



Surgery triage: responding to the COVID-19 pandemic

A rapid review commissioned by RACS

Version 2.0
5 May 2020

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Clinical Expert COVID-19 Working Group

Mr Trevor Collinson, President, General Surgeons Australia

Professor Peter Hewett, Head of Colorectal Surgical Unit at The Queen Elizabeth Hospital, Clinical Professor of Surgery at the University of Adelaide

Professor Thomas Hugh, Professor of Surgery, Chair of Surgery, Northern Clinical School Royal North Shore Hospital

Professor Rob Padbury, Director of Surgery and Perioperative Medicine, Southern Adelaide Local Health Network, SA Health

Professor Guy Maddern, R.P. Jepson Professor of Surgery at The University of Adelaide; Surgical Director Research and Evaluation, RACS

Dr Nicola Hill, Nelson-Marlborough District Health Board; New Zealand National Board, RACS

RACS Evidence Synthesis Team: ASERNIP-S and Research, Audit & Academic Surgery

Dr David Tivey

Joshua Kovoov

Associate Professor Wendy Babidge

Dr Kristin Weidenbach

With support from: Justine Peterson New Zealand Manager

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1	20 April 2020	Original version
2	5 May 2020	New Zealand information added Information on high-risk groups added Addendum: updated with recent government advice p23

Recommendations derived from rapid review of existing guidelines

1. Urgent and emergency surgery must continue, with appropriate precautions
2. Limit non-urgent elective surgery only to cases where delay would significantly worsen patient outcome; before scheduling, particularly for complex procedures, obtain a documented, independent peer or Surgical Review Committee opinion where possible
3. Multidisciplinary care, decision-making and review should be implemented wherever possible, especially for complex surgical issues; where multidisciplinary team discussion is not possible a discussion with a colleague should be documented
4. Surgical decision-making should incorporate a real-time, data-driven approach of daily assessment that considers both individual patient cases and the supply of hospital resources, particularly personal protective equipment
5. Case-by-case assessment of immediate need to operate should incorporate the individual patient's age, comorbidities, disease severity, wishes, and possibility of SARS-CoV-2 infection
6. Non-operative management strategies that do not worsen patient outcomes should be considered where possible, based on the surgical team's decision
7. Minimise postoperative length of stay and need for critical care, encouraging use of enhanced recovery protocols and maximising use of short stay procedures where possible
8. Senior consultants should direct both the initial assessment of surgical patients and an efficient and appropriate management strategy, overseeing the operative intervention
9. Preparation for a potential future surge in COVID-19 cases is crucial
10. Avoid unnecessary delay of cancer cases, as a backlog could progress to a future peak of urgent cases that may coincide with a peak in COVID-19 cases
11. Patients should be assessed on booking and then again on admission for their COVID-19 status; this would include questions related to a history of symptoms, close contacts and recent travel. COVID-19 testing should be carried out wherever possible in accordance with current Federal, State, and/or Territory Department of Health or New Zealand Ministry of Health guidelines. However, recent modelling estimates a 1/100,000 risk of a healthcare worker contracting SARS-CoV-2 from an asymptomatic patient.*

* Dr Nick Coatsworth, Australian Deputy Chief Medical Officer "Webinar on Personal Protective Equipment"
21 April 2020, 15:30h

Advised schema for Elective Surgery Triage within Australia
(Developed by COVID-19 Working Group)

Situations where elective surgery is not advised:

- Non-essential surgery

Situations where elective surgery can be advised:

- **Stage 1:**
 - All Category 1 patients
 - Urgent Category 2 patients
 - Category 2 patients with projected postoperative admission \leq 23 hours
- **Stage 2:**
 - All Category 2 patients with projected postoperative admission \leq 72 hours
 - Category 3 patients projected to be admitted and discharged as same day cases
- **Stage 3:**
 - All Category 2 patients
 - Category 3 patients projected to be admitted and discharged as same day cases
- **Stage 4:**
 - All surgery

Stage 2 can be moved back to **Stage 1** within 3 days if COVID-19 hospitalisations increase. For same day cases, there is no congestion of beds and all such patients can be COVID-19 tested. In **Stage 3** more urgent cases are getting attended to. **Stage 4** is when the COVID-19 crisis is completely under control.

Advised schema for Elective Surgery Triage within New Zealand

(Developed by the New Zealand National Board)

When prioritising surgical waiting lists clinical urgency is to be the over-riding principle. However, where there is a clinically acceptable option to defer treatment at this time, then several important factors are to be assessed related to the patient and the health system:

i. Patient factors

- a) Co-morbidities and other factors that are identified as placing the patient at a higher risk of death if they contract COVID-19. (e.g., age >70, BMI >40, co-existing respiratory, renal and cardiac disease, diabetes, hypertension, immunosuppression and pregnancy)
- b) Reasonable expectation of needing ICU/high dependency care
- c) Discharge issues including personal circumstances such as if lives alone
- d) Whether this is a day case procedure
- e) Risk of the condition requiring acute admission within a short timeframe
- f) Other time-critical issues where long-term outcome will be significantly worsened by further deferral of treatment
- g) Whether the patient needs authority to travel past police or community check points
- h) As air travel is still not routinely available, inter-District Health Board travel may need to be minimised

ii. Health system factors in that hospital

- a) Bed state (including any policy for patients having single rooms only versus capacity)
- b) Supply chain of consumables, especially Personal Protective Equipment
- c) ICU / HDU status
- d) Ability to manage system capacity and demand (Cross-service, cross facility and cross provider planning and coordination must be maximised, and siloed planning is unacceptable. Each health system must prioritise collectively at local and regional level, including private providers, so that clinical risk is minimised for all patients regardless of provider.)
- e) Availability of community services for post-discharge support (e.g., district nursing, allied health, NGOs and others)
- f) Where applicable, specific requirements of the aged care sector facility where a patient is expected to reside following discharge from hospital

The presence of any of these factors in themselves does NOT mean a patient MUST be deferred. These highlight the need for a “whole of system” approach to case selection and, where sensible, to deferral of some cases whilst a heightened risk of COVID–19 exists. Referrers and patients require clear communications on the reasons for deferral, timing expectations and interim management.

Executive summary:

Introduction: The disease (COVID-19) caused by the coronavirus SARS-CoV-2, has caused a global pandemic that represents a significant risk to the populations of Australia and New Zealand. Without effective control measures both countries health systems may need to treat a significant number of infected patients.

To control COVID-19, the Australian government activated their influenza pandemic management plan, and in New Zealand a COVID-19 National Hospital Response Framework was developed to deal with the COVID-19 pandemic. These plans include healthcare services preparing to manage the potential increased demand on scarce resources needed for intensive care, and importantly to protect healthcare workers from this infection. In this emergency situation, triage for surgery is an important process for decision-making to treat the most urgent cases, protecting the healthcare systems' capacity to respond to COVID-19 cases.

The initial response from the governments of Australia and New Zealand, with the support of the Royal Australasian College of Surgeons (RACS) and other medical Colleges was to request that elective surgery be postponed. In Australia, Category 2 cases were restricted to only the most urgent and all Category 3 procedures were cancelled. In New Zealand, most elective surgery (i.e., all non-acute planned and all non-urgent cancers) were cancelled from 24 March 2020.

RACS, other Colleges and the Specialty Surgical Societies have produced guidelines to support current decision-making. This rapid review summarises the current advice from Australian and New Zealand Speciality groups, as well as that from other countries, regarding triaging of surgical cases. Peer-reviewed literature and other publications have provided further relevant information. A Working Group of surgeons, along with clinicians from other Medical Colleges have advised and guided this review.

Method: A rapid review methodology was adapted to search for all levels of evidence on triaging surgery during the current COVID-19 outbreak. Searches were limited to PubMed (inception to 10 April 2020) supplemented with grey literature searches using the Google search engine. Further, relevant articles were also sourced through the RACS COVID-19 Working Group. All levels of evidence were considered, and inclusion was not limited by language. Non-English articles were translated using Artificial Intelligence translation tools. Following meeting with the Working Group supplementary searches were conducted if any evidence gaps were identified.

Results:

The Australian Health Ministers' Advisory Council published guidelines in 2015 for national elective surgery categorisation; this outlined three categories for urgency based on clinical indications and a timeframe. New Zealand has a planned care program for elective (non-acute and non-cancer) procedures in District Health Boards (DHB), with specialists determining a priority score that is used to determine the urgency of a case against others and then, from the score and the threshold in that DHB, determine whether the procedure can be undertaken within four months and therefore the patient is on the elective waiting list.

Core Recommendations from Australian & New Zealand Specialty Societies

RACS and Specialty Surgical Societies have produced advice to guide their members in this current crisis; there is a need to triage and ration cases to ensure adequate hospital and Intensive Care Unit (ICU) beds, Personal Protective Equipment (PPE) and other equipment, and medicines, as well as protecting healthcare workers from exposure to the virus.

For individual cases there should be an assessment (based on age, co-morbidities, disease status) of each patient to determine if the procedure should proceed, or if non-operative treatment is an option. Additionally, surgeons should have a plan on how any complication, if it arises, might be dealt with. However, while a short delay in treatment may not cause worse outcomes, a backlog of cancer cases could create a later treatment surge which may coincide with a COVID-19 peak.

Multidisciplinary care is advised for any complex issues. Additionally, seeking the advice of a colleague, an independent peer opinion or review by a hospital-based committee is advised. Key points to consider in decision-making are for short hospital stays, fewest likely complications, least likelihood to need critical care, lowest utilisation of healthcare resources, highest life expectancy and return to functional capacity, as well as the lowest risk of transmission of SARS-CoV-2. Infection with SARS-CoV-2 is a risk for healthcare workers through droplet spread. Operating on certain anatomical sites, as well as when conducting aerosol generating procedures presents higher risks.

Guidelines from other countries

Guidelines from the USA and UK have permeated the recommendations provided internationally. Most recommendations call for the real-time, data-driven efficient allocation and utilisation of medical resources, so that the external strain on healthcare systems from COVID-19 is minimised. The aim is to conduct daily assessments of available hospital supplies and staffing capability, while considering the requirements and wishes of individual surgical patients. Also, administrative staff need to advise the surgical team about the status of hospital and community supplies for logistic efficiency. Similarly, when possible, to implement multidisciplinary care and senior consultant-led surgical decision-making relating to the severity of the local COVID-19 situation. Preparation for a potential future surge in COVID-19 cases is advocated by all international guidelines.

Clinical teams are to review all scheduled surgery and the impact on ICU access. When possible defer non-essential surgery if patient outcomes are not compromised. Surgery should proceed if the delay would result in a longer length stay and increased likelihood of readmission. Similarly, proceed with surgery when non-operative medical treatment fails. Further, choose surgical approaches that minimise operating time while maintaining the highest practicable safety against infection for the patient, other patients within the facility, and the surgical team. Finally, do not compromise clinical judgment and individualised, ethical, and patient-centred care.

Australia and New Zealand COVID-19 capacity

The Australian baseload for ICU beds is around 2,300, while in New Zealand the number is close to 250. There is an estimated surge capacity in Australia to 7,000 beds.

The Australian Government Department of Health is reporting the ICU demand; there were 56 patients currently in ICU as at 2 May, while in New Zealand there were no cases as of 3 May. Although the situation is promising, continued monitoring is necessary, particularly considering the upcoming winter season in the Southern Hemisphere.

Implications of COVID-19 on surgical triage

There is limited evidence that COVID-19 infection increases the risk of perioperative complications. To mitigate this risk, it may be beneficial to assess the COVID-19 status of patients before surgery (see Recommendation 11). This can include RT-PCR testing for viral load if the time to surgery allows return of test results. For negative patients it is ideal to wait and retest for higher reassurance. Patients should be isolated prior to the surgery commencing. In emergency cases, testing may not be possible and patient history unavailable, in which case appropriate PPE should be used. If an aerosol generating procedure is being used or the operation is in a high-risk anatomical location this is particularly critical.

Competing demands on healthcare resources: surgery versus COVID-19

To protect the healthcare system from a potential surge in COVID-19 cases, only urgent surgical cases are currently being performed. The key challenge associated with this is to define the clinical urgency, and this can be dealt with by triage protocols. All critically ill patients requiring treatment should receive it.

Low incidence of COVID-19 and the possibility to increase surgical cases loads

With the current low levels of COVID-19 hospitalisations in Australia and New Zealand a carefully considered increase of the surgical caseload will reduce a major backlog of cases and reduce the risk of a surge in the future. The key objective of such a process is to do this in a staged manner so that it could be wound back if a major COVID-19 surge occurred.

Conclusions:

In the current environment, urgent and emergency surgery must continue however a carefully staged return of elective surgery is recommended. Based on the evidence provided in this report and consideration by the COVID-19 Working Group, a schema has been proposed to guide this. A number of recommendations are provided at this time for guidance.

Introduction

COVID-19 is caused by the coronavirus SARS-CoV-2.¹ This disease has spread rapidly around the world; currently there are no effective treatments or a vaccine, thus strict prevention and control methods have been applied.² In recent decades there have been several other coronavirus epidemics, SARS-CoV and MERS. These have recorded higher fatality rates (10% and 32%, respectively)³ than that reported for SARS-CoV-2 of 3.6%.⁴ The high reproductive number of SARS-CoV-2, R_0 around 2.79 (IQR 1.16), reported by Liu et al (2020)⁵ from a number of studies, accounts for the rapid spread of disease. This has the potential to overrun the capacity of healthcare systems since a significant number of COVID-19 patients require hospitalisation and critical care.

During pandemics such as influenza, the Australian Government Department of Health enacts health management plans to support an integrated and co-ordinated response between the Australian Government and State and Territory Governments for preparation, action and stand down (where the public health threat can be managed within normal arrangements and monitoring for any change) phases. Critical to these plans is the appropriate allocation of resources.⁶ This was the basis for the current COVID-19 Emergency Response Plan in Australia.⁷ Similarly, the New Zealand Government has an influenza pandemic management plan that has been activated to manage the COVID-19 pandemic.⁸ They clearly outline the critical interventions to reduce transmission, such as appropriate hand washing and cough etiquette, as well as social distancing.

