinical deterioration for patients awaiting surgery. This may be due to the condition for which surgery is planned, or other factors that might lead to a worse outcome. Change in the underlying surgical condition may require a patient's surgical prioritisation to be changed. New or deteriorating medical conditions may necessitate a change in the perioperative plan.

Regular electronic contact (e.g. automated text messaging every 3 months) may be a helpful means of providing a prompt for patients to alert secondary care of significant changes in health. A text message system might ask patients if, since their last contact with the perioperative service, they have had:

- A hospital admission
- A change of medication
- A new diagnosis
- A significant deterioration in the condition for which surgery is planned

In addition, perioperative services could consider providing patients with a “business card” to be shared with primary care staff (Appendix 1) and a more detailed patient information leaflet which signposts what needs to be notified to the perioperative team (Appendix 2).

There are a number of risks of entirely relying on patients to provide information on changes in their health, the most important of which is that it will potentially increase health inequalities: patients who are less health literate, less activated, more socially isolated, more deprived or from some ethnic groups may be less likely to proactively report changes in their health.<sup>156-158</sup> Primary and secondary care services should therefore work together to ensure patient care is not further disrupted; this will require effective and prompt communication in order to ensure that changes in clinical condition are alerted to perioperative services, and where required, validation provided by whichever primary or secondary care provider is responsible for management of any change. Many opportunities exist to use technology to facilitate better communication between primary and secondary care, including provision of read only access between primary and secondary care records, supporting patients to use the NHS app and secondary care access to summary care records (SCR).

Local agreement will need to be reached on who in secondary care will manage the additional workload associated with this active clinical surveillance system – this may be the preoperative assessment service, individual surgical services or a combination.

## 13. Preoperative Assessment and Optimisation in emergency surgery

### **Recommendations:**

- Pathways should be designed so that care needs are anticipated, delay to time-critical surgery is reduced and time spent in hospital is minimised.
- Surgery specific risk assessment tools such as the NELA (national emergency laparotomy audit) risk model or Nottingham Hip Fracture Score should be used to risk assess before surgery and guide consent and shared decision-making discussions, including Treatment Escalation Plans.
- Some emergency pathways may be planned on a day case basis such as ambulatory fracture surgery. This may involve having ‘hot clinics’ and high quality patient preparation: protocols are available to support this.<sup>22</sup> This may involve COVID-19 testing followed by self-isolation, so the patient can use a ‘Green’ or ‘COVID-19-light’ area.

### **Supporting information**

Preoperative assessment and optimisation, even in the limited time available before emergency surgery, benefits both the individual patient (through reduction in complications) and may also reduce pressure on resources for all other patients (through reduced length of stay).

In many units, emergency and elective patients directly or indirectly compete for resources. For example, before the pandemic, 23.6% of UK intensive care admissions followed elective surgery.<sup>159</sup> The commonest reason for cancellation of elective surgery is lack of a surgical ward or intensive care bed.<sup>160</sup> The necessity for ensuring COVID- and non-COVID pathways adds complexity and may reduce efficient use of resources.

An important aspect of delivering high quality, safe, efficient care of emergency patients is planning of pathways in advance, so that common presentations are expected. This benefits from trans-disciplinary working.<sup>20</sup> For example, a healthcare assistant in the emergency department can be empowered to know that a patient with a hip fracture should have intravenous fluids and an ECG, be considered for a fascia iliaca block<sup>161</sup> for pain relief and to share a standard patient information leaflet for the patient and relatives.

Laparotomy and hip fracture surgery are the two highest volume emergency operations and have 30-day mortality rates of 9.2% and 5.4% respectively. The National Emergency Laparotomy Audit (NELA)<sup>162</sup> and the hip fracture database<sup>163</sup> have demonstrated where care can be improved.

Further guidance for patients undergoing emergency surgery can be found from the British Orthopaedic Association (in the form of standards documents<sup>164</sup>) and the British Geriatric Society (targeting older patients undergoing surgery<sup>165</sup>).

## Appendix 1: Template for 'business card' for patients on surgical waiting lists

### Front of card:

	
NAME:	Hospital Number:
Dear Hospital team or GP:	
<b>I am on a surgical waiting list</b>	
To reduce the risk of me being postponed or cancelled, if I:	
<ul style="list-style-type: none"><li>- have a new diagnosis</li><li>- am admitted to hospital</li><li>- am seen in the emergency department</li><li>- have a change in my medications</li><li>- have anything else that might change:<ul style="list-style-type: none"><li>o whether or not I need surgery</li><li>o the timing of surgery</li></ul></li></ul>	

### Back of card:

(To be completed by surgical / perioperative service only with patient's permission)
Condition:
Surgery planned:
NHS Trust:

## Appendix 2: Template for information leaflet for patients awaiting surgery

**This template can be used as a framework for hospitals or specialist societies to adapt for their patient population needs. We suggest adding a prompt for specific symptoms which may signify either a significant deterioration in the condition for which surgery is planned, or the requirement for urgent investigation for a new diagnosis. An example of this might be a sudden deterioration in eyesight in patients awaiting cataract surgery, or development of inter-menstrual bleeding in women awaiting interventions for fibroids.**

You are receiving this information because you are due to have surgery.

Between now and the time of your procedure, it is important that you keep as healthy and active as possible. Doing so will mean that you have the best possible chance of your surgery and recovery going well and help to reduce complications. The key things are to be physically active, to eat well and to be psychologically prepared. For example, doing some exercise every day is proven to reduce the risk of a complication.

There are lots of resources available to help you with this (see the end of this leaflet for details)

If there is a significant change in your health, we need to know about it, and can be contacted at [insert email address and phone number]. Once you contact us, we may then request further information from your GP practice to help us decide what needs to be done. In particular, we need to know about the following events:

1. If you are admitted to hospital for any reason.
2. If your GP or hospital specialist starts you on a new medication
3. If you have a new diagnosis (e.g. a heart condition, high blood pressure, diabetes or any other new condition diagnosed by your GP or the hospital)
4. If you experience any of the following symptoms, please let us know, as these are symptoms which may potentially alter the treatment you need and it is therefore important we know about them.

If you contact us, we will get back in touch within 10 working days to confirm receipt of your message and anything that you or we need to do.

Please also let us know if your circumstances have changed that might affect when and if you want to have an operation (e.g. parenthood or a new job). If you change your mind or are having second thoughts about having surgery, please also contact us to discuss this.

We will check in with you every 3 months by text message, email or phone, to find out if there have been any major changes in your health.

