



Guideline on surgical patient safety for SARS-CoV-2 infection and vaccination

Short title: SARS-CoV-2 elective surgery guideline

1. Purpose

To provide frequently updated advice on safety concerns for surgery in patients with current or previous SARS-CoV-2 infection, or who have recently received or soon plan to receive a SARS-CoV-2 vaccination.

2. Scope

This document is intended to apply to fellows, trainees and SIMGs involved in perioperative care of surgical patients.

3. Background

The Australian and New Zealand College of Anaesthetists (ANZCA) has produced this guideline to provide current advice to our fellows, trainees and SIMGs on navigating surgical patient safety concerns in the rapidly changing environment of the SARS-CoV-2 pandemic.

This document updates previous ANZCA advice:

- ANZCA, ASA, RACS, RANZCOG, RANZCO and RACDS. Guidance on delays to elective surgery post recovery from SARS-COV 2 infection. 5 August 2020.
- ANZCA. Surgery following the Astra Zeneca Vaccine. 8 June 2021.

This document has been produced via a review of current best available clinical evidence and of relevant health sector, regulatory and government body guidance. It is living guidance and will be reviewed and updated frequently. Before making use of this document, please ensure you are accessing the latest version, which is available from the college website (www.anzca.edu.au).

Public health orders in each state, territory or country supersede this guidance and should be followed ahead of this guideline.

We invite suggestions and contributions for future versions, via email to sq@anzca.edu.au.

4. Recommendations: surgical patients and SARS-CoV-2 infection

4.1 Timing of elective surgery after a confirmed SARS-CoV-2 infection

Decisions regarding surgical timing will require careful consideration of possible sequelae of SARS-CoV-2 infection, the urgency of the required surgery and the expected physiological effects of surgery and anaesthesia on the patient. After 7 weeks,¹ the perioperative risk is thought to return to baseline in those who had asymptomatic SARS-CoV-2 infection and/or those whose symptoms have resolved.

For further advice on risk assessment and shared decision-making on optimal timing of elective surgery, we recommend the recent multidisciplinary consensus statement on timing of elective surgery and risk assessment after SARS-CoV-2 infection from the Association of Anaesthetists, Centre for Perioperative Care, Federation of Surgical Specialty Associations, Royal College of Anaesthetists, and Royal College of Surgeons of England.²

4.1.1 General recommendation

It is recommended that post PCR or RAT confirmation of SARS-CoV-2 infection, **non-urgent elective major surgery** should be delayed for a **minimum of 7 weeks** and **non-urgent elective minor surgery** for **at least 4 weeks**^{3,4,5} provided the patient has returned to baseline function and is symptom free. Those with ongoing symptoms may benefit from further delay if circumstances allow.

All patients should have an individualised risk assessment based on patient risk factors, surgical need and risk factors, and symptoms and severity of the prior SARS-CoV-2 infection.

4.1.2 Time-sensitive surgery, including cancer surgery (risk-benefit analysis)

For time-sensitive surgery (e.g. cancer surgery), the individual risk versus benefit of proceeding and delaying needs to be carefully assessed. Ideally a plan should be formulated based on individualised risk assessment, clinical judgement and shared decision-making of all involved in the patient's care, to ensure optimal timing.⁶

From the available evidence,¹ perioperative outcomes start to improve after 2 weeks predominantly in the asymptomatic group of patients, though the best outcomes are found 7 weeks post PCR or RAT confirmation of SARS-CoV-2 infection for both asymptomatic and symptomatic patients with resolved symptoms. Patients with persistent symptoms at 7 weeks have worse outcomes.¹

4.1.3 Proceeding with acute or time-critical surgery

Acute or time-critical surgery should proceed as required with multidisciplinary support from the infectious diseases, intensive care, cardiology, respiratory and renal units as appropriate. It is essential that acute or time-critical surgery is not delayed waiting for test results in a patient suspected of having SARS-CoV-2, and an assumption should be made that they are SARS-CoV-2-positive where no test result is available. Appropriate strategies are needed to mitigate the risks to the patient of undergoing surgery while in the acute phase of the infection, as well as the risk of spreading the infection to staff and other patients. RAT or rapid PCR tests (e.g. cobas Liat) can aid prompt risk assessment and avoid unnecessary use of staff and PPE resources.