During the preparation and action phases, the focus is also on ensuring healthcare services are organised to manage increased demand, particularly for scarce resources such as intensive care, as well as protect healthcare workers from infection.⁸ Health emergencies, such as those experienced in a pandemic, require priority setting, rationing and triage. Triage relates to decision-making regarding the order of treating patients based on urgency of need; it should follow due process and be transparent.⁹

In response to the COVID-19 pandemic, and at the combined urging of the Royal Australasian College of Surgeons (RACS), the Australian and New Zealand College of Anaesthetists, the Royal Australian and New Zealand College of Obstetricians and Gynaecologists, and the Royal Australian and New Zealand College of Ophthalmologists,¹⁰ the Australian and New Zealand Governments have issued directives for elective surgery. The advice was to either postpone surgery or, for those that cannot wait, redirect it from public to private providers, if necessary, due to lack of capacity in the public healthcare system.^{11,12}

In Australia, the directive to postpone elective surgery effectively curtailed elective surgery within Category 2 (only to the most urgent), while not pursuing Category 3 cases (as defined by the Australian Health Ministers' Advisory Council (AHMAC) guidelines).¹³ The intention of the directive was to protect both surgical teams and patients from infection, as well as preserving medical supplies, including vital equipment needed for the anticipated surge in COVID-19 patients requiring high acuity care. There is uncertainty around patient and procedure classifications in making the decision to postpone surgery; RACS and the Specialty Surgical Societies have produced guidelines to support such decision-making. In New Zealand, elective surgery (planned non-acute plus non-urgent cancer) was halted on 24 March.

Further, the continued requirement to postpone elective surgery is dependent on how well the social control measures are limiting the number of infections. A rigid adherence to restrictions in elective cases may, however, have an unintended consequence of creating a post COVID-19 surge in surgery with a potential to overwhelm and compromise healthcare in Australia and New Zealand. The aim of this review is to summarise the current advice that Australian and New Zealand Speciality Societies, as well as those that other countries are providing, regarding triaging of surgical cases. Based on this advice and input from an expert working group, overarching principles will be provided to assist with this decision-making. Furthermore, this rapid review presents approaches to inform local decision-making on elective surgery, to protect surgical teams while maintaining equitable access to surgical treatment.

Methods

A rapid review methodology was adapted to search for all levels of evidence on triaging surgery during the current COVID-19 outbreak. Searching for peer-reviewed publications was limited to PubMed from inception to 10 April 2020. The search developed for the “*Guidelines for safe surgery: open versus laparoscopic*” rapid review[†] was adapted to target surgery triage in the COVID-19 pandemic.

PubMed searches were supplemented with grey literature searches using the Google search engine. Searching was limited to websites of Departments of Health, Surgical Colleges, health authorities e.g., WHO, CDC, and major teaching hospitals.

Further, relevant articles were also sourced through the RACS COVID-19 Working Group.

Study selection and extraction was performed by KW, DRT, JK and WB.

All levels of evidence were considered, and inclusion was not limited by language. Non-English articles were translated using Artificial Intelligence translation tools, which may affect the interpretation of results.

Included studies report primary research, reviews and opinion pieces that are either in print or published. When necessary, supplementary searches were conducted to fill any evidence gaps identified during meetings with the Working Group.

The review team will appraise new evidence, updating the Working Group as necessary i.e., where any new evidence is deemed to have a potential impact on previously issued recommendations. If so, the review will be updated, and new recommendations provided regarding triage of surgical cases during the pandemic.

[†] Available at: <https://umbraco.surgeons.org/media/5214/2020-04-15-recommendations-on-safe-surgery-laparoscopic-vs-open.pdf>

Results

Elective surgery / urgency categorisation

In Australia, the current national elective surgery urgency categorisation is determined according to the 2015 guideline established by the AHMAC:¹³

- Category 1: Procedures that are clinically indicated within 30 days
- Category 2: Procedures that are clinically indicated within 90 days
- Category 3: Procedures that are clinically indicated within 365 days

In contrast, New Zealand operates a planned care program for elective procedures (non-urgent plus non-cancer) performed by District Health Boards (DHBs). Specialists assess if treatment is needed and, if so, determine a priority score of need for the individual relative to others. If patients are offered public treatment, that treatment is required to be delivered within four months.¹⁴ Prioritisation scores are based on the impact of the condition on the patient's life, the risk of deterioration, the consequences of deterioration, the expected benefit of surgery and the risk of surgery.

In these prioritisation systems it is the responsibility of the treating surgeon to assign the Australian urgency category or the New Zealand prioritisation score.

- The urgency category / score should be appropriate to the patient and their clinical situation and not influenced by the availability of hospital or surgeon resources.
- The usual Australian urgency category listed in this guide should be used to assign an urgency category unless a patient's clinical indications require earlier treatment.
- If a patient's clinical indications require the allocation of an alternative category to the usual urgency category listed in the guideline the treating surgeon should follow the escalation principles outlined in their respective State or Territory elective surgery policy.
- Where multiple procedures are being performed, the urgency category should be allocated to the primary procedure.
- Australian patients with a malignant condition are usually considered to require treatment within 30 days (Australian Category 1). In New Zealand, these patients are expected to be treated within the Cancer Treatment pathway timeframes.
- The Australian National Guideline does not attempt to cover every surgical procedure.
- The National Guideline does not overrule State or Territory policies or directives and should be used and interpreted in conjunction with any such policies and directives.

The 'treat in turn' principle is to be applied when booking elective surgery patients. That is, patients are treated in accordance within their urgency category / prioritisation score.

RACS guidelines for the management of surgical patients during the COVID-19 pandemic

RACS recognises the current challenging situation due to the COVID-19 pandemic. This impacts healthcare staff who provide surgery, as well as their patients. The current situation presents additional consideration of risks for surgery due to the potential for COVID-19 spread. Only the most urgent conditions should be treated.

The RACS COVID-19 information hub provides a range of resources on elective surgery recommendations and communications from specialty societies, as well as information regarding CPD, exams, courses, events, hospital accreditation and training.¹⁵ Outlined in this advice are principles to guide surgical management, including precautions to be considered in the operating theatre.

Surgery and COVID-19 | Core Recommendations from Australia & New Zealand Specialty Societies[‡]

The COVID-19 pandemic has the potential to challenge the capacity of Australian and New Zealand healthcare facilities. There is a potential for the number of symptomatic patients to increase to a point where resources in hospitals may need to be repurposed.¹⁶

In Australia & New Zealand non-urgent surgery was suspended in response to the COVID-19 pandemic. On 25 March 2020, Australian Prime Minister Scott Morrison announced suspension of all non-urgent surgery and procedures, with only Category 1 and urgent Category 2 cases continuing.¹¹ In New Zealand a state of national emergency was declared on 25 March 2020 and the COVID-19 Alert Level 4 came into force on 26 March. New Zealand has transitioned back to COVID-19 Alert Level 3 on Tuesday 28 April.^{17,18}

Specialty Societies support the Australian and New Zealand Governments position of limiting elective surgery. This will reduce the burden on the national health systems, preventing harm to patients, healthcare workers and other staff during the COVID-19 pandemic.

The Australian and New Zealand Endocrine Society stressed the current need to triage and ration cases due to the potential shortage of hospital and ICU beds, ventilators, as well as Personal Protective Equipment (PPE); the impact on hospital resources due to staff sickness, quarantine or home duties; and the potential increased exposure of surgeons and other healthcare workers due to community spread in undiagnosed patients.¹⁹ Decision-making for patient treatment at this time must also consider the available resources, including drugs, equipment (e.g., PPE and critical care resources) as well as all healthcare staff required for each case.²⁰

Additionally, an individual patient-needs assessment should be conducted considering patient age, comorbidities, disease site and staging, as well as the wishes of the patient, in the context of the capacity to deliver the care. Where possible non-operative treatment should be considered, especially where significant comorbidities are present. It is critical to have a plan to deal with any potential complication if it arises, especially in the current setting where resources could be limited. Surgery should be avoided, where possible, in older or more compromised patients.²¹

The importance of multidisciplinary care is stressed at this time, with multidisciplinary team (MDT) meetings considering the complex issues. There could even be consideration of MDTs across hospitals or referral to less affected centres.²⁰

While a brief delay in treatment or diagnosis may not result in worse outcomes it is important not to unnecessarily delay cases. A backlog of cases could cause a peak of cancer cases requiring treatment,

[‡] Appendix A lists guidelines reviewed with access date and URL to source document

which might coincide with a COVID peak i.e., cases become more urgent and complex as the disease progresses.²² In orthopaedic surgery, the Australian Orthopaedic Association's recommendation is to continue with emergency (urgent and essential) surgery at the present level to prevent future physical disability in the population. However, until there is a better understanding of the COVID-19 pandemic on the health system, non-urgent surgery must be suspended.²³ Also noted, is the need to avoid potential long-term harm for some patients, who may suffer a significant adverse outcome by a considerable delay in their surgery.^{21,24} However there needs to be consideration of the impact of a potential SARS-CoV-2 infection in patients undergoing surgery, especially regarding any comorbidities they may have.²⁴

The Australian and New Zealand Hepatic, Pancreatic and Biliary Association²⁵ also provides guidance on factors to assist decision-making regarding the urgency of the investigation or intervention. These factors include risk of progression with delay, impact of such a progression, available alternatives, likely outcomes with and without the intervention, and the available resources considering potentially competing cases. This is a complex decision-making process where the needs of one individual patient are weighed against another. In the current COVID-19 setting, cases should be chosen that have the:

- shortest hospital stay, with the fewest likely complications
- least likelihood of needing critical care or shortest duration in critical care
- highest life expectancy and return to best functional capacity
- lowest combined utilisation of hospital resources
- lowest risk of transmitting COVID-19 to healthcare workers.

Where there is uncertainty regarding proceeding with surgery, the Australian Spine Society recommended that surgeons must review the patient details with a colleague or the hospital administration.²⁶ The Australian Knee Society recommended that surgeons obtain a documented, independent peer opinion before scheduling surgery for Urgent Category 2 cases.²⁷ The Australian Orthopaedic Foot and Ankle Society suggested that operative cases could be reviewed by a hospital-based committee.²³

Surgery and COVID-19 | recommendation for higher risk procedures

As transmission of SARS-CoV-2 is primarily through droplet spread there is a risk to healthcare workers. In certain surgical procedures there is a higher risk due to aerosols being produced as well as the anatomical site of the surgery, where the virus is more likely to be present.

In SARS-CoV-2 infected patients, otolaryngology head and neck surgeons are at particular risk due to the potential exposure to a high viral load.²⁸ The Australian Commission on Safety and Quality in Healthcare²⁹ released guidance on COVID-19 and endoscopy procedures, highlighting the Guide for Triage of Endoscopic Procedures during the COVID-19 Pandemic produced by the Gastrointestinal Society of Australia.³⁰ For upper gastrointestinal endoscopy procedures, Endoscopic Retrograde Cholangio-Pancreatography (ERCP) and Endoscopic Ultrasound (EUS), there is also a risk of increased aerosolisation.^{25,30}

Oesophagectomy is considered an aerosol generating procedure that does not have a risk as high as gastroscopy or otolaryngology, head and neck procedures, however appropriate protection should be used in suspected or confirmed COVID-19 cases.²⁰

In orthopaedic surgery, drills and saws are commonly used, which can aerosolise tissue, presenting a risk to healthcare workers in the current COVID-19 environment.²³

Surgery triage and COVID-19 | Guidelines from other countries[§]

Preparation for a potential future surge in COVID-19 cases is advocated by all international guidelines that were reviewed. Balancing comprehensive surgical management and maintaining a supply of medical resources is difficult due to the impact of COVID-19 on healthcare systems. The high reproductive number of SARS-CoV-2 requires a daily assessment of medical resource supplies and staffing capability, as an exponential increase in community cases could cause a hospital to be overwhelmed quickly.

The American College of Surgeons (ACS) have developed a phased model to support decision-making by both administrators and healthcare professionals relative to the acuity of the specific local COVID-19 situation.³¹⁻³⁷ Phase I describes a semi-urgent setting for surgery that should be used for preparation, where hospital resources are not exhausted and the institution's ICU still has an excess supply of beds, ventilators and other essential equipment relative to the demand created by the COVID-19 situation. In Phase I, surgery should be restricted to patients whose survival would be compromised if their operation were not performed within the next three months wherever possible alternative, non-operative treatment approaches should be considered. Phase II describes an urgent setting, where the increase in COVID-19 cases is likely to overwhelm hospital resources in the next few days. In this situation, surgery should be limited to cases requiring treatment as soon as possible; all other surgery should be deferred and alternative treatment sought. In Phase III, all hospital resources have been diverted to COVID-19 patients exhausting ICU capacity for care and medical supplies. Here, the hospital's status is critical and likely to deteriorate within hours. Surgery is restricted to patients whose survival is compromised if an operation is not performed as soon as possible. Other international organisations have developed similar schema that categorise different potential situations of COVID-19 case-load and medical resource availability to facilitate efficient surgical triage.^{38,39}

Throughout this crisis, there is no substitute for sound clinical judgment and individualised, patient-centred care.^{37,39,40} Patient needs are considered on a case-by-case basis⁴¹⁻⁴³ to meet their clinical needs within the resources available to the treating healthcare facility and wider community at that point in time. Ethical standards of surgical care must be upheld, and patient outcomes optimised, despite the external strain that the COVID-19 pandemic places on the normal mechanism of care. Surgical teams are urged to choose an approach that minimises time spent within the operating theatre, while maximising safety for the patient being treated, other patients within the healthcare facility, and the treating healthcare workers.^{35,44}

[§] Appendix A lists guidelines reviewed with access date and URL to source document

Given the unpredictable and volatile nature of the current milieu, the need for senior leadership within treating surgical teams cannot be overstated.⁴⁵⁻⁴⁷ Senior consultants and specialists must lead the initial assessment of patients wherever possible. They should ensure efficient surgical management strategies that minimise the use of PPE and other medical resources, while not affecting the outcome of the patient being treated.