**Resources to help you prepare for surgery:**

**General preparation**

[www.cpac.org.uk/patients](http://www.cpac.org.uk/patients)

[https://www.rcoa.ac.uk/sites/default/files/documents/2020-10/FitterBetterSooner2018web\\_0.pdf](https://www.rcoa.ac.uk/sites/default/files/documents/2020-10/FitterBetterSooner2018web_0.pdf)

**Weight management guidance if you are overweight**

<https://www.nhs.uk/conditions/obesity/>

<https://www.nhs.uk/conditions/diabetes/>

**Smoking reduction support**

<https://www.nhs.uk/better-health/quit-smoking/>

**Alcohol management support**

<https://www.nhs.uk/live-well/alcohol-support/>

**Opioids Aware resource**

<https://www.fpm.ac.uk/opioids-aware>

**Keeping active**

<https://www.nhs.uk/live-well/exercise/>

<https://www.nhs.uk/better-health/>

[www.movingmedicine.ac.uk](http://www.movingmedicine.ac.uk)

**Resources to help you relax**

**Relaxation techniques**

<https://www.cntw.nhs.uk/resource-library/relaxation-techniques/>

**Information about sleep**

<https://www.sleepstation.org.uk/articles/>

**Apps that help with emotional and mental well-being**

### **Mindfulness and relaxation exercises**

<https://velindre.nhs.wales/news/archived-news/the-velindre-mindfulness-app-has-now-officially-launched/>

### **Tools for problem solving and letting go of worry**

<https://www.nhs.uk/apps-library/worrytree/>

### **Tools to manage anxiety and relax**

<https://www.anxietycanada.com/resources/mindshift-cbt/>

### **NHS Talking Therapies**

<https://www.nhs.uk/mental-health/talking-therapies-medicine-treatments/talking-therapies-and-counselling/nhs-talking-therapies/>

### **Exercise Resources On-line**

<https://www.nhs.uk/live-well/exercise/>

<https://www.nhs.uk/oneyou/active10/home>

<https://www.blf.org.uk/support-for-you/keep-active/exercise-video>

<https://www.thisgirlcan.co.uk/activities/home-exercise/>

<https://movingmedicine.ac.uk/wp-content/uploads/sites/5/2020/04/Chair-exercise-programme-v.3-final-2.pdf>

<https://movingmedicine.ac.uk/wp-content/uploads/sites/5/2020/04/Bed-exercise-programme.pdf>

<https://movingmedicine.ac.uk/wp-content/uploads/sites/5/2020/04/Standing-exercise-programme-v.2-final-1.pdf>

### **Nutrition resources**

#### **Eatwell: Healthy eating information**

<https://www.nhs.uk/live-well/eat-well/>

#### **Eatwell: Healthy eating video**

<https://www.nutrition.org.uk/healthyliving/healthydiet/eatwellvideo.html>

#### **Dietary Advice for People with Cancer**

## **WCRF Eat well with cancer**

<https://www.wcrf-uk.org/sites/default/files/Eat-well-during-cancer-2019-WEB.pdf>

### **Food facts**

The British Dietetic Association has a comprehensive range of food facts sheets on a wide range of nutrition topics which can be found via the link below.

<https://www.bda.uk.com/food-health/food-facts/all-food-fact-sheets.html>

### **Resources at Independent Age tailored for people in later life:**

- Staying active in later life:  
<https://www.independentage.org/information/health/healthy-living/staying-active-later-life>
- Going into hospital: [Going into hospital | Independent Age](#)
- Getting help at home: [Getting help at home | Independent Age](#)
- Getting a good night's sleep: <https://www.independentage.org/get-advice/health/healthy-living/getting-a-good-nights-sleep>

## Appendix 3: Training resources and examples of best practice for healthcare professionals

### Motivational interviewing

- RCN Information and learning materials on motivational interviewing: <https://www.rcn.org.uk/clinical-topics/supporting-behaviour-change>
- Free BMJ learning on motivational interviewing (aimed at clinicians) <https://new-learning.bmj.com/course/1005158>
- HEE learning resources about Making Every Contact Count for ALL health workers: <https://www.makingeverycontactcount.co.uk/training/other-training-resources/>

### Shared decision making and risk communication

- Personalised Care Institute: <https://www.personalisedcareinstitute.org.uk>

### Innovation in preoperative assessment and optimisation

- <https://cpoc.org.uk/guidelines-resources-case-studies/case-studies-surgery>

## Appendix 4: Screening tools recommended in this guidance

- MUST: [https://www.bapen.org.uk/pdfs/must/must\\_full.pdf](https://www.bapen.org.uk/pdfs/must/must_full.pdf)
- NRS-2002: <https://www.clinicalnutritionjournal.com/action/showPdf?pii=S0261-5614%2803%2900098-0>
- Clinical Frailty Scale: [https://www.bgs.org.uk/sites/default/files/content/attachment/2018-07-05/rockwood\\_cfs.pdf](https://www.bgs.org.uk/sites/default/files/content/attachment/2018-07-05/rockwood_cfs.pdf)

## References

1. NHS Digital. Hospital Episode Statistics, Admitted Patient Care - England, 2011-12. NHS Digital. Published November 1, 2012. Accessed April 13, 2021.  
<https://digital.nhs.uk/data-and-information/publications/statistical/hospital-admitted-patient-care-activity/hospital-episode-statistics-admitted-patient-care-england-2011-12>
2. Barnett K, Mercer SW, Norbury M, Watt G, Wyke S, Guthrie B. Epidemiology of multimorbidity and implications for health care, research, and medical education: a cross-sectional study. *Lancet*. 2012;380(9836):37-43. doi:10.1016/S0140-6736(12)60240-2
3. 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. doi:10.1007/s00268-017-3895-9
4. Bolliger M, Kroehnert J-A, Molineus F, Kandioler D, Schindl M, Riss P. Experiences with the standardized classification of surgical complications (Clavien-Dindo) in general surgery patients. *Eur Surg*. 2018;50(6):256-261. doi:10.1007/s10353-018-0551-z
5. Khuri SF, Henderson WG, DePalma RG, Mosca C, Healey NA, Kumbhani DJ. Determinants of Long-Term Survival After Major Surgery and the Adverse Effect of Postoperative Complications. *Ann Surg*. 2005;242(3):326-343. doi:10.1097/01.sla.0000179621.33268.83
6. Moonasinghe SR, Harris S, Mythen MG, et al. Survival after postoperative morbidity: a longitudinal observational cohort study. *Br J Anaesth*. 2014;113(6):977-984. doi:10.1093/bja/aeu224
7. Toner A, Hamilton M. The long-term effects of postoperative complications. *Curr Opin Crit Care*. 2013;19(4):364-368. doi:10.1097/MCC.0b013e3283632f77
8. General Medical Council. The seven principles of decision making and consent. Published November 9, 2020. Accessed June 17, 2021. <https://www.gmc-uk.org/ethical-guidance/ethical-guidance-for-doctors/decision-making-and-consent/the-seven-principles-of-decision-making-and-consent>
9. Department of Health and Social Care. The NHS Constitution for England. GOV.UK. Published January 1, 2021. Accessed June 17, 2021. <https://www.gov.uk/government/publications/the-nhs-constitution-for-england/the-nhs-constitution-for-england>
10. Centre for Perioperative Care. Shared Decision Making. Accessed May 18, 2021. <https://cpoc.org.uk/shared-decision-making>
11. Elwyn G, Durand MA, Song J, et al. A three-talk model for shared decision making: multistage consultation process. *BMJ*. 2017;359:j4891. doi:10.1136/bmj.j4891
12. 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. doi:10.1016/j.bja.2018.11.025