4.1.4 Repeat testing

It is apparent that repeat testing subsequent to initial recovery may yield false-positive results for at least 30 days (see below). Current advice in many health-care protocols is not to re-test asymptomatic patients during this period.

4.1.5 Children

Studies suggests that the surgical risks in children with SARS-CoV-2 are much lower than in adults, mirroring the lower morbidity of SARS-CoV-2infection seen in children.⁷ The current recommendation endorsed by Society for Paediatric

Anaesthesia in New Zealand and Australia (SPANZA) is to defer elective non-urgent surgery on a similar timeframe as other acute respiratory illness.

4.1.6 Long COVID and other sequelae

Long COVID, cardiorespiratory and/or immunological sequelae post SARS-CoV-2 infection should be considered and optimised, especially in the presence of persisting symptoms including fatigue.

4.1.7 Follow-up of patients whose surgery is delayed

It is of the utmost importance to ensure that patients whose surgery is delayed due to SARS-CoV-2 infection are not lost to follow-up, and unnecessary prolonged delays to diagnostic procedures or surgery are avoided, to prevent poorer short and long term outcomes.

4.2 PCR or RAT re-testing after a SARS-CoV-2 infection, prior to elective surgery

Jurisdictional guidelines may vary, however re-testing with PCR^{8,9} for SARS-CoV-2 within 90 days of symptom onset or a first positive test is not recommended, since **persistent or recurrent positive PCR tests are common after recovery**. This is presumably due to shedding of viral fragments. The duration of shedding was found to be a median of 19 days (interquartile range 12-28 days).¹⁰

Although RATs may also detect these viral fragments, there is some evidence that a RAT may be used as an indicator for infectiousness after recovery from SARS-CoV-2 infection.¹¹

We recommend consulting with an infectious disease expert if there is any doubt about continuing infectiousness and/or a repeat SARS-CoV-2 infection.

4.2.1 Determining when patients are no longer infectious

In the absence of re-testing, a time-and symptom-based strategy is needed to determine when patients with SARS-CoV-2 are no longer infectious.

a. Patients with mild/asymptomatic SARS-CoV-2 infection or with a break-through SARS-CoV-2 infection

Patients with mild/asymptomatic SARS-CoV-2 infection and patients who are up-to-date with vaccination with a break-through infection are no longer considered infectious at least 7 days from onset of symptoms and/or first PCR/RAT positive test, and at least 24 hours since resolution of fever without the use of antipyretic medications and improvement in respiratory symptoms.

b. Severely ill hospitalised patients

A small number of severely ill hospitalised patients, especially if immunocompromised, can have culturable virus out to 20 days after detection of infection. Taking a cautious approach, one can assume that they are no longer infectious after 20 days from onset of symptoms and/or first PCR positive test and at least 24 hours since resolution of fever without the use of antipyretic medications and improvement in respiratory symptoms.

c. Patients who are moderately or severely immunocompromised

These patients might have a longer infectious period of 20 or more days (day 0 is the first day of symptoms or a positive viral test). Use a test-based strategy (NAAT at 7 days or RAT at 14 days) in addition to a symptom- and time-based strategy, and consult with an infectious disease specialist to determine the appropriate duration of isolation and precautions.¹²

4.3 Assessment and optimisation after SARS-CoV-2 infection, prior to elective surgery

4.3.1 Formal clinical review

Patients should have a formal clinical review prior to surgery, especially if they have not returned to their pre-COVID baseline function. This must include evaluation of the cardiorespiratory system, as well as other potentially affected systems, e.g. renal, hepatic, haematological, immunological, musculoskeletal, neurological (memory, sleep) and psychological (fatigue, post-traumatic stress disorder). This is especially important in those who have any persisting symptoms (including fatigue, chest pains or dyspnoea) and those who were hospitalised for SARS-CoV-2 care. Where available, the perioperative care team is ideally placed to coordinate the assessment and optimisation of these patients.⁷

4.3.2 Potential investigations

Depending on severity of infection, assessment of functional status and return to baseline, investigations may include:

- N-terminal-pro hormone B-type natriuretic peptide and B-type natriuretic peptide (NTproBNP/BNP).
- ferritin.
- possibly transthoracic echocardiogram (TTE), if any indication of cardiac injury or compromise.

