



## ANZCA statement on personal protection equipment (PPE) during the SARS-CoV-2 pandemic; Version 4 (October 2020)

*This statement is intended to provide advice on infection control precautions and personal protective equipment (PPE) for providers of anaesthesia and pain medicine.*

*We have revised this statement incorporating updated advice of Australian and New Zealand health authorities, including the Infection Control Expert Group (ICEG) as the peak infection control committee advising the Australian Health Protection Principal Committee (AHPPC), and Australia's chief medical officers. We have also consulted with colleges and societies representing perioperative surgical, nursing and procedural medical practice.*

*The character, magnitude and spread of SARS-CoV-2 varies from location to location. Health services and hospitals are encouraged to seek advice from local specialist infectious diseases and or public health authorities, where they are available.*

*This revision is influenced by new evidence and practices, particularly from the Victorian second COVID-19 wave that started in July 2020. We will further revise this guidance as new information becomes available.*

### Contents

1	Introduction.....	2
2	Purpose.....	3
3	Key principles.....	3
4	Recommendations.....	4
4.1	Contingencies for infection prevention precautions according to fluctuations in regional or facility risk status.....	4
4.2	Safe use of PPE.....	7
4.3	Training and preparation.....	7
4.4	Wellbeing and workforce.....	7
4.5	PPE Supplies.....	8
5	Further Resources.....	8
6	Acknowledgements.....	8
7	Disclaimer.....	9
	Appendix 1: Classification of infection control precautions.....	10
	Appendix 2: Risk stratification and case definitions.....	12
	Appendix 3: Aerosol generating procedures (AGPs) and aerosol generating behaviours (AG-Bs).....	13

## 1 Introduction

The severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)<sup>1</sup> is highly infectious and can cause a range of symptoms from asymptomatic carriage to coronavirus disease (COVID-19). The underlying epidemiology and pathophysiology of this disease is still emerging, however it is clear that patients, healthcare workers (HCWs) and any people visiting a health care setting, including aged care facilities, are at increased risk of contracting SARS-CoV-2, and of developing COVID-19. This risk is greatly reduced if those exposed to a person infected with SARS-CoV-2 take appropriate transmission risk mitigation precautions ([Appendix 1](#)).

Community concern about contracting COVID-19 through healthcare may lead some patients to delay seeking medical care, potentially leading to a deterioration in their comorbidities and a progression in their surgical pathology.<sup>2</sup> Further, recent evidence suggests patients with active COVID-19 may have worse perioperative outcomes, particularly respiratory complications.<sup>3</sup> Another emerging problem is long-term organ injury after COVID-19.<sup>4</sup>

While HCW and patient wellbeing is the prime objective of this statement, potential SARS-CoV-2 exposure due to inadequate PPE has also led to HCWs being furloughed and loss of clinical capacity for hospitals.

ANZCA acknowledges that there is significant and justified concern from anaesthesia and pain medicine clinicians across Australia and New Zealand regarding their safety, and what constitutes optimal precautions, including PPE, during the ongoing COVID-19 crisis.<sup>5,6</sup> Importantly while this ANZCA statement focuses on PPE for reducing patient to HCW transmission, SARS-CoV-2 transmission can occur between HCWs, and from HCWs to patients and other community members. Further, this statement applies to both escalating and de-escalating PPE use.

The college has previously published guidance to support standards for infection control in the ANZCA professional document *PS28 Guideline on Infection Control in Anaesthesia*.<sup>7</sup> This continues to provide relevant advice on routine infection control precautions applicable to all patients, irrespective of their risk of communicable disease. The evolving COVID-19 pandemic has revealed a need for additional guidance on transmission-based precautions, specifically for SARS-CoV-2.

The college is aware that many PPE guidelines have been published and updated during the pandemic, across jurisdictions and regions in Australia and New Zealand.<sup>8,9</sup> The recommendations for PPE in these guidelines are based on established principles of infection prevention and control, scientific evidence for modes of SARS-CoV-2 transmission, epidemiological risk factors, and occupational health and safety<sup>10</sup>. There are ongoing concerns about the quality of evidence and consequently where evidence is inconclusive, guidelines and this statement are informed by expert opinion.<sup>9</sup> Some of these guidelines have undergone revision with new epidemiological and infection control data regarding, for example, asymptomatic and pre-symptomatic community transmission and local case prevalence. Recognised added risks for perioperative practice now include planned and unplanned aerosol generating procedures (AGPs) and patient aerosol generating behaviours (AG-Bs).<sup>9</sup>

## 2 Purpose

The intent of this document is to provide guidance on minimum requirements for PPE to protect HCWs while providing anaesthesia and pain medicine care to patients. This statement also aims to protect their patients and other HCWs. By providing this advice, the college defers where possible to established, endorsed infection control guidelines and seeks to present these specifically for anaesthesia and pain medicine practice.