13. General Medical Council. Decision making and consent. Published online November 9, 2020. [https://www.gmc-uk.org/-/media/documents/gmc-guidance-for-doctors---decision-making-and-consent-english\\_pdf-84191055.pdf?la=en&hash=BE327A1C584627D12BC51F66E790443F0E0651DA](https://www.gmc-uk.org/-/media/documents/gmc-guidance-for-doctors---decision-making-and-consent-english_pdf-84191055.pdf?la=en&hash=BE327A1C584627D12BC51F66E790443F0E0651DA)
14. National Institute for Health and Care Excellence. Shared decision making. Published online June 17, 2021. Accessed June 17, 2021. <https://www.nice.org.uk/guidance/ng197/resources/shared-decision-making-pdf-66142087186885>
15. National Institute for Health and Care Excellence. Shared decision making: [B] Evidence review for interventions to support effective shared decision making. Published online December 2020. <https://www.nice.org.uk/guidance/gid-ng10120/documents/evidence-review-2>
16. Joseph-Williams N, Lloyd A, Edwards A, et al. Implementing shared decision making in the NHS: lessons from the MAGIC programme. *BMJ*. 2017;357:j1744. doi:10.1136/bmj.j1744
17. Personalised Care Institute. Personalised Care Institute. Personalised Care Institute. Published 2021. Accessed June 17, 2021. <https://www.personalisedcareinstitute.org.uk/>
18. University of Cambridge. Winton Centre Cambridge. Winton Centre for Risk and Evidence Communication. Published 2021. Accessed June 17, 2021. <https://wintoncentre.maths.cam.ac.uk/>
19. Hoffmann TC, Mar CD, Santhirapala R, Freeman A. Teaching clinicians shared decision making and risk communication online: an evaluation study. *BMJ Evidence-Based Medicine*. Published online September 22, 2020. doi:10.1136/bmjebm-2020-111521
20. Academy of Medical Royal Colleges. Developing professional identity in multi-professional teams. Published online May 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)
21. QIPP Digital Technology, NHS Networks. Online preoperative screening solutions. Published online 2012. <https://www.networks.nhs.uk/nhs-networks/qipp-digital-technology-and-vision/documents/Factsheet-20on-20Preoperative-20Screening-1.pdf>
22. Getting It Right First Time, Centre for Perioperative Care, British Association of Day Surgery. National Day Surgery Delivery Pack. Published online September 2020. Accessed March 12, 2021. [https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2020/10/National-Day-Surgery-Delivery-Pack\\_Sept2020\\_final.pdf](https://www.gettingitrightfirsttime.co.uk/wp-content/uploads/2020/10/National-Day-Surgery-Delivery-Pack_Sept2020_final.pdf)
23. Rockwood K, Song X, MacKnight C, et al. A global clinical measure of fitness and frailty in elderly people. *CMAJ*. 2005;173(5):489-495. doi:10.1503/cmaj.050051
24. White S, Griffiths R, Baxter M, et al. Guidelines for the peri-operative care of people with dementia: Guidelines from the Association of Anaesthetists. *Anaesthesia*. 2019;74(3):357-372. doi:10.1111/anae.14530
25. Royal College of Anaesthetists. Chapter 2: Guidelines for the Provision of Anaesthesia Services for the Perioperative Care of Elective and Urgent Care Patients | The Royal

College of Anaesthetists. Published March 31, 2021. Accessed April 10, 2021.  
<https://www.rcoa.ac.uk/gpas/chapter-2>

26. NHS England. Accessible Information Standard – Overview 2017/2018. Published online November 19, 2017. Accessed March 17, 2021. <https://www.england.nhs.uk/wp-content/uploads/2017/10/accessible-info-standard-overview-2017-18.pdf>
27. Srivastava D, Hill S, Cartt S, et al. Surgery and opioids: evidence-based expert consensus guidelines on the perioperative use of opioids in the United Kingdom. *Br J Anaesth.* 2021;126(6):1208-1216. doi:10.1016/j.bja.2021.02.030
28. Partridge JSL, Healey A, Modarai B, Harari D, Martin FC, Dhesi JK. Preoperative comprehensive geriatric assessment and optimisation prior to elective arterial vascular surgery: a health economic analysis. *Age Ageing.* Published online June 11, 2021. doi:10.1093/ageing/afab094
29. POPS Network. Perioperative care for Older people undergoing surgery (POPS) Network. POPS Network. Published 2021. Accessed June 18, 2021.  
<https://www.popolderpeople.org>
30. Partridge JSL, Harari D, Martin FC, et al. Randomized clinical trial of comprehensive geriatric assessment and optimization in vascular surgery. *Br J Surg.* 2017;104(6):679-687. doi:10.1002/bjs.10459
31. Eamer G, Taheri A, Chen SS, et al. Comprehensive geriatric assessment for older people admitted to a surgical service. *Cochrane Database Syst Rev.* 2018;1:CD012485. doi:10.1002/14651858.CD012485.pub2
32. Holding N. Announcing new NHS Elect Improvement Networks programme. Fab NHS Stuff. Published June 9, 2021. Accessed June 17, 2021. <https://fabnhsstuff.net/fab-stuff/announcing-new-nhs-elect-improvement-networks-programme>
33. Badger C, Digner M, Mahoney J, Curtis A, Wadsworth L, Wright A. Preoperative assessment. In: *Pudner's Nursing the Surgical Patient.* 4th ed. Elsevier; 2020.
34. Centre for Perioperative Care. Delivering on Opportunities for Better Health and Perioperative Care in the COVID-19 Era. Published online August 5, 2020. Accessed March 11, 2021. <https://cpoc.org.uk/sites/cpac/files/documents/2020-08/Opportunities%20in%20the%20COVID-19%20Era.pdf>
35. NHS England, NHS Improvement. Supported self-management: Summary guide. Published online March 10, 2020. <https://www.england.nhs.uk/wp-content/uploads/2020/03/supported-self-management-summary-guide.pdf>
36. NHS England, NHS Improvement. Shared Decision Making Summary guide. Published online January 31, 2019. Accessed March 16, 2021. <https://www.england.nhs.uk/wp-content/uploads/2019/01/shared-decision-making-summary-guide-v1.pdf>
37. National Institute for Health and Care Excellence. Routine preoperative tests for elective surgery. Published online April 5, 2016. Accessed March 12, 2021.  
<https://www.nice.org.uk/guidance/ng45/resources/routine-preoperative-tests-for-elective-surgery-pdf-1837454508997>