There is likely no value in repeating chest x-ray (CXR) or computed tomography (CT) of the chest unless more than 3 months has passed after the initial infection, and there is suspicion of ongoing post-COVID-19 symptoms and/or there are abnormal signs on clinical examination.

4.3.3 Risk of Deep Vein Thrombosis or Pulmonary Embolism (DVT/PE)

There is an increased risk of DVT/PE after SARS-CoV-2 infection. It is encouraged to discuss these patients with Haematology to ensure the implementation of the most appropriate perioperative pharmacological thromboprophylaxis plan, balancing bleeding and thrombosis risk. In addition to pharmacological thromboprophylaxis, it is important to consider perioperative mechanical preventative measures such as calf compressors and stockings.

4.3.4 Further guidance

For helpful further guidance on specific assessment and optimisation, please refer to the Royal Australasian College of Surgeons' guidance, [Delaying surgery for patients recovering from COVID-19](#).³

5. Recommendations: surgical patients and SARS-CoV-2 vaccines

5.1 Timing of elective surgery in relation to SARS-CoV-2 vaccination

5.1.1 Preoperative SARS-CoV-2 vaccination

If time permits, up-to-date vaccination status prior to surgery should be encouraged. Partial vaccination may still be of benefit if time is constrained. Recommendations on the timing for SARS-CoV-2 vaccination before surgery are variable due to the unknown vaccine immunogenicity and are further dependent on what the goal is.

If the goal is to avoid confusion between symptoms of vaccine-related side effects and symptoms of surgical complications: general advice is to have a minimum of 1 week between vaccination and surgery. This is in line with government advice in Australia¹² and New Zealand.⁵

If the goal is to ensure optimal immunological response and better (at least likely adequate) protection from SARS-CoV-2 infection: a minimum of 2 weeks is recommended. Optimal immunological response prior to surgery is especially important before transplant surgery, where the decision should be made in consultation with a specialist immunologist and the transplant team, as the timing may need to be significantly longer (up to 4-6 weeks before surgery).^{13,*}

People post SARS-CoV-2 infection can be vaccinated as soon as they have recovered. There may be an immune response advantage from a longer interval between recovery and vaccination, however, vaccination should not be deferred for more than 4 months. For those people with prolonged symptoms of COVID-19, vaccination is still recommended but the optimal timing should be determined on a case-by-case basis. Expert advice should be sought for people who have received anti-SARS-CoV-2 monoclonal antibody treatment or convalescent plasma, where deferral of future doses of SARS-CoV-2 vaccine is recommended for at least 90 days.¹¹

5.1.2 Postoperative and opportunistic SARS-CoV-2 vaccination

It is recommended to wait **2 weeks following major surgery** for SARS-CoV-2 vaccination, because it may be difficult to distinguish post-vaccination symptoms from postoperative symptoms in the immediate postoperative period. Additionally, many patients have some discomfort following surgery, and a vaccine-inflammatory response could worsen their discomfort or slow their recovery.

For patients undergoing minor or intermediate surgery who do not have up-to-date SARS-CoV-2 vaccination status, unless they are acutely unwell, it may be desirable to consider earlier, 'opportunistic' vaccination, including intraoperatively or prior to discharge from hospital. This may be particularly useful for patients at risk of being lost to follow up for vaccination, and patients with significant anxiety, behavioural disorders, or needle-phobia, who struggle to tolerate receiving vaccinations. The latter group may benefit from opportunistic vaccination during anaesthesia for their scheduled procedure.

There are no specific safety concerns around interaction between SARS-CoV-2 vaccinations and anaesthetic drugs. However, for the reasons stated at the beginning

* We note that our advice here differs from that of RACS, *Influence of COVID-19 vaccines on surgical practice*, October 2021, by making different recommendations based on different goals of the time delay between vaccination and surgery.

of this section, acutely unwell patients should not be vaccinated, and for all patients, the risks and benefits should be weighed during shared decision-making.

Clinicians may need to enquire into local compliance requirements for the administration of vaccinations, including arrangements for recording the vaccination on the Australian Immunisation Register or New Zealand National Immunisation Register, and ensure these are fulfilled.