The UK National Health Service⁴⁵ and the Royal College of Surgeons England⁴⁶ stress the importance of maintaining a real-time data-driven approach for both the governance of surgical management and the allocation of resources within a healthcare facility. Daily assessment of the risk-benefit ratio is a necessity for clinical care delivery during the COVID-19 pandemic. This method will optimise efficiency, while allowing individual centres to adjust to both local and regional situations of COVID-19 cases, and the supply of available medical resources. Further, the ACS has advised that a Surgical Review Committee, composed of surgery, anaesthesiology, and nursing personnel is essential to provide defined, transparent, and responsive oversight amidst this current crisis.⁴⁸ Multidisciplinary care is crucial and should be implemented at all stages of a surgical patient's management. This includes the determination of case status (i.e., the time-frame for risk of death),³¹ scheduling and prioritisation of the surgery, and ensuring adequate staffing and medical supplies to support all aspects of a patient's care. When making treatment decisions during the COVID-19 pandemic, multiple factors must be considered, including the current and projected COVID-19 cases in the community and region, the hospital's ability to implement telehealth, supply of PPE and staff, medical office/ambulatory service location and capacity, testing capability in the local community, health and age of each individual patient, and the urgency of the respective surgical treatment or service.^{39,47} It is crucial that administrative personnel provide input to clinical surgical staff regarding the status of hospital and community supply of resources, so that logistical efficiency can be optimised.³⁷

Hospitals and surgeons should review all scheduled elective procedures with a plan to minimise, postpone or cancel scheduled operations, endoscopies and other invasive procedures as necessary.^{42,43,46,49} Before scheduling any surgery, the ICU facilities must be re-evaluated, especially for operations with a high probability for postoperative intensive care. In general, non-essential surgery should be deferred wherever possible.⁴⁸ Where deferment does not compromise patient morbidity or mortality, such procedures should be suspended for up to three months wherever possible.^{31,33,36,37,42,48,50-54} Postponing surgery is necessary to maintain a reserve of PPE and other medical equipment needed for COVID-19 cases and to minimise the chances of widespread community transmission. However, procedures and operations should be performed if a delay is likely to prolong the hospital stay, increase the likelihood of later hospital admission, or cause harm to the patient involved. Further, patients who have failed medical management of a surgical condition should be considered for surgery to decrease the future use of resources for the treating institution.^{40,52} ACS recommends the Elective Surgery Acuity Scale (ESAS) from St. Louis University to assist in the surgical decision-making process for triage of non-emergent operations.³⁹ Similarly, multiple international organisations have developed classification systems designed to facilitate the rapid triage of patients depending on the severity and urgency of their clinical case.^{31,41,43,45,50,52,54-57}

Ideally, full testing and workup for COVID-19 should be conducted in patients prior to surgery, with surgery suspended until results from testing have returned.⁴⁷ This is important if a patient presents with any symptoms of COVID-19 or influenza-like illness, or has been in direct contact with a known positive COVID-19 case.⁵³ In these situations, a complete COVID-19 workup must be conducted and surgery should not go ahead within 14 days of the contact, even if the patient is asymptomatic. The exception to this is in situations of urgency where there is an immediate threat to either the patient's life or organs that necessitates operative management. In these cases the operation will be conducted with minimal staff and full PPE precautions.^{44,47} It is important that any decisions regarding surgical procedures are made using all available medical and logistical information, not solely on risks associated with COVID-19.³⁷

The general consensus was that operative management should be minimised wherever possible in order to preserve resources in preparation for a potential surge in COVID-19 cases. As the pandemic progresses, hospitals may need to manage multiple spikes in COVID-19 cases as government policies progressively wind back social intervention towards normalcy. Throughout this progression and subsequent de-escalation, the senior leaders of clinical care teams should liaise with hospital leadership to understand the dynamic climate that is associated with the COVID-19 pandemic.

COVID-19 / Australia and New Zealand status

COVID-19 surge capacity: ICU beds and healthcare resources

Accurate data on how well Australia's and New Zealand's social interventions have limited COVID-19 spread is critical to the review of postponed surgery during the pandemic. The Australian Government released a summary of the COVID-19 modelling conducted by the Doherty Institute (Australia) demonstrating that the current social interventions will restrict the daily peak demand on ICU beds to 5,000.⁵⁸ However, the current modelling is not based on Australian data. To address this the Department of Health will update predictions using real world Australian data; results are pending.

Regarding ICU capacity, Litton et al (2020) conducted an email survey of all ICU Directors in Australia to determine ICU surge capacity.⁵⁹ With a response rate of 92%, the survey demonstrated a maximum surge capacity of 4,258 additional ICU beds to a total of 6,486 in the ICUs included in the survey sample. This extrapolates to 7,000 beds nationally, which is inclusive of 2,378 beds at baseline activity,⁵⁹ and confirms the ICU bed capacity reported by the Australian Government Department of Health on 7 April 2020.⁵⁸ Utilisation of these beds requires additional healthcare staff estimated at 4,092 senior doctors and 42,720 ICU nurses. Further to the staff shortfall, the survey identified a significant lack of invasive ventilators and geographical variations in capacity.

New Zealand has 176 ICU beds, as well as 57 high-dependency and cardiac care beds, across 20 DHBs.⁶⁰ In contrast, Wong et al (2019)⁶¹ estimated a New Zealand baseline high-acuity bed capacity of 317 beds that may be appropriate to elevate to ICU care level based on the current New Zealand population of 4.97 million.⁶² This study used a modified Delphi consensus method to design a survey to collect hospital- and ward-level data about health services capacity to provide 'high-acuity' care. High-acuity care was defined to be care areas where postoperative patients can receive critical care outside of the HDU/ICU setting. The study authors reported a response rate of 94% and documented 6.38 high acuity beds and 5.93 ventilated beds per 100,000 population in New Zealand. The New

Zealand Ministry of Health released a document on 24 March describing the modelling of worst case health impacts from COVID-19.⁶³ This report describes the predicted situation if eradication fails; a peak predicted in July 2020 would result in 1% of symptomatic cases requiring critical care in an ICU.

COVID-19 / Current supply of PPE

There have been concerns in the Australian and New Zealand media that PPE is in short supply. Specifically, one report referred to lack of PPE for ICU staff in a Sydney Hospital⁶⁴ and in another, the need to ensure continued PPE supply in New Zealand.⁶⁵ The supply of PPE is critical for managing all COVID-19 patients, including those undergoing surgery who are considered at high risk of being COVID-19 positive. When PPE is in short supply, a triage system (based around procedural factors, the condition and the patient characteristics) is needed to support the decision to proceed with clinically necessary, time-sensitive procedures.⁶⁶ However, State and Territory governments as well as the Australian Department of Industry, Science, Energy and Resources are sourcing supplies from overseas or seeking to increase PPE production locally.^{67,68} The New Zealand Ministry of Health has provided advice on the type of PPE required in what circumstances.⁶⁹ Additionally there are processes in place to ensure supply of PPE to sites where most needed during the pandemic.⁷⁰

Current COVID-19 demand on ICU beds

Australia and New Zealand are in the preparation phase to ready the health system for the worst-case scenario for COVID-19 case surge. The number of new COVID-19 cases has slowed significantly since the introduction of social distancing (Australia) and lockdown (New Zealand).

In Australia, the impact of COVID-19 on ICU demand with ICU admissions and cases requiring ventilation are reported weekly by the Department of Health (Australian Government). Table 1 summarises this key data from recent Department of Health epidemiology reports spanning the period from when social distancing was introduced on 25 March 2020. As of 26 April, 148 patients required ICU admission of the 829 hospitalisations for COVID-19. Of those patients admitted to ICU, 41 required ventilation. These cumulative data describe progression of COVID-19 and how the current situation is tracking against the worst-case scenario. These daily “*Coronavirus (COVID-19) at a glance*”⁷¹ reports provide details of the number of COVID-19 patients in hospital and ICU on that day.

Table 1: Summary of Coronavirus disease (COVID-19) weekly epidemiology reports, Australia⁷²

Metric	Report 8 ⁷³ Up to 22 March	Report 9 ⁷⁴ Up to 29 March	Report 10 ⁷⁵ Up to 5 April	Report 11 ⁷⁶ Up to 12 April	Report 12 ⁷⁷ Up to 19 April	Report 13 ⁷⁸ Up to 26 April
Total cases	1,765	4,159	5,805	6,394	6,606	6,711
Deaths	7	15	33	46	69	77
Hospitalisations due to COVID-19	190	402	638	752	810	829
Intensive Care Unit admissions	17	38	82	127	141	148
Cases requiring ventilation	2	5	29	36	39	41

Note: for a daily summary, readers are advised to check <https://www.health.gov.au/resources/publications/coronavirus-covid-19-at-a-glance> for daily cases in hospital or ICU.

Table 2 details the summary of COVID-19 progression as collated by RACS New Zealand Office from the Ministry of Health’s formal daily briefings spanning the period when level 4 restrictions were introduced on 26 March 2020. On 3 May 2020, 8 patients were in hospital and none were admissions to ICU.⁷⁹ Concerns about a potential future surge in cases has prompted action towards tripling ICU capacity within coming weeks to prevent the healthcare system being overwhelmed.⁸⁰ With the suspension of non-essential elective surgery, methods to improve capacity for coping with a potential increase in ICU demand could include the conversion of operating theatres to ICU facilities.

Table 2: Summary of COVID-19 cases* , New Zealand

Metric	Up to 22 March	Up to 29 March	Up to 5 April	Up to 12 April	Up to 19 April	Up to 26 April
Total cases (confirmed and probable)	65	500	1,026	1,317	1,431	1,470
Deaths	0	1	1	4	12	18
Hospitalisations due to COVID-19 (aggregate patient days)	9	51	144	226	333	400
Intensive Care Unit admissions (aggregate patient days)	0	4	17	47	74	86
Cases requiring ventilation	NR	NR	NR	NR	NR	NR

Note: Current cases available from <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-current-situation/covid-19-current-cases>

* Dates aligned to those in Table 1; NR: not reported

These are promising statistics. Australia is tracking below baseline ICU capacity and predicted peak surge in ICU for COVID-19,⁵⁸ and the situation is similar in New Zealand. However, Australia and New Zealand are entering winter with temperatures ranging from 18°C to 23°C (Sydney, Australia) and 14°C to 16°C (Wellington, NZ). These temperatures are within the optimal range (13°C -24°C) for the survival and transmission of COVID-19;⁸¹ therefore onset of cooler weather may trigger an increase in locally acquired COVID-19 cases requiring ongoing adherence to current control interventions.

Implications of COVID-19 on surgical triage

The risk of perioperative complications associated with COVID-19 are significant and they profoundly affect patient survival.⁸² Ideally, the COVID-19 status of surgical patients should be determined before surgery.⁸³ Lippi et al (2020)⁸⁴ reviewed current RT-PCR tests for SARS-CoV-2 and identified the issue of false negative results. If time allows, this can be mitigated by serial RT-PCR to follow viral load and allow time to reach the limits of detection for the RT-PCR test. In emergency cases when time to surgery does not allow return of RT-PCR test results, then patient symptoms, history, contact history and diagnostic imaging can be used to inform risk of SARS-CoV-2 infection. Patients from any of the population groups at high-risk of contracting COVID-19 should be treated with extra caution

and triaged appropriately. In Australia these groups include travellers who have recently been overseas or on cruise ships, aged care residents, people in detention facilities, people in group residential settings, and those who have been in close contact with someone who has been diagnosed with COVID-19 (including the 48 hours prior to onset of symptoms).⁸⁵

Emergency surgery should be performed promptly but only with appropriate staff and provision of PPE, and where possible, avoidance of aerosol-generating procedures.⁸³ Coccolini et al (2020)⁴⁷ and Lee et al (2020)⁸⁶ discuss operational directives to protect patients and staff from SARS-CoV-2 infection, which include delaying surgery for patients whose survival is not compromised, allocating of staff and PPE, designating COVID-19 operating areas, limiting COVID-19 patient transits and having defined pathways to reduce the risk of environmental contamination. Further, in Singapore, surgical work flows were enhanced by establishing a cross-disciplinary team of senior surgeons.⁸⁷ This team approach allowed the standardisation of infection control protocols for surgery, maintained communication of reliable information, ensured sharing/preservation of limited resources, allocated staff to small teams with specific tasks to reduce the risk of transmission between staff, and highlighted the value of teleconferencing to limit physical contact while maintaining clinical discussions, management of surgical case load and postgraduate education.

Competing demands on healthcare resources: surgery versus COVID-19

COVID-19 preparations have included a restriction of surgery to patients who are likely to have a compromised survival. For Australia, this meant restrictions to urgent cases only. Decisions on the category of patients are at the discretion of the treating medical professional.¹¹

The challenge is defining urgency, for example the American College of Surgeons propose a phased system.⁸⁸ The first phase (preparation) limits surgeries to “*patients likely to have survivorship compromised if surgery is not performed within next 3 months*” to preserve essential equipment and resources. When COVID-19 cases escalate, the criterion for ‘survivorship’ being compromised is tightened to within days and then hours. For example, Ross et al (2020)⁸⁹ defined surgery triage according to the position of the hospital—ranging from Alert level (disaster preparedness begins) to Condition Zero (infrastructure and resources exhausted)—as follows:

- Alert: prioritise surgical cases for cardiovascular, cancer, urgent and emergent status. Minimise clinic visits. Non-time-sensitive elective cases should be postponed by three months.
- Level 2: Reduce elective case volume by 50%, eliminate non-time-sensitive cases (focus on required cancer and cardiovascular cases). Patients with high risk factors should be deferred (age > 60 years, diabetes, hypertension, smoker, coronary artery disease etc).
- Level 1: Cancel all non-emergent surgery. Consider cancelling all invasive cardiovascular and cancer cases with high risk factors (age > 60 years, diabetes, hypertension, smoker, coronary artery disease etc). Use non-operative techniques where possible and discharge patients home.
- Level 0: All non-emergent cases cancelled, transfer urgent cases to outlying facilities, pursue all non-operative options for emergent and urgent patients.

Within Australia, a three-month time frame would capture both Category 1 and 2 patients.¹³ For New Zealand the period covers a significant proportion of patients prioritised for surgery within the

four-month window defined by the planned care scheme.¹⁴ Care for all critical patients, not just pandemic patients, should be provided,⁸ and this should include surgical patients who have a compromised survival⁸⁹ and those requiring palliative care.⁹⁰

If the modelled surge in COVID-19 patients eventuates then healthcare professionals will need to balance the competing demands for ICU beds, which may be achieved using appropriate triage tools. A 2012 multicentre trial conducted in Australia (New South Wales [NSW] & Queensland) evaluated two triage protocols designed to allocate ICU beds during an influenza pandemic (NSW triage [2010] and Sequential Organ-Failure Assessment [SOFA, Canada]⁹¹).⁹² These triage tools are based on patient acuity. When applied to Influenza patients, they increased the availability of ICU beds on admission by 41% (NSW triage) and 53% (SOFA) in a non-pandemic setting. Within NSW, the application of ICU triage is triggered at 50% surge capacity for pandemic patients.⁹³ However, a review of influenza patients in ICU during a non-pandemic setting (assessed against the SOFA tool), questioned the triage of pandemic patients. Implementation of such tools requires clear protocols and support systems for healthcare professionals when making decisions about allocation of scarce essential equipment that peaks in a pandemic surge.⁹⁴ The release of ICU beds during a pandemic surge, through the application of triage processes, may allow allocation of ICU resources for patients requiring emergency surgery.