38. Verma DR, Wee PMYK, Hartle DA, et al. *Pre-Operative Assessment and Patient Preparation - the Role of the Anaesthetist*. The Association of Anaesthetists of Great Britain and Ireland; 2010. doi:10.21466/g.PAAPP-T.2010
39. The Faculty of Intensive Care Medicine, Centre for Perioperative Care. Guidance on Establishing and Delivering Enhanced Perioperative Care Services. Published online October 2020. Accessed March 2, 2021.  
[https://www.ficm.ac.uk/sites/default/files/enhanced\\_perioperative\\_care\\_guidance\\_v1.0.pdf](https://www.ficm.ac.uk/sites/default/files/enhanced_perioperative_care_guidance_v1.0.pdf)
40. Royal College of Surgeons. The High-Risk General Surgical Patient: Raising the Standard. Published online December 21, 2018. Accessed March 2, 2021.  
<https://www.rcseng.ac.uk/-/media/files/rcs/news-and-events/media-centre/2018-press-releases-documents/rcs-report-the-highrisk-general-surgical-patient-raising-the-standard--december-2018.pdf>
41. Protopapa KL, Simpson JC, Smith NCE, Moonesinghe SR. Development and validation of the Surgical Outcome Risk Tool (SORT). *Br J Surg.* 2014;101(13):1774-1783. doi:10.1002/bjs.9638
42. Wong DJN, Harris S, Sahni A, et al. Developing and validating subjective and objective risk-assessment measures for predicting mortality after major surgery: An international prospective cohort study. *PLoS Med.* 2020;17(10):e1003253. doi:10.1371/journal.pmed.1003253
43. Oakland K, Cosentino D, Cross T, Bucknall C, Dorudi S, Walker D. External validation of the Surgical Outcome Risk Tool (SORT) in 3305 abdominal surgery patients in the independent sector in the UK. *Perioper Med (Lond).* 2021;10(1):4. doi:10.1186/s13741-020-00173-1
44. COVIDSurg Collaborative, GlobalSurg Collaborative. Timing of surgery following SARS-CoV-2 infection: an international prospective cohort study. *Anaesthesia.* Published online March 9, 2021. doi:10.1111/anae.15458
45. El-Boghdadly K, Wong DJN, Owen R, et al. Risks to healthcare workers following tracheal intubation of patients with COVID-19: a prospective international multicentre cohort study. *Anaesthesia.* Published online June 9, 2020. doi:10.1111/anae.15170
46. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet.* 2020;395(10223):497-506. doi:10.1016/S0140-6736(20)30183-5
47. World Health Organization. WHO COVID-19 Dashboard. Accessed June 17, 2021.  
<https://who.sprinklr.com/>
48. GOV.UK. Coronavirus (COVID-19) in the UK: UK Summary. Accessed June 17, 2021.  
<https://coronavirus.data.gov.uk>
49. Wouters OJ, Shadlen KC, Salcher-Konrad M, et al. Challenges in ensuring global access to COVID-19 vaccines: production, affordability, allocation, and deployment. *Lancet.* 2021;397(10278):1023-1034. doi:10.1016/S0140-6736(21)00306-8

50. Darby AC, Hiscox JA. Covid-19: variants and vaccination. *BMJ*. 2021;372:n771. doi:10.1136/bmj.n771
51. Guan W-J, Ni Z-Y, Hu Y, et al. Clinical Characteristics of Coronavirus Disease 2019 in China. *N Engl J Med*. Published online February 28, 2020. doi:10.1056/NEJMoa2002032
52. Grasselli G, Zangrillo A, Zanella A, et al. Baseline Characteristics and Outcomes of 1591 Patients Infected With SARS-CoV-2 Admitted to ICUs of the Lombardy Region, Italy. *JAMA*. 2020;323(16):1574-1581. doi:10.1001/jama.2020.5394
53. Dhami K, Khan S, Tiwari R, et al. Coronavirus Disease 2019–COVID-19. *Clin Microbiol Rev*. 2020;33(4). doi:10.1128/CMR.00028-20
54. Greenland JR, Michelow MD, Wang L, London MJ. COVID-19 Infection: Implications for Perioperative and Critical Care Physicians. *Anesthesiology*. 2020;132(6):1346-1361. doi:10.1097/ALN.0000000000003303
55. Phua J, Weng L, Ling L, et al. Intensive care management of coronavirus disease 2019 (COVID-19): challenges and recommendations. *Lancet Respir Med*. 2020;8(5):506-517. doi:10.1016/S2213-2600(20)30161-2
56. Intensive Care National Audit & Research Centre. ICNARC report on COVID-19 in critical care. Published online March 26, 2021. Accessed April 6, 2021. <https://www.icnarc.org/DataServices/Attachments/Download/2d288f8e-728e-eb11-912f-00505601089b>
57. Hajjar LA, Costa IBS da S, Rizk SI, et al. Intensive care management of patients with COVID-19: a practical approach. *Annals of Intensive Care*. 2021;11(1):36. doi:10.1186/s13613-021-00820-w
58. Carfi A, Bernabei R, Landi F, Group for the GAC-19 P-ACS. Persistent Symptoms in Patients After Acute COVID-19. *JAMA*. 2020;324(6):603-605. doi:10.1001/jama.2020.12603
59. Greenhalgh T, Knight M, A'Court C, Buxton M, Husain L. Management of post-acute covid-19 in primary care. *BMJ*. 2020;370. doi:10.1136/bmj.m3026
60. Mahase E. Covid-19: What do we know about “long covid”? *BMJ*. 2020;370. doi:10.1136/bmj.m2815
61. Zhao Y, Shang Y, Song W, et al. Follow-up study of the pulmonary function and related physiological characteristics of COVID-19 survivors three months after recovery. *EClinicalMedicine*. 2020;25:100463. doi:10.1016/j.eclinm.2020.100463
62. van den Borst B, Peters JB, Brink M, et al. Comprehensive health assessment three months after recovery from acute COVID-19. *Clin Infect Dis*. Published online November 21, 2020. doi:10.1093/cid/ciaa1750
63. Huang C, Huang L, Wang Y, et al. 6-month consequences of COVID-19 in patients discharged from hospital: a cohort study. *The Lancet*. 2021;0(0). doi:10.1016/S0140-6736(20)32656-8