More information on intraoperative vaccination is available from the Australian Technical Advisory Group on Immunisation (ATAGI) [advice on use of sedation for COVID-19 vaccination](#).¹⁴

5.2 Myocarditis and/or pericarditis post-mRNA SARS-CoV-2 vaccination

Myocarditis is defined as ‘inflammation of the heart muscle, which can reduce the heart’s ability to pump and can cause rapid or abnormal heart rhythms’. Pericarditis is defined as ‘inflammation of the pericardium’. Both conditions can be caused by a wide variety of infectious agents, toxins, and autoimmune conditions.

Myocarditis and pericarditis are rare adverse events post SARS-CoV-2 messenger ribonucleic acid (mRNA) vaccination (Pfizer-BioNTech/Comirnaty and Moderna/Spikevax) with an onset usually within 7 days of vaccination. It is important to note that in general, myocarditis risk is about fivefold in those with SARS-CoV-2 infection compared to mRNA vaccination. The risk of myocarditis following mRNA vaccination increases in patients under 40 years old.

5.2.1 Incidence

Post mRNA SARS-CoV-2 vaccine myocarditis is more common after the second dose and especially in males, with the highest incidence among adolescents, young adults and infants.¹⁵

Most data to date regarding myocarditis post SARS-CoV-2 mRNA vaccine has been captured through VAERS data (Vaccine Adverse Event Reporting System, the US national vaccine safety passive monitoring system), which inevitably overestimates its incidence. VAERS is designed as a research data generating tool; it is not a diagnostic tool and is unable to ascertain causation.

Myocarditis reporting rates were 40.6 cases per million second doses of mRNA SARS-CoV-2 vaccines administered to males aged 12-29 years (versus 2.4 per million second doses administered to males age ≥ 30). The highest reported rates were among males aged 12-17: 62.8 per million second doses, and those aged 18-24: 50.5 per million second doses. This is in contrast to reporting rates among females: 4.2 per million in age group 12-29 and 1 per million second doses in those aged ≥ 30 .^{16,17}

5.2.2 Symptoms

Symptoms of post mRNA SARS-CoV-2 vaccine myocarditis or pericarditis include chest pain, dyspnoea or palpitations. There may be an elevated troponin level and/or abnormal findings on electrocardiogram (ECG), echocardiography or cardiac magnetic resonance imaging (MRI). The most accurate diagnosis is via pathology.

Not every patient with a raised troponin post SARS-CoV-2 mRNA vaccination has myocarditis, as troponin may be released just from other causes such as intense exercise.¹⁸

5.2.3 Recovery and follow-up

It is worth noting that most cases recover with supportive management and simple non-steroidal anti-inflammatory drugs (NSAID) therapy, and that longer-term follow-up of these cases is ongoing.

In patients with a history of vaccine associated myocarditis/pericarditis, it is important to ascertain whether there are any long-term sequelae. It is advised to manage these patients perioperatively in close collaboration with a specialist cardiologist. They may require additional preoperative investigations such as transthoracic echocardiogram (TTE) or cardiopulmonary exercise testing (CPET), and a higher level of monitoring perioperatively.

5.3 Vaccine Induced Thrombosis and Thrombocytopenia (VITT) post-SARS-CoV-2 vaccination¹⁹

Vaccine Induced Thrombosis and Thrombocytopenia (VITT) is a severe prothrombotic syndrome associated with thrombocytopenia, which has been described in a small number of patients exposed to the SARS-CoV-2 AstraZeneca/Covishield or Vaxzevria and Janssen (Johnson & Johnson) vaccines. Even though the exact pathophysiology of the syndrome is unknown, the presence of pathological antibodies against PF4/polyanion complexes has been identified in the majority of cases. It is worth noting that these antibodies are only detectable by specific enzyme-linked immunosorbent assay (ELISA) methods in specialised laboratories.

In patients with confirmed VITT and not HITTS (Heparin Induced Thrombotic Thrombocytopenia Syndrome), the use of subsequent routine heparin prophylaxis is recommended. If there is a history of 'spontaneous HITTS' or the history is unclear, then a haematological review is recommended.

6. Definitions and abbreviations

- Break-through SARS-CoV-2 infection

A SARS-CoV-2 infection occurring in a patient with up-to-date SARS-CoV-2 vaccination status.

- COVID-19

The disease or syndrome caused by SARS-CoV-2 infection.