Low incidence of COVID-19 and the possibility to increase surgical cases loads

Given the low and stable COVID-19 hospitalisation and demand for ICU in Australia and New Zealand, both countries are still in the preparation phase as defined by Ross et al (2020).⁸⁹ Health authorities should consider an increased surgical case load to provide patients with timely surgical care and lessen the post-COVID-19 surge to clear postponed surgeries.

Any increase in surgery should be staged in a way that allows release of staff, beds and resources if COVID-19 cases rapidly increase. The decision to expand surgery case load should be informed by local COVID-19 information, preferably at a health network level.⁹⁵ Models are available to evaluate the impact of infectious disease outbreaks at an area- or/hospital-level, for example, CHIME (based on local COVID-19 data for three Philadelphia hospitals)⁹⁵ and the AsiaFluCap Simulator.⁹⁶ Although models are imperfect, Australia is collecting local epidemiological data that can inform the model inputs to generate outputs. This can assist decision-making around local resource allocation to manage COVID-19 and determine whether there is capacity to accommodate non-emergency surgical cases.

On the assumption that current COVID-19 cases and related resource needs remain low, the RACS COVID-19 Working Party developed the following schema to guide an expansion of surgical services. This schema is based on the Australian categorisation of urgency for elective surgery,¹³ with the immediate expansion being those within Category 2 and then extending to Category 3 surgeries. The schema balances urgency with patient COVID-19 status and resource needs for surgery, or ongoing healthcare needs if surgery is further postponed. It has been designed to help health service providers develop clear plans about surgical procedures that should continue during the pandemic.⁹⁷

Proposed Schema for Triaging Elective Surgery

Any surgical decision-making during the COVID-19 pandemic must take into account both the urgency of the patient's clinical presentation and the availability of hospital resources. Hence, this schema assumes that an MDT discussion has taken place that has considered both the individual patient's case and available hospital resources, and that surgery has been decided as the superior management for both the patient and the hospital. This schema also incorporates the Australian national definitions for elective surgery urgency categories as defined by the National Elective Surgery Urgency Categorisation Guideline.¹³

There is a degree of uncertainty when estimating postoperative length of stay prior to elective surgery, and this could likely increase due to the volatility associated with the COVID-19 pandemic. However, surgeons should consider outcomes at both an individual and a community level when predicting postoperative admissions and making the decision to pursue operative management.

Advised schema for Elective Surgery Triage within Australia

(developed by COVID-19 Working Group)

Situations where elective surgery is not advised:

- Non-essential surgery

Situations where elective surgery can be advised:

- **Stage 1:**
 - All Category 1 patients
 - Urgent Category 2 patients
 - Category 2 patients with projected postoperative admission \leq 23 hours
- **Stage 2:**
 - All Category 2 patients with projected postoperative admission \leq 72 hours
 - Category 3 patients projected to be admitted and discharged as same day cases
- **Stage 3:**
 - All Category 2 patients
- **Stage 4:**
 - All surgery

Stage 2 can be moved back to **Stage 1** within 3 days if COVID-19 hospitalisations increase. For same day cases, there is no congestion of beds and all such patients can be COVID-19 tested. In **Stage 3** more urgent cases are getting attended to. **Stage 4** is when the COVID-19 crisis is completely under control.

Advised schema for Elective Surgery Triage within New Zealand

(developed by the New Zealand National Board)

In New Zealand, triaging for elective surgery is based around prescribed prioritisation principles and the actual procedures performed may vary between District Health Boards (DHBs). New Zealand does not generally use the three level categorisation system with its associated list of procedures, as exists in Australia.

The Ministry of Health's "*COVID-19 National Hospital Response Framework*" (Version 2, circulated to DHBs 21 April 2020) aims to "*ensure that patients remain at the centre of care by making proportionate responses to escalations and de-escalations in the COVID-19 pandemic*"; and that "*Te Tiriti o Waitangi and Equity are at the centre of each level of the Framework*". Its four alert levels are triggered by the number of COVID-19 cases in a specific hospital and / or the extent of cases in its community. These levels are different to the Government's National COVID-19 Alert Levels for all community activities. Hospitals are expected to operate in line with this Framework and different hospitals may be at different levels depending on the situation in their own community. No hospital in New Zealand has reached the highest (severe impact) level.

As the number of new cases in New Zealand has continued to decline, with low hospitalisation rates, the Ministry of Health's Planned Care Sector Advisory Group circulated advice to all DHBs (21 April 2020) on the resumption of delivery of planned care. Its document ("*Increasing and improving Planned Care in accordance with the National Hospital Response Framework*") is for use during the community National Alert Level 3 (i.e., from Tuesday 27 April) and is to be adapted according to each DHB's alert level on the National Hospital Response Framework.

Sections within this advisory relevant to triaging planned care (elective) surgery are as follows:

- Waiting lists must be actively reviewed to identify patients where priority or treatment advice/options may have changed since s/he was accepted for that list. Those reviews should occur across services as well as within them, to prioritise highest clinical need.
- Maintenance of physical distancing requirements between workers, between patients and between work "bubbles" (ie. where teams have been separated into two bubbles to reduce risk of entire teams being stood down) are to be maintained.
- When prioritising surgical waiting lists clinical urgency is to be the over-riding principle. However, where there is a clinically acceptable option to defer treatment at this time, then several important factors are to be assessed related to the patient and the health system:

i. Patient factors

- a) Co-morbidities and other factors that are identified as placing the patient at a higher risk of death if they contract COVID-19. (e.g., age >70, BMI >40, co-existing respiratory, renal and cardiac disease, diabetes, hypertension, immunosuppression and pregnancy)
- b) Reasonable expectation of needing ICU/high dependency care
- c) Discharge issues including personal circumstances such as if lives alone
- d) Whether this is a day case procedure
- e) Risk of the condition requiring acute admission within a short timeframe
- f) Other time-critical issues where long-term outcome will be significantly worsened by further deferral of treatment
- g) Whether the patient needs authority to travel past police or community check points
- h) As air travel is still not routinely available, inter-DHB travel may need to be minimised.

ii. Health system factors in that hospital

- a) Bed state (including any policy for patients having single rooms only vs. capacity)
- b) Supply chain of consumables, especially PPE
- c) ICU / HDU status
- d) Ability to manage system capacity and demand. (Cross-service, cross facility and cross provider planning and coordination must be maximised and siloed planning is unacceptable. Each health system must prioritise collectively at local and regional level, including private providers, so that clinical risk is minimised for all patients regardless of provider.)
- e) Availability of community services for post-discharge support (eg. district nursing, allied health, NGOs and others)
- f) Where applicable, specific requirements of the aged care sector facility where a patient is expected to reside following discharge from hospital.

The presence of any of these factors in themselves does NOT mean a patient MUST be deferred. These highlight the need for a “whole of system” approach to case selection and, where sensible, to deferral of some cases whilst a heightened risk of COVID–19 exists. Referrers and patients require clear communications on the reasons for deferral, timing expectations and interim management.

Consistency of distancing and scheduling will be vital between public and private facilities. Case selection for private must, in addition to the factors listed above, include consideration of any in-hospital care other than at day-case level (ie. will medical cover be required overnight) and, where the workforce is shared, providers must collaborate to prioritise capacity.

Conclusions

Across surgical specialties and jurisdictions there is agreement regarding the recommendations for surgical triage in anticipation of a high incidence of SARS-CoV-2 infections. Under these conditions, hospital and ICU admissions would be dominated by COVID-19 patients, thereby limiting resource for surgery to the most urgent. However, the Government directives of social distancing (Australia) and initial lockdown (New Zealand) have restricted the COVID-19 transmission and thus released resources for non-COVID-19 patients. Based on the review findings and current incidence of infection, the COVID-19 Working Group has developed schemas for both Australia and New Zealand to broaden the criteria of allowable surgeries in the context of fighting the pandemic.

Limitations of the review

The limitation to a single database for sourcing peer-reviewed publications may have overlooked some articles. In addition, the expedited publication of peer-reviewed articles means that the currency of information related to COVID-19 will change rapidly. To mitigate this limitation, the review team has established automated alerts to identify relevant evidence on this topic.

Addendum

As the COVID-19 pandemic numbers and thus the effect on our health systems seems to be better than initially feared, the Australian and New Zealand governments have relaxed some restrictions on elective surgery. As per the recommendations and schema presented in this report, a careful and staged approach is needed, especially with the impending winter season which could cause a future surge in cases.

In Australia, the Federal government issued new guidance for restoration of elective surgery (Australian Health Protection Principal Committee, April 23).^{**} The risks for reintroduction of elective surgery were noted. They related to the increased burden on ICUs, infection control, PPE supplies and preoperative testing for COVID-19. Principles for the first tranche of elective surgery recommencement was outlined. The suggested approach from 27 April 2020 included reopening of 25% of elective surgery and endoscopy lists, focusing on category 2 procedures but with recommencement of some category 3 procedures, as well as the previously allowed category 1 procedures.

As detailed in the New Zealand Schema (p21), advice was provided by the Ministry of Health's Planned Care Sector Advisory Group on 21 April 2020 for the resumption of delivery of planned care, with release of the document "*Increasing and improving Planned Care in accordance with the National Hospital Response Framework*",^{††} for use from 27 April (for Community Alert Level 3).

^{**} <https://www.health.gov.au/news/australian-health-protection-principal-committee-ahppc-statement-on-restoration-of-elective-surgery>

^{††} Available from New Zealand DHBs or the RACS New Zealand Office

References

1. World Health Organization. Naming the coronavirus disease (COVID-19) and the virus that causes it. 2020; [https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-\(covid-2019\)-and-the-virus-that-causes-it](https://www.who.int/emergencies/diseases/novel-coronavirus-2019/technical-guidance/naming-the-coronavirus-disease-(covid-2019)-and-the-virus-that-causes-it). Accessed 16 April, 2020, 2020.
2. Dhama K, Sharun K, Tiwari R, et al. COVID-19, an emerging coronavirus infection: advances and prospects in designing and developing vaccines, immunotherapeutics, and therapeutics. *Hum Vaccin Immunother*. 2020;1-7.
3. Cascella M, M. R, A. C, Dulebohn SC, Napoli RD. Features, Evaluation and Treatment Coronavirus (COVID-19). *StatPearls [Internet]*. 2020; <https://www.ncbi.nlm.nih.gov/books/NBK554776/>. Accessed 17 April, 2020, 2020.
4. Khafaie MA, Rahim F. Cross-Country Comparison of Case Fatality Rates of COVID-19/SARS-COV-2. *Osong Public Health Res Perspect*. 2020;11(2):74-80.
5. Liu Y, Gayle AA, Wilder-Smith A, Rocklöv J. The reproductive number of COVID-19 is higher compared to SARS coronavirus. *J Travel Med*. 2020;27(2).
6. Australian Government Department of Health. *Australian Health Management Plan for Pandemic Influenza*. Canberra: Commonwealth Government of Australia; 2019.
7. Australian Government Department of Health. Australian Health Sector Emergency Response Plan for Novel Coronavirus (COVID-19) 2020; https://www.health.gov.au/resources/publications/australian-health-sector-emergency-response-plan-for-novel-coronavirus-covid-19?utm_source=health.gov.au&utm_medium=redirect&utm_campaign=digital_transformation&utm_content=covid19-plan. Accessed 13 April, 2020, 2020.
8. Ministry of Health New Zealand Government. *New Zealand Influenza Pandemic Plan: A framework for action*. 2nd ed. Wellington, New Zealand: Ministry of Health; 2017.
9. Petrini C. Triage in public health emergencies: ethical issues. *Intern Emerg Med*. 2010;5(2):137-144.
10. Medical Colleges call for urgent freeze to all non-critical elective surgery [press release]. Melbourne: RANZCOG, 25 March 2020.
11. ELECTIVE SURGERY -media release [press release]. Canberra: Prime Minister of Australia 25 March 2020.
12. Jones N. Covid 19 coronavirus: Huge elective surgery shift to private hospitals to free-up space. 26 March, 2020.
13. Australian Health Ministers' Advisory Council (AHMAC). NATIONAL ELECTIVE SURGERY URGENCY CATEGORISATION. Canberra: Australian Health Ministers' Advisory Council; 2015.
14. Ministry of Health New Zealand Government. Planned Care services. 2020; <https://www.health.govt.nz/our-work/hospitals-and-specialist-care/planned-care-services>. Accessed 12 April, 2020.
15. Royal Australasian College of Surgeons. COVID-19 information hub. <https://www.surgeons.org/media-centre/covid-19-information-hub>. Accessed 3rd May, 2020.
16. Australasian Trauma Society. Maintaining front-line trauma services during the COVID-19 response https://www.traumasociety.com.au/wp-content/uploads/2020/03/20200330_999999_LTR_Trauma-Group_COVID-Statement_Hospital-CEO.pdf. Accessed 12th April, 2020.
17. New Zealand Government. New Zealand is now at Alert Level 3. <https://covid19.govt.nz/alert-system/covid-19-alert-system/-new-zealand-is-now-at-alert-level-3> Accessed 3rd May, 2020.
18. New Zealand Government. New Zealand COVID-19 Alert Levels Summary. <https://covid19.govt.nz/assets/resources/tables/COVID-19-alert-levels-summary.pdf>. Accessed 3 May, 2020.