64. Gorna R, MacDermott N, Rayner C, et al. Long COVID guidelines need to reflect lived experience. *The Lancet*. 2020;0(0). doi:10.1016/S0140-6736(20)32705-7
65. National Institute for Health and Care Excellence. COVID-19 rapid guideline: managing the long-term effects of COVID-19. Published online December 18, 2020. Accessed January 21, 2021. <https://www.nice.org.uk/guidance/ng188>
66. Goërtz YMJ, Van Herck M, Delbressine JM, et al. Persistent symptoms 3 months after a SARS-CoV-2 infection: the post-COVID-19 syndrome? *ERJ Open Res*. Published online September 11, 2020. doi:10.1183/23120541.00542-2020
67. Mandal S, Barnett J, Brill SE, et al. 'Long-COVID': a cross-sectional study of persisting symptoms, biomarker and imaging abnormalities following hospitalisation for COVID-19. *Thorax*. Published online November 10, 2020. doi:10.1136/thoraxjnl-2020-215818
68. Office for National Statistics. The prevalence of long COVID symptoms and COVID-19 complications - Office for National Statistics. Published December 16, 2020. Accessed January 22, 2021.  
<https://www.ons.gov.uk/news/statementsandletters/the-prevalence-of-long-covid-symptoms-and-covid-19-complications>
69. Office for National Statistics. Prevalence of ongoing symptoms following coronavirus (COVID-19) infection in the UK - Office for National Statistics. Published April 1, 2021. Accessed April 6, 2021.  
<https://www.ons.gov.uk/peoplepopulationandcommunity/healthandsocialcare/conditionsanddiseases/bulletins/prevalence-of-ongoing-symptoms-following-coronavirus-covid-19-infection-in-the-uk/1-april-2021>
70. Holroyd CR, Seth R, Bukhari M, et al. The British Society for Rheumatology biologic DMARD safety guidelines in inflammatory arthritis. *Rheumatology (Oxford)*. 2019;58(2):e3-e42. doi:10.1093/rheumatology/key208
71. Nishimoto N, Ito K, Takagi N. Safety and efficacy profiles of tocilizumab monotherapy in Japanese patients with rheumatoid arthritis: meta-analysis of six initial trials and five long-term extensions. *Mod Rheumatol*. 2010;20(3):222-232. doi:10.1007/s10165-010-0279-5
72. Maini RN, Taylor PC, Szechinski J, et al. Double-blind randomized controlled clinical trial of the interleukin-6 receptor antagonist, tocilizumab, in European patients with rheumatoid arthritis who had an incomplete response to methotrexate. *Arthritis Rheum*. 2006;54(9):2817-2829. doi:10.1002/art.22033
73. Woodcock T, Barker P, Daniel S, et al. Guidelines for the management of glucocorticoids during the peri-operative period for patients with adrenal insufficiency: Guidelines from the Association of Anaesthetists, the Royal College of Physicians and the Society for Endocrinology UK. *Anaesthesia*. 2020;75(5):654-663. doi:10.1111/anae.14963
74. Academy of Medical Royal Colleges. Exercise: The miracle cure and the role of the doctor in promoting it. Published online February 2015. [https://www.aomrc.org.uk/wp-content/uploads/2016/05/Exercise\\_the\\_Miracle\\_Cure\\_0215.pdf](https://www.aomrc.org.uk/wp-content/uploads/2016/05/Exercise_the_Miracle_Cure_0215.pdf)

75. 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. doi:10.1016/0002-9149(89)90496-7
76. Godin G, Shephard RJ. A simple method to assess exercise behavior in the community. *Can J Appl Sport Sci.* 1985;10(3):141-146.
77. Wijeysundera DN, Beattie WS, Hillis GS, et al. Integration of the Duke Activity Status Index into preoperative risk evaluation: a multicentre prospective cohort study. *Br J Anaesth.* 2020;124(3):261-270. doi:10.1016/j.bja.2019.11.025
78. Wijeysundera DN, Pearse RM, Shulman MA, et al. Assessment of functional capacity before major non-cardiac surgery: an international, prospective cohort study. *Lancet.* 2018;391(10140):2631-2640. doi:10.1016/S0140-6736(18)31131-0
79. Davies SJ, Minto G. Occam's razor at the sharp end: simplified preoperative risk assessment. *Br J Anaesth.* 2021;126(1):27-30. doi:10.1016/j.bja.2020.09.015
80. Craig CL, Marshall AL, Sjöström M, et al. International physical activity questionnaire: 12-country reliability and validity. *Med Sci Sports Exerc.* 2003;35(8):1381-1395. doi:10.1249/01.MSS.0000078924.61453.FB
81. Gao Y, Chen R, Geng Q, et al. Cardiopulmonary exercise testing might be helpful for interpretation of impaired pulmonary function in recovered COVID-19 patients. *Eur Respir J.* 2021;57(1). doi:10.1183/13993003.04265-2020
82. Levett DZH, Jack S, Swart M, et al. Perioperative cardiopulmonary exercise testing (CPET): consensus clinical guidelines on indications, organization, conduct, and physiological interpretation. *Br J Anaesth.* 2018;120(3):484-500. doi:10.1016/j.bja.2017.10.020
83. Struthers R, Erasmus P, Holmes K, Warman P, Collingwood A, Sneyd JR. Assessing fitness for surgery: a comparison of questionnaire, incremental shuttle walk, and cardiopulmonary exercise testing in general surgical patients. *Br J Anaesth.* 2008;101(6):774-780. doi:10.1093/bja/aen310
84. Moran J, Wilson F, Guinan E, McCormick P, Hussey J, Moriarty J. The preoperative use of field tests of exercise tolerance to predict postoperative outcome in intra-abdominal surgery: a systematic review. *J Clin Anesth.* 2016;35:446-455. doi:10.1016/j.jclinane.2016.09.019
85. Ramos RJ, Ladha KS, Cuthbertson BH, et al. Association of six-minute walk test distance with postoperative complications in non-cardiac surgery: a secondary analysis of a multicentre prospective cohort study. *Can J Anaesth.* 2021;68(4):514-529. doi:10.1007/s12630-020-01909-9
86. Sinclair RCF, Batterham AM, Davies S, Cawthorn L, Danjoux GR. Validity of the 6 min walk test in prediction of the anaerobic threshold before major non-cardiac surgery. *Br J Anaesth.* 2012;108(1):30-35. doi:10.1093/bja/aer322
87. Núñez-Cortés R, Rivera-Lillo G, Arias-Campoverde M, Soto-García D, García-Palomera R, Torres-Castro R. Use of sit-to-stand test to assess the physical capacity and exertional