- Long COVID

This document uses 'Long COVID' to mean post COVID-19 condition as described by the World Health Organization:

Post COVID-19 condition occurs in individuals with a history of probable or confirmed SARS CoV-2 infection, usually 3 months from the onset of COVID-19 with symptoms and that last for at least 2 months and cannot be explained by an alternative diagnosis. Common symptoms include fatigue, shortness of breath, cognitive dysfunction but also others and generally have an impact on everyday functioning. Symptoms may be new onset following initial recovery from an acute

COVID-19 episode or persist from the initial illness. Symptoms may also fluctuate or relapse over time.²⁰

- Major and minor surgery

There is no universally agreed definition of major or minor surgery; however, we offer these general descriptions, which are based on expected perioperative systemic stress and/or inflammatory response to the procedure.

- Minor surgery

Procedures generally able to be managed as day procedures, typically superficial surgical procedures involving skin or soft tissues. Such procedures may also include elective minor ear-nose-throat procedures and simple endoscopy involving limited tissue sampling or resection.

- Major surgery

Procedures that involve significant physiological stress to the body as compared to minor surgery. Some examples are: endoscopic resection of prostate, major intra-abdominal surgery such as colorectal resection, thyroidectomy, total joint replacement or lung operations.²¹

- NAAT

Nucleic Acid Amplification Test for SARS-CoV-2.

- PCR

Polymerase chain reaction test for SARS-CoV-2.

- RAT

Rapid antigen test for SARS-CoV-2.

- Up-to-date SARS-CoV-2 vaccination status

A person has this status if they have received the full course of SARS-CoV-2 vaccine doses and boosters that is recommended for them by their country's national health authority at the time of consideration.^{11,22}

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Version control

Date	Author/reviewer	Approved by	Changes
7 Feb 2022	SARS-CoV-2 surgery guideline working group	Professor David Story, Dr Peter Roessler	First published version
17 May 2022	SARS-CoV-2 surgery guideline working group	Professor David Story, Dr Peter Roessler	<ul style="list-style-type: none"> • Minor title change • 4.1: Sections re-ordered • 4.1: Added advice to consult El-Boghdadly et al • 4.1.1: General recommendation for non-urgent elective major surgery changed to minimum 7 weeks (was 8 weeks) in line with ongoing evidence review including El-Boghdadly et al • 4.1.1: Inserted need for individualised risk assessment • 4.1.2: Removed separate recommendation for patients with break-through infection due to lack of evidence • 4.1.2 (now Time-sensitive surgery): Added “including cancer surgery” to title for emphasis • 4.1.2: Added need for risk assessment and clinical judgement • 4.2: Added advice that RAT may be useful inside 90 days of infection, and to seek infectious disease expert advice if in doubt on infectiousness • 4.2.1.a.: Removed distinction between omicron and other variants – period till no longer infectious for stated patient group now 7 days for all variants • 4.2.1.c.: New section on immunocompromised patients • 4.3.1: Important persisting symptoms now include chest pains • 4.3.2: Added criteria for use of TTE • 5.1.1: Added advice about preoperative patients who are post SARS-CoV-2 • 5.2: Additional sentence stressing higher myocarditis risk from SARS-CoV-2 than vaccination • 5.3: Added advice on heparin prophylaxis for VITT patients • 5.3.1-5.3.3: Removed these sections as VITT advice is best sought from Haematology • 6: new definitions for major and minor surgery, NAAT, up to date SARS-CoV-2 vaccination status • Minor editorial changes
4 Aug 2022	SARS-CoV-2 surgery guideline working group		<ul style="list-style-type: none"> • 5.1.2: Added information on intraoperative SARS-CoV-2 vaccination • Minor editorial changes

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The members of the SARS-CoV-2 surgery guideline working group are:

*Dr Vanessa Beavis, ANZCA Immediate Past President
Professor Paul Myles
Professor David A Scott
Dr Jill Van Acker
Dr Joreline (Jay) Van Der Westhuizen*

We would also like to acknowledge the valuable assistance of:

*Dr Philip Choi, Thrombosis and Haemostasis Society of Australia and New Zealand
Dr Ben Turner, Society for Paediatric Anaesthesia in Australia and New Zealand
Professor Mark Frydenberg, Royal Australasian College of Surgeons*

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