19. Australian and New Zealand Endocrine Surgeons. ANZES Executive Position Statement: Endocrine Surgery during the COVID-19 Pandemic. Defining urgent endocrine surgical conditions <https://umbraco.surgeons.org/media/5166/anzes-executive-position-statement.pdf>. Accessed 12th April, 2020.
20. Australia and New Zealand Gastric and Oesophageal Surgery Association. ANZGOSA General Guidelines for managing patients with Oesophageal and Gastric Cancer during COVID-19 pandemic <http://www.anzgosa.org/pdf/general-guidelines-og-cancer-management-covid-new.pdf>. Accessed 12th April, 2020.
21. Australian Orthopaedic Foot and Ankle Society. Position statement from the AOFAS about Elective Surgery and Covid-19 https://www.aoa.org.au/docs/default-source/advocacy/aofas-position-statement---covid-19.pdf?sfvrsn=4f77dd04_2. Accessed 12th April, 2020.
22. Australian and New Zealand Hepatic Pancreatic and Biliary Association. Considerations for HPB Surgeons in a Complex Triage Scenario COVID-19 https://anzmoss.com.au/wp-content/uploads/Considerations-for-HPB-surgeons-in-a-complex-triage-scenario-COVID19_1.pdf. Accessed 12th April, 2020.
23. Australian Orthopaedic Association. Position statement: Orthopaedic surgery during the COVID-19 pandemic https://www.aoa.org.au/docs/default-source/advocacy/aoa-position-statement-orthopaedic-surgery-during-the-covid-19-pandemic_march-2020.pdf?sfvrsn=957fdd04_4. Accessed 12th April, 2020.
24. Shoulder and Elbow Society of Australia. SESA position statement on surgery during the COVID-19 pandemic https://www.aoa.org.au/docs/default-source/advocacy/sesa-position-statement-on-surgery-during-the-covid-19-pandemic.pdf?sfvrsn=727ddd04_4. Accessed 12th April, 2020.
25. Australian and New Zealand Hepatic Pancreatic and Biliary Association. ANZHPBA Guidelines for Management of HPB Surgery during the COVID-19 pandemic <https://anzmoss.com.au/wp-content/uploads/Guidelines-for-ANZHPB-Surgeons-during-the-COVID-pandemic-1-April.pdf>. Accessed 12th April, 2020.
26. Spine Society of Australia. SSA COVID-19 Surgery Position Statement and Category Definitions https://www.aoa.org.au/docs/default-source/advocacy/ssa-covid-19-surgery-position-statement-and-category-definitions.pdf?sfvrsn=2677dd04_4. Accessed 12th April, 2020.
27. Australian Knee Society. AKS Position Statement, COVID-19 Pandemic <http://aoa.e-newsletter.com.au/link/id/z33z5e814ac7478de180Pzzz508f44ad8c994136/page.html>. Accessed 12th April, 2020.
28. The Australian Society of Otolaryngology Head and Neck Surgery. ASOHNS Guidelines addressing the COVID-19 pandemic <https://umbraco.surgeons.org/media/5176/australian-society-of-otolaryngology-head-neck-surgery-covid-19-statement.pdf>. Accessed 12th April, 2020.
29. Australian Commission on Safety and Quality in Health Care. COVID-19 and Endoscopy Procedures. https://www.safetyandquality.gov.au/sites/default/files/2020-04/fact_sheet_covid-19_and_endoscopy_procedures_april_2020.pdf. Accessed 14th April, 2020.
30. Gastroenterological Society of Australia on behalf of the New Zealand Association of General Surgeons. Guide for Triage of Endoscopic Procedures During the COVID-19 Pandemic https://www.gesa.org.au/public/13/files/COVID-19/Triage_Guide_Endoscopic_Procedure_26032020.pdf. Accessed 13th April, 2020.
31. American College of Surgeons and COVID 19 Pandemic Breast Cancer Consortium. COVID 19: Elective Case Triage Guidelines for Surgical Care, Breast Cancer Surgery https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_breast_cancer.ashx. Accessed 13th April, 2020.

32. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Cancer Surgery [https://www.facs.org/-/media/files/covid19/guidance for triage of nonemergent surgical procedures cancer surgery.ashx](https://www.facs.org/-/media/files/covid19/guidance%20for%20triage%20of%20nonemergent%20surgical%20procedures%20cancer%20surgery.ashx). Accessed 13th April, 2020.
33. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Colorectal Cancer Surgery [https://www.facs.org/-/media/files/covid19/guidance for triage of nonemergent surgical procedures colorectal cancer.ashx](https://www.facs.org/-/media/files/covid19/guidance%20for%20triage%20of%20nonemergent%20surgical%20procedures%20colorectal%20cancer.ashx). Accessed 13th April, 2020.
34. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Orthopaedics [https://www.facs.org/-/media/files/covid19/guidance for triage of nonemergent surgical procedures orthopaedics.ashx](https://www.facs.org/-/media/files/covid19/guidance%20for%20triage%20of%20nonemergent%20surgical%20procedures%20orthopaedics.ashx). Accessed 13th April, 2020.
35. American College of Surgeons. COVID-19: Elective Case Triage Guidelines for Surgical Care <https://www.facs.org/covid-19/clinical-guidance/elective-case>. Accessed 13th April, 2020.
36. American College of Surgeons. COVID-19: Elective Case Triage Guidelines for Surgical Care, Thoracic Cancer Surgery [https://www.facs.org/-/media/files/covid19/guidance for triage of nonemergent surgical procedures thoracic cancer.ashx](https://www.facs.org/-/media/files/covid19/guidance%20for%20triage%20of%20nonemergent%20surgical%20procedures%20thoracic%20cancer.ashx). Accessed 13th April, 2020.
37. American College of Surgeons. COVID-19: Guidance for Triage of Non-Emergent Surgical Procedures. <https://www.facs.org/covid-19/clinical-guidance/triage>. Accessed 13th April, 2020.
38. Spanish Society of Surgery (AEC). Dynamic Scale for Surgical Activity During the Pandemic COVID-19 [https://www.aecirujanos.es/files/noticias/158/documentos/Dynamic scale for surgical activity during the pandemic COVID19\(1\).pdf](https://www.aecirujanos.es/files/noticias/158/documentos/Dynamic%20scale%20for%20surgical%20activity%20during%20the%20pandemic%20COVID19(1).pdf). Accessed 15th April, 2020.
39. Centers for Medicare and Medicaid Services. Non-Emergent, Elective Medical Services, and Treatment Recommendations <https://www.cms.gov/files/document/cms-non-emergent-elective-medical-recommendations.pdf>. Accessed 13th April, 2020.
40. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Emergency General Surgery [https://www.facs.org/-/media/files/covid19/guidance for triage of nonemergent surgical procedures general surgery.ashx](https://www.facs.org/-/media/files/covid19/guidance%20for%20triage%20of%20nonemergent%20surgical%20procedures%20general%20surgery.ashx). Accessed 13th April, 2020.
41. Burke JF, Chan AK, Mummaneni V, et al. Letter: The Coronavirus Disease 2019 Global Pandemic: A Neurosurgical Treatment Algorithm. *Neurosurgery*. 2020.
42. Joint Advisory Group on GI Endoscopy, British Society of Gastroenterology. Endoscopy activity and COVID-19: BSG and JAG guidance <https://www.bsg.org.uk/covid-19-advice/endoscopy-activity-and-covid-19-bsg-and-jag-guidance/>. Accessed 13th April, 2020.
43. The International Society for Diseases of the Esophagus. ISDE Guidance Statement: Management of upper-GI Endoscopy and Surgery in COVID-19 outbreak [https://www.isde.net/resources/Documents/Resources/ISDE Position Statement COVID19 2020.03.30.pdf](https://www.isde.net/resources/Documents/Resources/ISDE%20Position%20Statement%20COVID19%202020.03.30.pdf). Accessed 13th April, 2020.
44. Spanish Society of Surgery (AEC). General Recommendations of Urgent Surgical Care in the Context of the COVID-19 Pandemic (SARS-CoV-2) from the Spanish Association of Surgery (AEC) [https://www.aecirujanos.es/files/noticias/158/documentos/4 - Recomendaciones for URGENT Surgical care during the pandemic COVID 19 v 2.pdf](https://www.aecirujanos.es/files/noticias/158/documentos/4%20Recomendaciones%20for%20URGENT%20Surgical%20care%20during%20the%20pandemic%20COVID%2019%20v%202.pdf) . Accessed 15th April, 2020.
45. National Health Service. Clinical guide for the management of surgical patients during the coronavirus pandemic <https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/specialty-guide-surgery-and-coronavirus-v1-16-march-2020.pdf>. Accessed 13th April, 2020.

46. Royal College of Surgeons. COVID-19: Good Practice For Surgeons and Surgical Teams <https://www.rcseng.ac.uk/standards-and-research/standards-and-guidance/good-practice-guides/coronavirus/>. Accessed 13th April, 2020.
47. Coccolini F, Perrone G, Chiarugi M, et al. Surgery in COVID-19 patients: operational directives. *World J Emerg Surg*. 2020;15(1):25.
48. American College of Surgeons, American Society of Anesthesiologists, Association of periOperative Registered Nurses. Create a Surgical Review Committee for COVID-19-Related Surgical Triage Decision Making <https://www.facs.org/covid-19/clinical-guidance/review-committee>. Accessed 13th April, 2020.
49. Society of American Gastrointestinal and Endoscopic Surgeons, European Association for Endoscopic Surgery and other Interventional Techniques. SAGES and EAES Recommendations Regarding Surgical Response to COVID-19 Crisis <https://www.sages.org/recommendations-surgical-response-covid-19/>. Accessed 13th April, 2020.
50. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Metabolic and Bariatric Surgery https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_metabolic_bariatric.ashx. Accessed 13th April, 2020.
51. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Otolaryngology https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_otolaryngology.ashx. Accessed 13th April, 2020.
52. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Pediatric Surgery https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_pediatric.ashx. Accessed 13th April, 2020.
53. Shared health Soins communs Manitoba. COVID-19: Provincial Guidance on Management of Elective Surgery <https://sharedhealthmb.ca/files/covid-19-elective-surgery.pdf>. Accessed 13th April, 2020.
54. The American Society of Breast Surgeons. Recommendations for Prioritization, Treatment and Triage of Breast Cancer Patients During the COVID-19 Pandemic: Executive Summary, Version 1.0, The COVID-19 Pandemic Breast Cancer Consortium https://www.breastsurgeons.org/docs/news/The_COVID-19_Pandemic_Breast_Cancer_Consortium_Recommendations_EXECUTIVE_SUMMARY.pdf. Accessed 12th April, 2020.
55. American College of Surgeons. COVID 19: Elective Case Triage Guidelines for Surgical Care, Vascular Surgery https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_vascular.ashx. Accessed 13th April, 2020.
56. European Association of Urology. EAU Robotic Urology Section (ERUS) guidelines during COVID-19 emergency <https://uroweb.org/wp-content/uploads/ERUS-guidelines-for-COVID-def.pdf>. Accessed 13th April, 2020.
57. North American Spine Society. NASS Guidance Document on Elective, Emergent and Urgent Procedures <https://www.spine.org/Portals/0/assets/downloads/Publications/NASSInsider/NASSGuidanceDocument040320.pdf>. Accessed 13th April, 2020.
58. Australian Government Department of Health. Impact of COVID-19 in Australia – ensuring the health system can respond. *Coronavirus (COVID-19) resources 2020*; <https://www.health.gov.au/resources/publications/impact-of-covid-19-in-australia-ensuring-the-health-system-can-respond>. Accessed 13 April 2020, 2020.

59. Litton E, Bucci T, Chavan S, et al. Surge capacity of Australian intensive care units associated with COVID-19 admissions. *Medical Journal of Australia* 2020;Preprint only – Version 2, updated 6 April 2020.
60. New Zealand Ministry of Health. COVID-19 (novel coronavirus) update - 25 February. <https://www.health.govt.nz/news-media/news-items/covid-19-novel-coronavirus-update-25-february> Accessed 3rd May, 2020.
61. Wong DJN, Popham S, Wilson AM, et al. Postoperative critical care and high-acuity care provision in the United Kingdom, Australia, and New Zealand. *Br J Anaesth.* 2019;122(4):460-469.
62. Stats NZ. Population clock. http://archive.stats.govt.nz/tools_and_services/population_clock.aspx Accessed 17 April, 2020.
63. Wilson N. Potential Worse Case Health Impacts from the COVID-19 Pandemic for New Zealand if Eradication Fails: Report to the NZ Ministry of Health. https://www.health.govt.nz/system/files/documents/publications/report_for_chief_science_advisor_-_health_-_24_march_final.pdf. Accessed 3rd May, 2020.
64. McClymont K. 'No other option': ICU staff forced to make own PPE with stationery. *The Age*2020.
65. byline n. Not enough protective medical gear available despite govt assurances, supplier says *NZ Herald*2020.
66. Prachand VN, Milner R, Angelos P, et al. Medically-Necessary, Time-Sensitive Procedures: A Scoring System to Ethically and Efficiently Manage Resource Scarcity and Provider Risk During the COVID-19 Pandemic. *Journal of the American College of Surgeons.* 2020.
67. Resources AGDoISEa. Call for information on manufacturing medical personal protective equipment. 2020; <https://www.industry.gov.au/news-media/covid-19-news/call-for-information-on-manufacturing-medical-personal-protective-equipment>. Accessed 21 April, 2020, 2020.
68. Cross D. 'Morale boosting' PPE worth millions arrives in Perth to protect frontline workers. *The Age*2020.
69. New Zealand Ministry of Health. Personal protective equipment use in health care. <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-novel-coronavirus-information-specific-audiences/covid-19-advice-workers-including-personal-protective-equipment/personal-protective-equipment-use-health-care> Accessed 3rd May, 2020.
70. New Zealand Ministry of Health. Guidelines for the use of personal protective equipment for frontline health care workers. <https://www.health.govt.nz/system/files/documents/pages/covid-19-guidelines-use-ppe-frontline-health-care-workers-7apr20.pdf> Accessed 3rd May, 2020.
71. Australian Government Department of Health. Coronavirus (COVID-19) at a glance 2020; <https://www.health.gov.au/resources/publications/coronavirus-covid-19-at-a-glance>. Accessed 13 April, 2020, 2020.
72. Australian Government Department of Health. Coronavirus disease (COVID-19) weekly epidemiology reports, Australia, 2020. https://www1.health.gov.au/internet/main/publishing.nsf/Content/novel_coronavirus_2019_ncov_weekly_epidemiology_reports_australia_2020.htm Accessed 3rd May, 2020.
73. Covid- National Incident Room Surveillance Team. COVID-19, Australia: Epidemiology Report 8 (Reporting period from 19:00 AEDT 14 March to 23:59 AEDT 22 March 2020). *Commun Dis Intell (2018).* 2020;44.
74. Covid- National Incident Room Surveillance Team. COVID-19, Australia: Epidemiology Report 9 (Reporting week to 23:59 AEDT 29 March 2020). *Commun Dis Intell (2018).* 2020;44.