- desaturation in patients post COVID-19. *Chron Respir Dis.* 2021;18:1479973121999205. doi:10.1177/1479973121999205
88. Huisman MG, van Leeuwen BL, Ugolini G, et al. "Timed Up & Go": a screening tool for predicting 30-day morbidity in onco-geriatric surgical patients? A multicenter cohort study. *PLoS One.* 2014;9(1):e86863. doi:10.1371/journal.pone.0086863
89. British Thoracic Society. British Thoracic Society Guidance on Respiratory Follow Up of Patients with a Clinico-Radiological Diagnosis of COVID-19 Pneumonia. Published online May 11, 2020. <https://www.brit-thoracic.org.uk/document-library/quality-improvement/covid-19/resp-follow-up-guidance-post-covid-pneumonia/>
90. George PM, Barratt SL, Condliffe R, et al. Respiratory follow-up of patients with COVID-19 pneumonia. *Thorax.* 2020;75(11):1009-1016. doi:10.1136/thoraxjnl-2020-215314
91. Arena R, Myers J, Williams MA, et al. Assessment of functional capacity in clinical and research settings: a scientific statement from the American Heart Association Committee on Exercise, Rehabilitation, and Prevention of the Council on Clinical Cardiology and the Council on Cardiovascular Nursing. *Circulation.* 2007;116(3):329-343. doi:10.1161/CIRCULATIONAHA.106.184461
92. American Thoracic Society, American College of Chest Physicians. ATS/ACCP Statement on cardiopulmonary exercise testing. *Am J Respir Crit Care Med.* 2003;167(2):211-277. doi:10.1164/rccm.167.2.211
93. Gupta R, Ruppel GL, Espiritu JRD. Exercise-Induced Oxygen Desaturation during the 6-Minute Walk Test. *Med Sci (Basel).* 2020;8(1). doi:10.3390/medsci8010008
94. Centre for Perioperative Care. Impact of perioperative care on healthcare resource use. Published online June 2020. <https://cpoc.org.uk/sites/cpac/files/documents/2020-09/Impact%20of%20perioperative%20care%20-%20rapid%20review%20FINAL%20-%2009092020MW.pdf>
95. Luther A, Gabriel J, Watson RP, Francis NK. The Impact of Total Body Prehabilitation on Post-Operative Outcomes After Major Abdominal Surgery: A Systematic Review. *World J Surg.* 2018;42(9):2781-2791. doi:10.1007/s00268-018-4569-y
96. 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. doi:10.1016/j.surg.2016.05.014
97. Gillis C, Buhler K, Bresee L, et al. Effects of Nutritional Prehabilitation, With and Without Exercise, on Outcomes of Patients Who Undergo Colorectal Surgery: A Systematic Review and Meta-analysis. *Gastroenterology.* 2018;155(2):391-410.e4. doi:10.1053/j.gastro.2018.05.012
98. Macmillan Cancer Support, Royal College of Anaesthetists, National Institute for Health Research, Cancer and Nutrition collaboration. Principles and guidance for rehabilitation within the management and support of people with cancer. Published online November 30, 2020. <https://www.macmillan.org.uk/healthcare-professionals/news-and-resources/guides/principles-and-guidance-for-prehabilitation>

99. Warburton DE, Charlesworth S, Ivey A, Nettlefold L, Bredin SS. A systematic review of the evidence for Canada's Physical Activity Guidelines for Adults. *Int J Behav Nutr Phys Act.* 2010;7:39. doi:10.1186/1479-5868-7-39
100. Department of Health and Social Care. UK Chief Medical Officers' Physical Activity Guidelines. Published online September 7, 2019. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/832868/uk-chief-medical-officers-physical-activity-guidelines.pdf)
101. Barberan-Garcia A, Ubré M, Roca J, et al. Personalised Prehabilitation in High-risk Patients Undergoing Elective Major Abdominal Surgery: A Randomized Blinded Controlled Trial. *Ann Surg.* 2018;267(1):50-56. doi:10.1097/SLA.0000000000002293
102. West MA, Loughney L, Lythgoe D, et al. Effect of prehabilitation on objectively measured physical fitness after neoadjuvant treatment in preoperative rectal cancer patients: a blinded interventional pilot study. *Br J Anaesth.* 2015;114(2):244-251. doi:10.1093/bja/aeu318
103. French DP, Olander EK, Chisholm A, Mc Sharry J. Which behaviour change techniques are most effective at increasing older adults' self-efficacy and physical activity behaviour? A systematic review. *Ann Behav Med.* 2014;48(2):225-234. doi:10.1007/s12160-014-9593-z
104. Public Health England, NHS England. Making Every Contact Count (MECC): Consensus statement. Published online April 2016. <https://www.england.nhs.uk/wp-content/uploads/2016/04/making-every-contact-count.pdf>
105. American College of Sports Medicine. ACSM's Guidelines for Exercise Testing and Prescription. 11th ed. Wolters Kluwer; 2021.
106. Stout NL, Baima J, Swisher AK, Winters-Stone KM, Welsh J. A Systematic Review of Exercise Systematic Reviews in the Cancer Literature (2005-2017). *PM R.* 2017;9(9S2):S347-S384. doi:10.1016/j.pmrj.2017.07.074
107. Phelan D, Kim JH, Chung EH. A Game Plan for the Resumption of Sport and Exercise After Coronavirus Disease 2019 (COVID-19) Infection. *JAMA Cardiol.* 2020;5(10):1085-1086. doi:10.1001/jamacardio.2020.2136
108. Kehler DS, Stammers AN, Tangri N, et al. Systematic review of preoperative physical activity and its impact on postcardiac surgical outcomes. *BMJ Open.* 2017;7(8):e015712. doi:10.1136/bmjopen-2016-015712
109. Barberan-Garcia A, Ubre M, Pascual-Argente N, et al. Post-discharge impact and cost-consequence analysis of prehabilitation in high-risk patients undergoing major abdominal surgery: secondary results from a randomised controlled trial. *Br J Anaesth.* 2019;123(4):450-456. doi:10.1016/j.bja.2019.05.032
110. West MA, Astin R, Moyses HE, et al. Exercise prehabilitation may lead to augmented tumor regression following neoadjuvant chemoradiotherapy in locally advanced rectal cancer. *Acta Oncol.* 2019;58(5):588-595. doi:10.1080/0284186X.2019.1566775
111. Poon ET-C, Wongpipit W, Ho RS-T, Wong SH-S. Interval training versus moderate-intensity continuous training for cardiorespiratory fitness improvements in middle-aged

and older adults: a systematic review and meta-analysis. *J Sports Sci*. Published online April 7, 2021;1-10. doi:10.1080/02640414.2021.1912453