75. Covid- National Incident Room Surveillance Team. COVID-19, Australia: Epidemiology Report 10 (Reporting week to 23:59 AEST 5 April 2020). *Commun Dis Intell* (2018). 2020;44.
76. Covid- National Incident Room Surveillance Team. COVID-19, Australia: Epidemiology Report 11: Reporting week ending 23:59 AEST 12 April 2020. *Communicable Diseases Intelligence*. 2020;44
77. COVID-19 National Incident Room Surveillance Team. *COVID-19, Australia: Epidemiology Report 12 (Reporting week ending 23:59 AEST 19 April 2020)*. 2020.
78. COVID-19 National Incident Room Surveillance Team. *COVID-19, Australia: Epidemiology Report 13 (Reporting week ending 23:59 AEST 26 April 2020)*. 2020.
79. New Zealand Ministry of Health. COVID-19 - current cases. <https://www.health.govt.nz/our-work/diseases-and-conditions/covid-19-novel-coronavirus/covid-19-current-situation/covid-19-current-cases>. Accessed 20 April, 2020.
80. Morton J. Coronavirus: ICU overload risks 'thousands' more NZ deaths - model. *NZ Herald* 2020; https://www.nzherald.co.nz/nz/news/article.cfm?c_id=1&objectid=12318501. Accessed 17 April, 2020, 2020.
81. Anis A. The Effect of Temperature Upon Transmission of COVID-19: Australia And Egypt Case Study. *SSRN* 2 April 2020. 2020.
82. Aminian A, Safari S, Razeghian-Jahromi A, Ghorbani M, Delaney CP. COVID-19 Outbreak and Surgical Practice: Unexpected Fatality in Perioperative Period. *Ann Surg*. 2020.
83. Chew MH, Koh FH, Ng KH. A call to arms: a perspective of safe general surgery in Singapore during the COVID-19 pandemic. *Singapore Med J*. 2020.
84. Lippi G, Simundic AM, Plebani M. Potential preanalytical and analytical vulnerabilities in the laboratory diagnosis of coronavirus disease 2019 (COVID-19). *Clin Chem Lab Med*. 2020.
85. Healthdirect Australian Government. Groups at higher risk of developing COVID-19. <https://www.healthdirect.gov.au/coronavirus-covid-19-groups-at-higher-risk-faqs>. Accessed 3rd May, 2020.
86. Lee CCM, Thampi S, Lewin B, et al. Battling COVID-19: Critical care and peri-operative healthcare resource management strategies in a tertiary academic medical centre in Singapore. *Anaesthesia*. 2020.
87. Ng Shan Hua A, Chew MH, Charn TC, Wong MK, Wong WK, Lee LS. A cut above COVID-19-surgical perspectives from a public health institution in Singapore during a coronavirus epidemic. *ANZ Journal of Surgery*. 2020.
88. Surgeons ACo. COVID 19: Elective Case Triage Guidelines for Surgical Care. Chicago, USA: Amecian College of Surgeons; 2020.
89. Ross SW, Lauer CW, Miles WS, et al. Maximizing the Calm Before the Storm: Tiered Surgical Response Plan for Novel Coronavirus (COVID-19). *J Am Coll Surg*. 2020.
90. Downar J, Seccareccia D. Palliating a pandemic: "all patients must be cared for". *J Pain Symptom Manage*. 2010;39(2):291-295.
91. Christian MD, Hawryluck L, Wax RS, et al. Development of a triage protocol for critical care during an influenza pandemic. *Cmaj*. 2006;175(11):1377-1381.
92. Cheung WK, Myburgh J, Seppelt IM, et al. A multicentre evaluation of two intensive care unit triage protocols for use in an influenza pandemic. *Med J Aust*. 2012;197(3):178-181.
93. Ministry of Health N. Influenza Pandemic - Providing Critical Care (Policy directive PD2010-028]. Sydney: NSW Government; 2010
94. Frolic A, Kata A, Kraus P. Development of a critical care triage protocol for pandemic influenza: integrating ethics, evidence and effectiveness. *Healthc Q*. 2009;12(4):54-62.
95. Weissman GE, Crane-Droesch A, Chivers C, et al. Locally Informed Simulation to Predict Hospital Capacity Needs During the COVID-19 Pandemic. *Ann Intern Med*. 2020.
96. Stein ML, Rudge JW, Coker R, et al. Development of a resource modelling tool to support decision makers in pandemic influenza preparedness: The AsiaFluCap Simulator. *BMC Public Health*. 2012;12:870.

97. Brindle M, Gawande A. Managing COVID-19 in Surgical Systems. *Ann Surg.* 2020.

Appendix A:

Table 1A to 4A list a selection of surgical triage guidelines published by Surgical Societies/Association and health service providers/funders.

Table 1A: Summary surgical triage guidance provided by a selection of General Surgical Societies/Associations, effective as of 17 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
AUSTRALIA & NEW ZEALAND						
Breast Surgery	Breast Surgeons of Australia and New Zealand	Australia and New Zealand	BreastSurgANZ and COVID-19: Guidance for Triage of Surgical Procedures (Date not stated)	<ul style="list-style-type: none"> Case status determination should be made by a multidisciplinary team Guidance is provided for two categories of semi-urgent (stage 1) and urgent (stage 2) settings, based on patient condition, prevalence of COVID-19, and resource availability, refer to URL For stage 1, encourage use of breast conserving surgery whenever possible, and defer definitive mastectomy and/or reconstruction, provided radiation oncology services are available 	https://www.breastsurganz.org/news/guidance-to-breast-surgeons-for-triage-of-surgical-procedures/	12 April 2020
Colorectal Surgery	Colorectal Surgical Society of Australia and New Zealand	Australia and New Zealand	CSSANZ Recommendations during COVID-19 pandemic (Date not stated)	<ul style="list-style-type: none"> Surgery for colorectal cancer and other selected urgent cases can be continued Consider instituting pre-screening for COVID-19 prior to both urgent elective and emergency major surgery Consider open approach in place of laparoscopic approach Only urgent endoscopic procedures should be conducted Consider only performing elective category 1/urgent colonoscopy 	https://umbraco.surgeons.org/media/5178/colorectal-surgical-society-of-australia-and-new-zealand-covid-19-statement.pdf	12 April 2020
Endocrine Surgery	Australian and New Zealand Endocrine Surgeons	Australia and New Zealand	ANZES Executive Position Statement: Endocrine Surgery during the COVID-19 Pandemic. Defining urgent endocrine surgical conditions (Date not stated)	<ul style="list-style-type: none"> Some thyroid, parathyroid and adrenal cases may require surgery, refer to URL Most other endocrine surgery can be safely deferred pending availability of hospital resources 	https://umbraco.surgeons.org/media/5166/anzes-executive-position-statement.pdf	12 April 2020
Endoscopy	Gastroenterological Society of Australia on behalf of the New Zealand Association of General Surgeons	Australia and New Zealand	Guide for Triage of Endoscopic Procedures During the COVID-19 Pandemic (26 March 2020)	<ul style="list-style-type: none"> Consider each case on its own merits Strict parameters are appropriate when triaging urgent cases for endoscopy and colonoscopy Lists of urgent/emergency cases provided for gastroscopy, colonoscopy, enteroscopy, ERCP, EUS, and capsule endoscopy to proceed, refer to URL All oesophageal motility and pH studies should be deferred where possible 	https://www.gesa.org.au/public/13/files/COVID-19/Triage_Guide_Endoscopic_Procedure_26032020.pdf	13 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Endoscopy	Gastroenterological Society of Australia on behalf of the New Zealand Association of General Surgeons	Australia and New Zealand	Considerations for Australian Endoscopy Units during the COVID-19 Pandemic (20 March 2020)	<ul style="list-style-type: none"> Limit endoscopy to urgent and emergency cases All patients requiring endoscopy should be asked screening questions prior to the procedure to determine their risk of COVID-19 infection Except in an emergency, endoscopy procedures should be postponed in patients with history suspicious of possible COVID-19 infection 	https://www.gesa.org.au/public/13/files/COVID-19/COVID-19%20GESA%20ENDOSCOPY%20STATEMENT%2020Mar20_2.pdf	13 April 2020
Gastric and Oesophageal Surgery	Australia and New Zealand Gastric and Oesophageal Surgery Association	Australia and New Zealand	ANZGOSA General Guidelines for managing patients with Oesophageal and Gastric Cancer during COVID-19 pandemic (6 April 2020)	<ul style="list-style-type: none"> Testing for COVID-19 prior to oesophagectomy is suggested as it is considered an AGP Decisions on patient care should take consider available resources Suggestions provided for the staging and management of oesophago-gastric malignancies, refer to URL 	http://www.anzgos.org/pdf/general-guidelines-og-cancer-managment-covid-new.pdf	12 April 2020
Gastric and Oesophageal Surgery	Australia and New Zealand Gastric and Oesophageal Surgery Association, and Australian and New Zealand Metabolic and Obesity Surgery Society	Australia and New Zealand	ANZGOSA and ANZMOSS guidelines for triaging upper GI and bariatric surgery during the COVID-19 pandemic (6 April 2020)	<ul style="list-style-type: none"> Emergency surgery: made up of priority 1 (requires care in 1-4 hours), priority 2 (requires care in 4-12 hours), and priority 3 (requires care in 12-24 hours) Urgent and semi-urgent elective surgery: made up of category 1 (requires care in 30 days), and category 2 (requires care in 90 days) List of operations and respective categories provided, refer to URL 	http://www.anzgos.org/pdf/guidelines-upper-gi-bariatric-surgery-covid-new.pdf	12 April 2020
General Surgery	General Surgeons Australia and New Zealand Association of General Surgeons	Australia and New Zealand	COVID-19 Guidelines for General Surgery (31 March 2020)	<ul style="list-style-type: none"> Choose most appropriate surgical approach for patient care Minimise number of staff in theatre, especially for AGPs Limit surgery and endoscopy to urgent and emergency patients COVID-19 testing should be carried out wherever possible 	https://www.generalsurgeons.com.au/media/files/News/DOC%202020-03-31%20COVID-19%20Guidelines%20for%20General%20Surgery_FINAL_UPDATED.pdf	12 April 2020
General Surgery	General Surgeons Australia	Australia	Decision Tree for Surgeons (Date in URL)	<ul style="list-style-type: none"> Only emergency or urgent procedures should be performed Obtain a colleague's opinion regarding decision for surgery wherever possible Only postpone surgery if it will not significantly impact the patient's quality of life 	https://www.generalsurgeons.com.au/media/files/News/DOC%202020-04-08%20Impact%20of%20COVID-19%20-%20General%20Surgery%20Decision%20Tree.pdf	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Hernia Surgery	ANZ Hernia Society	Australia and New Zealand	Hernia Surgery in the COVID-19 Crisis Position Statement	<ul style="list-style-type: none"> • Indications for surgery should include hernias at risk of strangulation • Hernias that cause significant pain or result in inability to work could be an exceptional category 2 requiring surgery • Prior to surgery all patients should be screened for COVID-19 infection with history and temperature • If suspicious for possible COVID-19, delay elective surgery pending full workup • Consider performing non-complicated inguinal and simple primary ventral hernias under local anaesthetic with sedation as a day case procedure 	https://umbraco.surgeons.org/media/5215/anzh-covid-aust.pdf	17 April 2020
Hepatic, Pancreatic and Biliary Surgery	Australian and New Zealand Hepatic, Pancreatic and Biliary Association	Australia and New Zealand	ANZHPBA Guidelines for Management of HPB Surgery during the COVID-19 pandemic (Date in URL)	<ul style="list-style-type: none"> • All emergency, urgent or semi-urgent surgical and endoscopic patients require completion of an appropriate questionnaire prior to any procedure to assess the risk of current COVID-19 infection • For semi-elective procedures, questionnaire must be repeated in the 24 hours prior to surgery • Consider alternative percutaneous or operative interventions in place of ERCP and EUS • Surgical procedures should be led by a surgical consultant • Avoid minimally invasive approaches where possible 	https://anzmoss.com.au/wp-content/uploads/Guidelines-for-ANZHPB-Surgeons-during-the-COVID-pandemic-1-April.pdf	12 April 2020
Hepatic, Pancreatic and Biliary Surgery	Australian and New Zealand Hepatic, Pancreatic and Biliary Association	Australia and New Zealand	Considerations for HPB Surgeons in a Complex Triage Scenario COVID-19 (6 April 2020)	<ul style="list-style-type: none"> • ACS schema described, phase I-III reflecting availability of medical resources within the hospital and community • Provided recommendations are stratified based on tumour and Response Phase, refer to URL • Both clinical factors and resources must be considered when deciding treatment • Select management that has least utilisation of healthcare resources with fewest complications, best patient outcomes, and highest safety of treating staff • Patients at risk of poor outcomes from COVID-19 are over-represented within HPB malignancy population • Malignancy and chemotherapy are significant risks of poor outcome when COVID-19 is contracted 	https://anzmoss.com.au/wp-content/uploads/Considerations-for-HPB-surgeons-in-a-complex-triage-scenario-COVID19_1.pdf	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Trauma	Australasian Trauma Society	Australia and New Zealand	Maintaining front-line trauma services during the COVID-19 response (30 March 2020)	<ul style="list-style-type: none"> Trauma patients will still continue to arrive and require a high level of care and resources during the COVID-19 pandemic The demand for trauma services will be unpredictable during the crisis Experienced trauma specialists be increasingly applied as the volume of COVID-19 patients escalates 	https://www.traumasociety.com.au/wp-content/uploads/2020/03/20200330_999999_LTR_Trauma-Group_COVID-Statement_Hospital-CEO.pdf	12 April 2020
INTERNATIONAL						
Breast Surgery	The American Society of Breast Surgeons	USA	Recommendations for Prioritisation, Treatment and Triage of Breast Cancer Patients during the COVID-19 Pandemic: Executive Summary, Version 1.0, The COVID-19 Pandemic Breast Cancer Consortium (24 March 2020)	<ul style="list-style-type: none"> Recommendations are classified into priority A-C based on patient condition Areas covered: priorities for breast disease focused outpatient visits, priorities for breast disease-focused imaging, priorities for breast disease-focused surgical oncology, priorities for breast cancer focused medical oncology, and priorities for breast cancer focused radiation oncology Refer to URL for full details 	https://www.breastsurgeons.org/docs/news/The_COVID-19_Pandemic_Breast_Cancer_Consortium_Recommendations_EXECUTIVE_SUMMARY.pdf	12 April 2020
Breast Cancer Surgery	American College of Surgeons and COVID 19 Pandemic Breast Cancer Consortium	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care, Breast Cancer Surgery (24 March 2020)	<ul style="list-style-type: none"> Cases for phase I-III listed, refer to URL Decisions must take institutional resources into account Encourage use of breast-conserving surgery whenever possible, defer definitive mastectomy and/or reconstruction provided radiation oncology services are available Autologous reconstruction should be deferred Surgery restricted to patients likely to have survival compromised if surgery not performed within next few days Case status determination should be made by a multidisciplinary team, ideally in a multi-clinician setting 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_breast_cancer.ashx	13 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Cancer Surgery	American College of Surgeons	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care, Cancer Surgery (24 March 2020)	<ul style="list-style-type: none"> Individual provider decisions about proceeding with elective surgeries should take the availability of local institutional resources into consideration Multidisciplinary virtual discussions to prioritise non-urgent cancer surgery Decision-making organised into three phases according to the acuity of the local COVID-19 situation Hospitals likely to progress through three phases over the weeks to months, and then will also de-escalate thereafter Important that leaders of the cancer care team are updated regularly and frequently by hospital leadership 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_cancer_surgery.ashx	13 April 2020
Colorectal Cancer Surgery	American College of Surgeons	USA	COVID 19: Elective Case Triage Guidelines for Surgical Care, Colorectal Cancer Surgery (24 March 2020)	<ul style="list-style-type: none"> List of procedures, decisions whether to proceed or defer stratified relative to phase I-III, refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_colorectal_cancer.ashx	13 April 2020
Emergency General Surgery	American College of Surgeons	USA	COVID 19: Elective Case Triage Guidelines for Surgical Care, Emergency General Surgery (25 March 2020)	<ul style="list-style-type: none"> Provide timely care to patients presenting with urgent and emergent surgical conditions Procedures and operations should be performed if delay is likely to prolong the hospital stay, increase the likelihood of later hospital admission, or cause harm to the patient Patients who have failed attempts at medical management of a surgical condition should be considered for surgery to decrease future use of resources Special considerations are listed, refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_general_surgery.ashx	13 April 2020
Endoscopy	Joint Advisory Group on GI Endoscopy, British Society of Gastroenterology	UK	Endoscopy activity and COVID-19: BSG and JAG guidance (7 April 2020)	<ul style="list-style-type: none"> FIT screening and Bowel Scope paused with immediate effect All endoscopy to cease except emergency and essential procedures Risk assessments should be conducted on a case-by-case basis, taking into account available hospital resources List of procedures that are essential, those that need case-by-case discussion, and those that ought to be deferred, refer to URL Keep records of patients who have been deferred or cancelled Consider alternative pathways for diagnostic testing 	https://www.bsg.org.uk/covid-19-advice/endoscopy-activity-and-covid-19-bsg-and-jag-guidance/	13 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
General Surgery	Intercollegiate	Edinburgh, England, Glasgow, Ireland, Great Britain and Ireland	Updated intercollegiate General Surgery Guidance on COVID-19 (25 March 2020)	<ul style="list-style-type: none"> • Full COVID-19 workup should be sought for any patient requiring emergency surgery or urgent planned surgery • Consider stoma formation rather than anastomosis • Use laparoscopy extremely selectively • For appendicitis, use appropriate non-operative treatment or open appendicectomy • Treat acute biliary disease conservatively or with cholecystostomy • Only emergency endoscopic procedures should be performed 	https://anzmoss.com.au/wp-content/uploads/52_Updated-Intercollegiate-General-Surgery-Guidance-on-COVID-19-final.docx	12 April 2020
Metabolic and Bariatric Surgery	American College of Surgeons	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care, Metabolic and Bariatric (24 March 2020)	<ul style="list-style-type: none"> • List of operations categorised relative to urgency, refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_metabolic_bariatric.ashx	13 April 2020
Thoracic Cancer Surgery	American College of Surgeons	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care, Thoracic Cancer Surgery (24 March 2020)	<ul style="list-style-type: none"> • Phase I-III schema described, reflecting availability of medical resources within the hospital and community • List of procedures provided for each phase, refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_thoracic_cancer.ashx	13 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Upper GI Endoscopy and Surgery	The International Society for Diseases of the Esophagus	International	ISDE Guidance Statement: Management of upper-GI Endoscopy and Surgery in COVID-19 outbreak (30 March 2020)	<ul style="list-style-type: none"> • Assess need for endoscopic procedures on a case-by-case basis • Triage all patients undergoing urgent endoscopy or surgery for COVID-19 risk prior to their procedure • Non-urgent elective operations should be postponed • Consider alternative non-operative management where possible • Temporarily manage gastroesophageal acid reflux with proton pump inhibitors instead of fundoplication • Laparoscopy should be avoided in cases of suspected COVID-19 • Defer surgery on patients with active COVID-19 infection, except in life-threatening situations • Postpone transthoracic esophagectomy in COVID-19 cases, and avoid intraoperative CO₂ insufflation unless absolutely required • Delay adjuvant therapy following curative surgery for upper GI cancers in COVID-19 endemic areas • Closely monitor the capacity of ICU prior to performing esophagectomy, might be better to divert to centres with greater ICU capacity • List of upper GI endoscopic and surgical procedures to be postponed provided, refer to URL 	https://www.isde.net/resources/Documents/Resources/ISDE_Position_Statement_COVID19_2020.03.30.pdf	13 April 2020

Table 2A: Summary surgical triage guidance provided by a selection of Orthopaedic Surgical Societies/Associations, effective as of 17 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
AUSTRALIA & NEW ZEALAND						
Arthroplasty	Arthroplasty Society of Australia	Australia	ASA position statement on surgery during the COVID-19 pandemic (27 March 2020)	<ul style="list-style-type: none"> • Balance delaying lower-limb arthroplasty surgery (which will result in a prolongation of disability) against the current risk of surgery • Non-operative treatment should be considered where possible • Wherever possible manage patients without admission to hospital • Arthroplasty surgery should only be considered after appropriate peer review for urgent conditions • Elective primary and revision hip and knee arthroplasty surgery should be cancelled or delayed 	https://www.aoa.org.au/docs/default-source/advocacy/asa-position-statement-on-surgery-during-the-covid-19-pandemic.pdf?sfvrsn=a079dd04_6	12 April 2020
Foot and Ankle Surgery	Australian Orthopaedic Foot and Ankle Society	Australia	Position statement from the AOFAS about Elective Surgery and COVID-19 (Date not stated)	<ul style="list-style-type: none"> • Category 1 and trauma cases should continue • Non-operative treatment alternatives should be considered in patients with significant comorbidities • Avoid surgery in older or more compromised patients where possible • Hospital-based committee can review cases deemed to require operative management • List provided of cases that would be classified as urgent category 2 and those that would not, refer to URL 	https://www.aoa.org.au/docs/default-source/advocacy/aofas-position-statement---covid-19.pdf?sfvrsn=4f77dd04_2	12 April 2020
Hand Surgery	The Australian Hand Surgery Society	Australia	AHSS Letter to RACS, COVID-19 (1 April 2020)	<ul style="list-style-type: none"> • Examples of emergency, category 1 and almost-never category 2 provided, refer to URL 	https://umbraco.surgeons.org/media/5188/01042020-ahss-letter-to-racs.pdf	12 April 2020
Knee Surgery	Australian Knee Society	Australia	AKS Position Statement, COVID-19 Pandemic (27 March 2020)	<ul style="list-style-type: none"> • Surgeons should obtain documented independent peer opinion before scheduling surgery for urgent category 2 • Surgery should not be performed on non-urgent category 2 or category 3 patients • Examples of category 1, urgent category 2, non-urgent category 2 and category 3 provided, refer to URL 	http://aoa.e-newsletter.com.au/link/id/z3335e814ac7478de180Pzzz508f44ad8c994136/page.html	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Orthopaedic Trauma Surgery	Australian Orthopaedic Trauma Society	Australia	AOTS Guidelines for Emergency Orthopaedic Surgery during the COVID-19 Pandemic (Date not stated)	<ul style="list-style-type: none"> Timely treatment and discharge will be a priority Abbreviated treatment protocols may be utilised Consider non-operative treatments over operative treatments if similar outcomes Consider whether reconstructive work should be delayed until after the pandemic peaks and/or resolves Categories of priority within emergency cases listed, refer to URL Suggestions for life and limb-threatening injuries, amputations, debridements, fragility fractures, adherence to trauma guidelines, trauma volume and trauma management principles listed, refer to URL Emergent (semi-elective) surgery: requires care over the next 3 months, split into category 1-3 	https://www.aoa.org.au/docs/default-source/advocacy/2020-aots-guidelines-for-emergency-orthopaedic-surgery.pdf?sfvrsn=4b77dd04_2	12 April 2020
Orthopaedic surgery	Australian Orthopaedic Association	Australia	Position statement: Orthopaedic surgery during the COVID-19 pandemic (March 2020)	<ul style="list-style-type: none"> Emergency (urgent and essential) orthopaedic surgery must continue Non-urgent and lower-priority surgery must be suspended Examples for urgent and non-urgent surgery provided, refer to URL 	https://www.aoa.org.au/docs/default-source/advocacy/aoa-position-statement-orthopaedic-surgery-during-the-covid-19-pandemic_march-2020.pdf?sfvrsn=957fdd04_4	12 April 2020
Shoulder and Elbow Surgery	Shoulder and Elbow Society of Australia	Australia	SESA position statement on surgery during the COVID-19 pandemic (26 March 2020)	<ul style="list-style-type: none"> Category 1 and trauma cases should continue Non-operative treatment alternatives should be considered in patients with significant co-morbidities Avoid surgery in older or more compromised patients where possible Example provided of truly urgent category 2 cases and cases that will almost never reach a category 2 classification, refer to URL 	https://www.aoa.org.au/docs/default-source/advocacy/sesa-position-statement-on-surgery-during-the-covid-19-pandemic.pdf?sfvrsn=727ddd04_4	12 April 2020
Spine surgery	Spine Society of Australia	Australia	SSA COVID-19 Surgery Position Statement and Category Definitions (28 March 2020)	<ul style="list-style-type: none"> Elective surgery must be suspended, except for urgent category 2 procedures Examples of category 1 and urgent category 2 provided, refer to URL Patients at risk of COVID-19 are to be deferred, except in urgent cases Any patient who is otherwise unwell must be postponed 	https://www.aoa.org.au/docs/default-source/advocacy/ssa-covid-19-surgery-position-statement-and-category-definitions.pdf?sfvrsn=2677dd04_4	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
INTERNATIONAL						
Orthopaedic Surgery	American College of Surgeons	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care, Orthopaedics (24 March 2020)	<ul style="list-style-type: none"> • Tabulated stratification to classify presentations within Phase II and Phase III settings, refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_orthopaedics.ashx	13 April 2020
Orthopaedic Surgery	British Orthopaedic Association	UK	Management of patients with urgent orthopaedic conditions and trauma during the coronavirus pandemic (24 March 2020)	<ul style="list-style-type: none"> • Daily lead consultant has responsibility for overall resource management rather than hands-on clinical management, as outlined in the NHSE Specialty Guides • Individual Trusts will make their own overall logistic decisions depending on local circumstances • Regular appraisal of available resources should occur • Resource allocation and patient prioritisation should be agreed • Increased emphasis on managing patients with non-operative strategies • Increased emphasis on reducing hospital admission and minimising length of stay • Prioritise conditions that have immediate, permanent morbidity or lack a practical remedial option in order to minimise long-term consequences 	https://www.boa.ac.uk/uploads/assets/ee39d8a8-9457-4533-9774e973c835246d/COVID-19-BOASTS-Combined-v1FINAL.pdf	16 April 2020
Spine Surgery	North American Spine Society	USA	NASS Guidance Document on Elective, Emergent and Urgent Procedures (3 April 2020)	<ul style="list-style-type: none"> • Examples provided of cases within emergent, urgent and elective classifications provided, refer to URL 	https://www.spine.org/Portals/0/assets/downloads/Publications/NASSInsider/NASSGuidanceDocument040320.pdf	13 April 2020