112. Abd Razak MA, Ahmad NA, Chan YY, et al. Validity of screening tools for dementia and mild cognitive impairment among the elderly in primary health care: a systematic review. *Public Health*. 2019;169:84-92. doi:10.1016/j.puhe.2019.01.001
113. Levis B, Benedetti A, Thombs BD, DEPRESSION Screening Data (DEPRESSD) Collaboration. Accuracy of Patient Health Questionnaire-9 (PHQ-9) for screening to detect major depression: individual participant data meta-analysis. *BMJ*. 2019;365:i1476. doi:10.1136/bmj.i1476
114. Plummer F, Manea L, Trepel D, McMillan D. Screening for anxiety disorders with the GAD-7 and GAD-2: a systematic review and diagnostic metaanalysis. *Gen Hosp Psychiatry*. 2016;39:24-31. doi:10.1016/j.genhosppsych.2015.11.005
115. Vodermaier A, Millman RD. Accuracy of the Hospital Anxiety and Depression Scale as a screening tool in cancer patients: a systematic review and meta-analysis. *Support Care Cancer*. 2011;19(12):1899-1908. doi:10.1007/s00520-011-1251-4
116. Hooker S, Punjabi A, Justesen K, Boyle L, Sherman MD. Encouraging Health Behavior Change: Eight Evidence-Based Strategies. *Fam Pract Manag*. 2018;25(2):31-36.
117. Newland P, Lorenz R, Oliver BJ. Patient activation in adults with chronic conditions: A systematic review. *J Health Psychol*. 2021;26(1):103-114. doi:10.1177/1359105320947790
118. Levett DZH, Grimmett C. Psychological factors, prehabilitation and surgical outcomes: evidence and future directions. *Anaesthesia*. 2019;74 Suppl 1:36-42. doi:10.1111/anae.14507
119. National Institute for Health and Care Excellence. Generalised anxiety disorder and panic disorder in adults: management. Published online January 26, 2011. <https://www.nice.org.uk/guidance/cg113/resources/generalised-anxiety-disorder-and-panic-disorder-in-adults-management-pdf-35109387756997>
120. National Institute for Health and Care Excellence. Common mental health problems: identification and pathways to care. Published online May 25, 2011. <https://www.nice.org.uk/guidance/cg123/resources/common-mental-health-problems-identification-and-pathways-to-care-pdf-35109448223173>
121. National Institute for Health and Care Excellence. Depression in adults: recognition and management. Published online October 28, 2009. <https://www.nice.org.uk/guidance/cg90/resources/depression-in-adults-recognition-and-management-pdf-975742636741>
122. National Institute for Health and Care Excellence. Behaviour change: individual approaches. Published online January 2, 2014. <https://www.nice.org.uk/guidance/ph49/resources/behaviour-change-individual-approaches-pdf-1996366337989>
123. National Institute for Health and Care Excellence. Post-traumatic stress disorder. Published online December 5, 2018.

<https://www.nice.org.uk/guidance/ng116/resources/posttraumatic-stress-disorder-pdf-66141601777861>

124. Vindegaard N, Benros ME. COVID-19 pandemic and mental health consequences: Systematic review of the current evidence. *Brain Behav Immun.* 2020;89:531-542. doi:10.1016/j.bbi.2020.05.048
125. Bridgland VME, Moeck EK, Green DM, et al. Why the COVID-19 pandemic is a traumatic stressor. *PLoS One.* 2021;16(1):e0240146. doi:10.1371/journal.pone.0240146
126. Beaud V, Crottaz-Herbette S, Dunet V, et al. Pattern of cognitive deficits in severe COVID-19. *J Neurol Neurosurg Psychiatry.* 2021;92(5):567-568. doi:10.1136/jnnp-2020-325173
127. National Institute for Health and Care Excellence. Nutrition support for adults: oral nutrition support, enteral tube feeding and parenteral nutrition. Published online August 4, 2017. <https://www.nice.org.uk/guidance/cg32/resources/nutrition-support-for-adults-oral-nutrition-support-enteral-tube-feeding-and-parenteral-nutrition-pdf-975383198917>
128. Sun Z, Kong X-J, Jing X, Deng R-J, Tian Z-B. Nutritional Risk Screening 2002 as a Predictor of Postoperative Outcomes in Patients Undergoing Abdominal Surgery: A Systematic Review and Meta-Analysis of Prospective Cohort Studies. *PLoS One.* 2015;10(7):e0132857. doi:10.1371/journal.pone.0132857
129. Kondrup J, Rasmussen HH, Hamberg O, Stanga Z, Ad Hoc ESPEN Working Group. Nutritional risk screening (NRS 2002): a new method based on an analysis of controlled clinical trials. *Clin Nutr.* 2003;22(3):321-336. doi:10.1016/s0261-5614(02)00214-5
130. Elia M. THE 'MUST' REPORT - Nutritional screening of adults: a multidisciplinary responsibility. Published online 2003. <https://www.bapen.org.uk/pdfs/must/must-report.pdf>
131. Grocott MPW, Plumb JOM, Edwards M, Fecher-Jones I, Levett DZH. Re-designing the pathway to surgery: better care and added value. *Perioper Med (Lond).* 2017;6:9. doi:10.1186/s13741-017-0065-4
132. Cederholm T, Jensen GL, Correia MITD, et al. GLIM criteria for the diagnosis of malnutrition - A consensus report from the global clinical nutrition community. *Clin Nutr.* 2019;38(1):1-9. doi:10.1016/j.clnu.2018.08.002
133. NHS England. The Eatwell Guide. Published April 27, 2018. Accessed March 12, 2021. <https://www.nhs.uk/live-well/eat-well/the-eatwell-guide/>
134. BAPEN. Food First/Food Enrichment. Published November 28, 2016. Accessed March 12, 2021. <https://www.bapen.org.uk/nutrition-support/nutrition-by-mouth/food-first-food-enrichment>
135. Lobo DN, Gianotti L, Adiamah A, et al. Perioperative nutrition: Recommendations from the ESPEN expert group. *Clin Nutr.* 2020;39(11):3211-3227. doi:10.1016/j.clnu.2020.03.038
136. Wischmeyer PE, Carli F, Evans DC, et al. American Society for Enhanced Recovery and Perioperative Quality Initiative Joint Consensus Statement on Nutrition Screening and

Therapy Within a Surgical Enhanced Recovery Pathway. *Anesth Analg.* 2018;126(6):1883-1895. doi:10.1213/ANE.0000000000002743