Table 3A: Summary surgical triage guidance provided by a selection of Surgical Societies/Associations, effective as of 17 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
AUSTRALIA & NEW ZEALAND						
Cardiothoracic Surgery	The Australian and New Zealand Society of Cardiac and Thoracic Surgeons	Australia and New Zealand	Elective Cardiac and Thoracic Surgery Procedures (26 March 2020)	<ul style="list-style-type: none"> • Category 1: lobectomy/wedge/pneumonectomy • Category 2: congenital cardiac defect/s, coronary artery grafting, heart valve surgery, pleurodesis • Consider prognostic implications of the coronary, valvular or other pathology • Clinical presentation, coronary anatomy, valvular pathology and ventricular dysfunction will impact on the appropriate timing of surgery 	https://7n4ik1cb2c61rz1r11tw7m9t-wpengine.netdna-ssl.com/wp-content/uploads/2020/04/A NZSCTS-Elective-Surgery-Statement.pdf	12 April 2020
Cardiothoracic Surgery	Consensus statement endorsed by CSANZ, ANZSCTS, NHR, HBPRCA	Australia and New Zealand	Cardiovascular disease and COVID-19: Australian/New Zealand consensus statement (3 April 2020)	<ul style="list-style-type: none"> • Stop all non-urgent surgery • Patients will likely continue to present with symptomatic coronary disease and be referred for cardiac surgery • Cardiac surgical cases are likely to take longer during the pandemic due to infection control measures, and access to ICU will be limited • Separate COVID-free patients recovering from cardiac surgery in ICU from suspected or proven COVID-19 ICU patients • Weigh the inherent risk of the untreated cardiovascular condition against the risk of nosocomial infection during hospitalisation, and the implications on ventilator use, bed stay and recovery time 	https://www.mja.com.au/journal/2020/cardiovascular-disease-and-covid-19-australiannew-zealand-consensus-statement	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Neurosurgery	Neurosurgical Society of Australasia	Australia and New Zealand	Position Statement: COVID-19 (31 March 2020)	<ul style="list-style-type: none"> • Avoid endoscopic endonasal surgery • Only perform pituitary surgery on the most urgent patients who cannot be deferred, and consider craniotomy over transsphenoidal surgery in emergency cases • Preoperative COVID-19 testing (ideally two tests) should be employed where possible • Where surgery is necessary, consider methods which do not involve debriders and drills within the nasal cavity, and a submucosal approach should be considered • Most spinal and cranial procedures should be safe with routine face and eye protection • Focus on most urgent patients in elective procedures • Consider moving towards more heavily led consultant care • Consideration should be given to transfers between hospitals to minimise admissions, particularly to ICU • Transferred patients should bypass the emergency department and be admitted straight to the ward, theatre or ICU for assessment by a consultant to expedite treatment plans • Only use ICU beds for cases requiring ventilatory support or invasive monitoring, not for postoperative observation • Aim to minimise hospital stays where possible for elective patients, consider day surgery where possible 	https://www.dropbox.com/s/jgdf87axck0lx0s/DOC%2020%20COVID-19%20NSA%20Position%20Statement.pdf?dl=0	12 April 2020
Otolaryngology Head and Neck Surgery	The Australian Society of Otolaryngology Head and Neck Surgery	Australia	ASOHNS Guidelines addressing the COVID-19 pandemic (22 March 2020)	<ul style="list-style-type: none"> • Limit all non-essential planned surgeries and procedures • Suggestions listed for both private and public practice settings, refer to URL 	https://umbraco.surgeons.org/media/5176/australian-society-of-otolaryngology-head-neck-surgery-covid-19-statement.pdf	12 April 2020
Otolaryngology Head and Neck Surgery	The Australian Society of Otolaryngology Head and Neck Surgery	Australia	Major head and neck surgery during COVID-19 (Date not stated)	<ul style="list-style-type: none"> • Major head and neck surgery poses significant because of extensive exposure to saliva/mucous/upper airway mucosa, long duration so prolong period of exposure, and use of powered instruments (powered saw and drill) • Consequences and recommendations for major head and neck surgery in COVID-19 patient are listed, refer to URL 	http://asohns.org.au/CMS/Uploads/ASOHNS%20MAJOR%20HEAD%20AND%20NECK%20SURGERY%20DURING%20COVID[1].pdf	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
Plastics and Reconstructive Surgery	Australian Society of Plastic Surgeons	Australia	ASPS Communication about government ban on non-urgent elective surgery (26 March 2020)	<ul style="list-style-type: none"> No cosmetic/discretionary surgery or revision Skin cancer surgery is category 1, but consider deferring small lesions on back/trunk/legs Most elective/cold hand surgery is category 3, but worsening nerve compression could be escalated to “urgent category 2” Removal of ruptured breast implants is typically category 2 Major head and neck cancer surgery is category 1 Other cancer excisions and reconstructions category 1 or 2 Time-critical paediatric procedures would normally be category 2 with urgency determined by local clinicians and circumstances No cosmetic injectables, laser or “medispa” procedures should be provided Trauma, infection and burns are emergency cases and should all be carried out as usual 	https://plasticsurgery.org.au/wp-content/uploads/2020/03/ASPS-Communication-about-government-ban-on-non-urgent-elective-surgery.pdf	12 April 2020
Urology	Urological Society of Australia and New Zealand	Australia and New Zealand	Urological Prioritisation during COVID-19 (25 March 2020)	<ul style="list-style-type: none"> Need to re-define urgent urological surgery Conditions that may warrant urgent surgical intervention during the COVID-19 pandemic are listed, refer to URL 	https://usanz.org.au/publicassets/3fdf1dd5-5d6e-ea11-90fb-0050568796d8/Pol-020-Guidelines-Urol-Prioritisation-During-COVID-19--25-3-2020.pdf	12 April 2020
Urology	Urological Society of Australia and New Zealand	Australia and New Zealand	Urology Unit Configuration and Case Selection During COVID-19 Pandemic (5 April 2020)	<ul style="list-style-type: none"> Any potential case listed for urgent surgery should be discussed in formal multidisciplinary urology meeting or with the Head of Department/other senior urologists for formal approval Emergency and time critical cases need not go through formal approval process Important that all urology units (public or private) have structures in place to protect their workforce 	https://usanz.org.au/publicassets/441af0c8-9e77-ea11-90fb-0050568796d8/Pol-022-Guidelines---Surgical-Teams-and-Case-Selection-During-COVID--19.pdf	12 April 2020
Vascular Surgery	Australian and New Zealand Society for Vascular Surgery	Australia and New Zealand	Letter to ANZSVS Members (1 April 2020)	<ul style="list-style-type: none"> Consider halting elective surgery Only provide emergency and urgent surgery Discretion for individual locality, surgeon and patient circumstances 	https://www.anzsvs.org.au/wp-content/uploads/2020/04/LTR-2020-04-01-ANZSVS-COVID.pdf	12 April 2020

Specialty	Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of access
INTERNATIONAL						
Neurosurgery	Neurosurgery (peer-reviewed journal)	USA	Letter: The Coronavirus Disease 2019 Pandemic: A Neurosurgical Treatment Algorithm (March, 2020)	<ul style="list-style-type: none"> Neurosurgical algorithm (with accompanying checklist) for varying levels of COVID-19 community infection Algorithm centered around a 3-tiered system of viral “surge” quantification for triaging case scheduling, and a paired coverage model (PCM) for providing inpatient services 	https://academic.oup.com/neurosurgery/advance-article/doi/10.1093/neuros/nyaa116/5815125	13 April 2020
Otolaryngology	American College of Surgeons	USA	COVID 19: Elective Case Triage Guidelines for Surgical Care, Otolaryngology (24 March 2020)	<ul style="list-style-type: none"> Prioritise urgent and emergency procedures and operations Reschedule elective and non-urgent admissions Delay inpatient and outpatient elective surgical and procedural cases 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_otolaryngology.ashx	13 April 2020
Paediatric Surgery	American College of Surgeons	USA	COVID 19: Elective Case Triage Guidelines for Surgical Care, Pediatric Surgery (24 March 2020)	<ul style="list-style-type: none"> Children who have failed attempts at medical management of a surgical condition should be considered for surgery to decrease the future use of resources Examples of emergency, urgent and elective cases provided, refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_pediatric.ashx	13 April 2020
Robotic Urology	European Association of Urology	International/ Europe	EAU Robotic Urology Section (ERUS) Guidelines during COVID-19 emergency (25 March 2020)	<ul style="list-style-type: none"> Examples provided for prioritising urological interventions in the context of the COVID-19 pandemic (stage 1-4), refer to URL 	https://uroweb.org/wp-content/uploads/ERUS-guidelines-for-COVID-def.pdf	13 April 2020
Vascular Surgery	American College of Surgeons	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care, Vascular Surgery (24 March,2020)	<ul style="list-style-type: none"> Cases sorted into three tiers: 3 (do not postpone), 2b (postpone if possible), 2a (consider postponing), 1 (postpone); refer to URL 	https://www.facs.org/-/media/files/covid19/guidance_for_triage_of_nonemergent_surgical_procedures_vascular.ashx	13 April 2020

Table 4A: Summary surgical triage guidance provided by International organisations, effective as of 17 April 2020

International Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of Access
ACOI, SIC, SICUT, SICO, SICG, SIFIPAC, SICE, and SIAARTI	Italy	Surgery in COVID-19 patients: operational directives (7 April 2020)	<ul style="list-style-type: none"> • When possible, surgery on suspected COVID-19 patients should be postponed until confirmed infection clearance • Resource use should be considered when scheduling procedures • Known or suspected COVID-19 patients must be treated as positive until proven otherwise • Allocate dedicated senior staff to key management roles 	https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7137852/pdf/13017_2020_Article_307.pdf	15 April 2020
American College of Surgeons	USA	COVID-19: Elective Case Triage Guidelines for Surgical Care (24 March 2020)	<ul style="list-style-type: none"> • Surgeons should curtail elective procedures • Rates of COVID-19 predicted to increase in coming weeks • Consider nonoperative management whenever clinically appropriate • Consider awaiting results of COVID-19 testing in patients who may be infected • Avoid emergency surgical procedures at night when possible • Choose surgical approach that minimises theatre time and maximises safety for both patients and healthcare staff 	https://www.facs.org/covid-19/clinical-guidance/elective-case	13 April 2020
American College of Surgeons	USA	COVID-19: Guidance for Triage of non-Emergent Surgical Procedures	<ul style="list-style-type: none"> • Surgeon with expertise in the relevant specialty should determine need for a given procedure • Administrative personnel should determine logistical feasibility for a given procedure, taking into account local resources • Delay of 6-8 weeks or more may be required for some procedures • Day-by-day, data-driven assessment of changing risk-benefit analysis is needed to influence clinical care delivery • Surgical procedures should be considered based on all available medical and logistical information • Elective Surgery Acuity Scale (ESAS) from St. Louis University can assist triage of non-emergent operations 	https://www.facs.org/covid-19/clinical-guidance/triage	13 April 2020

International Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of Access
American College of Surgeons, American Society of Anesthesiologists, and Association of periOperative Registered Nurses	USA	Create a Surgical Review Committee for COVID-19-Related Surgical Triage Decision Making (24 March 2020)	<ul style="list-style-type: none"> Centres must defer non-essential surgery Decisions for surgery cases must be made on a daily basis, no later than the day before surgery, by a leadership team representing surgery, anaesthesiology, and nursing Surgical Review Committee composed of surgery, anaesthesiology, and nursing personnel is essential during the crisis 	https://www.facs.org/covid-19/clinical-guidance/review-committee	13 April 2020
Centers for Medicare and Medicaid Services	USA	Non-Emergent, Elective Medical Services, and Treatment Recommendations (7 April 2020)	<ul style="list-style-type: none"> Non-essential surgeries and procedures should be postponed Tiered framework (3 tiers of increasing acuity) is recommended to prioritise services and care COVID-19 treatment decisions should consider the local situation, the individual patient's case, and resource capability of the hospital 	https://www.cms.gov/files/document/cms-non-emergent-elective-medical-recommendations.pdf	13 April 2020
National Health Service	UK	Clinical guide for the management of surgical patients during the coronavirus pandemic (16 March 2020)	<ul style="list-style-type: none"> For obligatory inpatients, consultant must be designated as 'lead consultant', and a multidisciplinary leadership team should support the lead Increased pressure on the system may require a shift to viable non-operative management alternatives Elective day case surgery only for urgent cases 	https://www.england.nhs.uk/coronavirus/wp-content/uploads/sites/52/2020/03/specialty-guide-surgery-and-coronavirus-v1-16-march-2020.pdf	13 April 2020
Royal College of Surgeons	UK	COVID-19: Good Practice for Surgeons and Surgical Teams (3 April 2020)	<ul style="list-style-type: none"> Minimise, postpone or cancel scheduled elective operations and procedures as necessary Shift inpatient diagnostic and surgical procedures to outpatient settings when feasible Use National Confidential Enquiry into Patient Outcome and Death (NCEPOD) classification of immediate, urgent and expedited for defining surgical emergencies Rapid triage facilities and theatres must be available at short notice Senior clinician should complete initial assessment of patients with suspected surgical pathology Decisions to operate should be made jointly with the anaesthetic team, taking into account the likely need for ICU and its availability 	https://www.rcseng.ac.uk/standards-and-research/standards-and-guidance/good-practice-guides/coronavirus/	13 April 2020

International Organisation	Country	Guideline (Date)	Notes from Document	URL	Date of Access
Shared health Soins communs, Manitoba	Canada	COVID-19: Provincial Guidance on Management of Elective Surgery (25 March 2020)	<ul style="list-style-type: none"> • 'Elective surgery' not defined by procedure, but a non-urgent surgical procedure for which a delay of 3 months or more would not result in any significant adverse effect for the patient • Continue essential and time-sensitive procedures • Scheduled, elective surgeries will continue whenever possible • Surgery should be delayed for 14 days in any patient with suspected COVID-19 exposure • Patient who has been in direct contact with a person undergoing testing for COVID-19 should not have a procedure until the results are confirmed negative, even if asymptomatic, except in emergency circumstances • Patients with symptoms of COVID-19 or influenza-like illness should not have a procedure until after recovery, except in emergency circumstances 	https://sharedhealthmb.ca/files/covid-19-elective-surgery.pdf	13 April 2020
Society of American Gastrointestinal and Endoscopic Surgeons, European Association for Endoscopic Surgery and other Interventional Techniques	International	SAGES and EAES Recommendations Regarding Surgical Response to COVID-19 Crisis (30 March 2020)	<ul style="list-style-type: none"> • All elective surgical and endoscopic cases should be postponed • If available and practical, surgical patients should be tested pre-operatively for COVID-19 	https://www.sages.org/recommendations-surgical-response-covid-19/	13 April 2020
Spanish Society of Surgery (AEC)	Spain	Dynamic Scale for Surgical Activity during the Pandemic COVID-19 (8 April 2020)	<ul style="list-style-type: none"> • Phase I-V listed, reflecting increased in strain of COVID-19 on the individual hospital, refer to URL 	https://www.aecirujanos.es/files/noticias/158/documentos/Dynamic_scale_for_surgical_activity_during_the_pandemic_COVID19(1).pdf	15 April 2020
Spanish Society of Surgery (AEC)	Spain	General Recommendations of Urgent Surgical Care in the Context of the COVID-19 Pandemic (SARS-CoV-2) from the Spanish Association of Surgery (AEC) (8 th April, 2020)	<ul style="list-style-type: none"> • Minimise staff required for surgery and present in operating rooms • Maximise degree of training and experience of staff • COVID-19 screening recommended for every surgical patient • Centres should have specific operating theatre solely for confirmed COVID-19 patients • All trauma patients should be considered as potentially COVID-19 positive, so full PPE should be worn when treating 	https://www.aecirujanos.es/files/noticias/158/documentos/4_-_Recomendaciones_for_URGENT_Surgical_care_during_the_pandemic_COVID_19_v_2.pdf	15 April 2020