137. Weimann A, Braga M, Carli F, et al. ESPEN guideline: Clinical nutrition in surgery. *Clin Nutr.* 2017;36(3):623-650. doi:10.1016/j.clnu.2017.02.013
138. Sorensen J, Kondrup J, Prokopowicz J, et al. EuroOOPS: an international, multicentre study to implement nutritional risk screening and evaluate clinical outcome. *Clin Nutr.* 2008;27(3):340-349. doi:10.1016/j.clnu.2008.03.012
139. Jie B, Jiang Z-M, Nolan MT, Zhu S-N, Yu K, Kondrup J. Impact of preoperative nutritional support on clinical outcome in abdominal surgical patients at nutritional risk. *Nutrition.* 2012;28(10):1022-1027. doi:10.1016/j.nut.2012.01.017
140. Daphne DK, John S, Rajalakshmi P, et al. Customized nutrition intervention and personalized counseling helps achieve nutrition targets in perioperative liver transplant patients. *Clin Nutr ESPEN.* 2018;23:200-204. doi:10.1016/j.clnesp.2017.09.014
141. Novelli IR, Araújo BAD, Grandisoli LF, et al. Nutritional Counseling Protocol for Colorectal Cancer Patients after Surgery Improves Outcome. *Nutr Cancer.* Published online September 15, 2020:1-9. doi:10.1080/01635581.2020.1819345
142. Elia M, Normand C, Norman K, Laviano A. A systematic review of the cost and cost effectiveness of using standard oral nutritional supplements in the hospital setting. *Clin Nutr.* 2016;35(2):370-380. doi:10.1016/j.clnu.2015.05.010
143. Burden ST, Gibson DJ, Lal S, et al. Pre-operative oral nutritional supplementation with dietary advice versus dietary advice alone in weight-losing patients with colorectal cancer: single-blind randomized controlled trial. *J Cachexia Sarcopenia Muscle.* 2017;8(3):437-446. doi:10.1002/jcsm.12170
144. Cereda E, Cappello S, Colombo S, et al. Nutritional counseling with or without systematic use of oral nutritional supplements in head and neck cancer patients undergoing radiotherapy. *Radiother Oncol.* 2018;126(1):81-88. doi:10.1016/j.radonc.2017.10.015
145. 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.* Published online February 3, 2021. doi:10.1111/anae.15393
146. Moore J, Merchant Z, Rowlinson K, et al. Implementing a system-wide cancer prehabilitation programme: The journey of Greater Manchester's "Prehab4cancer." *Eur J Surg Oncol.* 2021;47(3 Pt A):524-532. doi:10.1016/j.ejso.2020.04.042
147. Pearce L. Surgery school speeds up patients' recovery. Published August 5, 2020. <https://journals.rcni.com/nursing-standard/feature/surgery-school-speeds-up-patients-recovery-ns.35.8.54.s19/abs>
148. The Newsroom. Macmillan opens a Cancer Support Surgery School in Portsmouth. Published August 31, 2018. Accessed May 17, 2021. <https://www.portsmouth.co.uk/health/macmillan-opens-cancer-support-surgery-school-portsmouth-1008219>

149. Sisak K, Darch R, Burgess LC, Middleton RG, Wainwright TW. A preoperative education class reduces length of stay for total knee replacement patients identified at risk of an extended length of stay. *J Rehabil Med.* 2019;51(10):788-796. doi:10.2340/16501977-2602
150. Jones S, Alnaib M, Kokkinakis M, Wilkinson M, St Clair Gibson A, Kader D. Pre-operative patient education reduces length of stay after knee joint arthroplasty. *Ann R Coll Surg Engl.* 2011;93(1):71-75. doi:10.1308/003588410X12771863936765
151. Wyman MF, Kallio P, Allred E, Meyer D. A group-based brief intervention for surgery patients with high-risk substance use. *Gen Hosp Psychiatry.* 2014;36(6):637-643. doi:10.1016/j.genhosppsych.2014.08.002
152. Moore JA, Conway DH, Thomas N, Cummings D, Atkinson D. Impact of a peri-operative quality improvement programme on postoperative pulmonary complications. *Anaesthesia.* 2017;72(3):317-327. doi:10.1111/anae.13763
153. World Health Organization. Tobacco & Postsurgical Outcomes. Published online January 2020. <https://apps.who.int/iris/bitstream/handle/10665/330485/9789240000360-eng.pdf>
154. Michie S, Ashford S, Sniehotta FF, Dombrowski SU, Bishop A, French DP. A refined taxonomy of behaviour change techniques to help people change their physical activity and healthy eating behaviours: the CALO-RE taxonomy. *Psychol Health.* 2011;26(11):1479-1498. doi:10.1080/08870446.2010.540664
155. NHS England. Clinical validation of surgical waiting lists: framework and support tools. Published online October 1, 2020. <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/10/C0760-Clinical-validation-of-surgical-waiting-lists-1-2.pdf>
156. Bostock S, Steptoe A. Association between low functional health literacy and mortality in older adults: longitudinal cohort study. *BMJ.* 2012;344:e1602. doi:10.1136/bmj.e1602
157. Public Health England. Local action on health inequalities: Understanding and reducing ethnic inequalities in health. Published online August 6, 2018. Accessed June 17, 2021. [https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment\\_data/file/730917/local\\_action\\_on\\_health\\_inequalities.pdf](https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/730917/local_action_on_health_inequalities.pdf)
158. Hibbard JH, Greene J. What the evidence shows about patient activation: better health outcomes and care experiences; fewer data on costs. *Health Aff (Millwood).* 2013;32(2):207-214. doi:10.1377/hlthaff.2012.1061
159. Intensive Care National Audit & Research Centre. Key statistics from the Case Mix Programme - adult, general critical care units. Published online December 12, 2018. <https://www.icnarc.org/DataServices/Attachments/Download/70e9c741-5f0f-e911-80ef-1402ec3fcfd79>
160. Wong DJN, Harris SK, Moonesinghe SR, et al. 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. doi:10.1016/j.bja.2018.07.002

161. Steenberg J, Møller AM. Systematic review of the effects of fascia iliaca compartment block on hip fracture patients before operation. *Br J Anaesth.* 2018;120(6):1368-1380. doi:10.1016/j.bja.2017.12.042
162. National Emergency Laparotomy Audit. Sixth Patient Report of the National Emergency Laparotomy Audit. Published online November 2020. <https://www.nela.org.uk/downloads/The%20Sixth%20Patient%20Report%20of%20the%20NELA%202020%20-%20FINAL%20November%202020.pdf>
163. Royal College of Physicians. The National Hip Fracture Database. Accessed May 5, 2021. <https://www.nhfd.co.uk/>
164. British Orthopaedic Association. BOA Standards for Trauma and Orthopaedics (BOASTs). Accessed June 17, 2021. <https://www.boa.ac.uk/standards-guidance/boasts.html>
165. Dhesi J. Peri-operative Care for Older Patients Undergoing Surgery. British Geriatrics Society. Published February 4, 2018. Accessed June 17, 2021. <https://www.bgs.org.uk/resources/peri-operative-care-for-older-patients-undergoing-surgery>