## 3 Key principles

The college recommends that providers of anaesthesia and pain medicine apply the following underpinning principles when determining PPE requirements:

- 3.1 Routine infection control precautions should be practised during all encounters with all patients irrespective of presumed risk of transmission for any infection according to established standards of practice. **Error! Bookmark not defined.**
- 3.2 PPE involves addition to routine precautions in an escalating and cumulative order of precautions: routine → contact → droplet → airborne ([Appendix 2](#)). Some jurisdictions use local terminology, which can be confusing.
- 3.3 The Hierarchy of Controls model ([Appendix 1](#)) highlights the effectiveness of controls in addition to PPE.
- 3.4 The three main risk considerations are; 1) Individual patient risk; 2) Risk of AGPs (planned and unplanned) and AG-Bs; and 3) Community transmission risk ([Figure 1](#)).
- 3.5 The risk assessment for an individual patient includes systematic screening questions about symptoms and possible SARS-CoV-2 exposure and virology testing; consistent with government and/or local health facility policy. Victoria mandated both screening and testing during the second wave ([Appendix 2](#)).<sup>11</sup>
- 3.6 The prevalence of SARS-CoV-2 has fluctuated over time. If community transmission is estimated to be low, it is considered safe to adhere to normally accepted approaches to PPE in patients assessed to be low risk on screening ([Figure 1](#)). However, as happened in the Victorian second wave, during rapid and sustained increases in rates of community transmission, where contacts are unknown, the increased likelihood of transmission from asymptomatic or pre-symptomatic infected patients may warrant applying droplet or airborne transmission precautions even for patients deemed to be low risk ([Figure 1](#)). This reasoning may also be applied for known hospital clusters, as happened in several Melbourne hospitals during the second wave. Public health experts are best placed to provide advice about community transmission risk and whether it would be prudent to upgrade facility-wide transmission precautions and whether transmission-based precautions should be applied to low risk patients. This is predicated on timely access to local data including prevalence (see [Recommendation 4.1](#)).
- 3.7 In addition to contact and droplet transmission risks, the risk of aerosol transmission is increased with AGPs conducted by clinicians and AG-Bs from patients. Because the aerosol risks of both these procedures and behaviours have become more certain as the pandemic has progressed, the college now recommends that anaesthetists and the anaesthesia team wear airborne precaution PPE for care of all patients with high risk of SARS-CoV-2, irrespective of the community transmission risk ([Figure 1](#)).

- 3.8** Adequate supplies of PPE are necessary to maintain standards of personal protection for patients and HCWs. Patient care without the minimum standards of PPE is unsafe for both HCWs and patients. Health services should view this as a headline risk to be managed, particularly in procuring stock and monitoring burn rate. However, stocks are not infinite, and unnecessary airborne precaution use should be avoided – notably for low risk patients in low risk areas. In order to conserve valuable supplies of PPE, region or facility risk should be determined and non-urgent elective surgery should be managed.
- 3.9** HCWs need to be both protected from contracting, and passing on, SARS-CoV-2. In addition to government mandated precautions, clinicians are obliged to comply with screening advice and practice physical distancing measures in both clinical and non-clinical settings as part of the Hierarchy of Controls ([Appendix 1](#)). In addition to physical distancing, standard PPE precautions within the workplace should be followed, as required.<sup>12</sup> The needs of HCWs vulnerable to COVID-19 should be respected.
- 3.10** Anaesthesia and pain medicine care require multidisciplinary practice in which the safety of all members of the multidisciplinary team is of equal and paramount importance. **Optimal protection for all team members can only be achieved if clinicians are familiar with the safety requirements of each other's respective roles.**
- 3.11** Modifications to conventional patient care, introduced for HCW protection, should simultaneously ensure that patients receive safe, high quality care.

## 4 Recommendations

### 4.1 Contingencies for infection prevention precautions according to fluctuations in regional or facility risk status

#### 4.1.1 Patients with low risk of SARS-CoV-2

Planning should include fluctuating community transmission risk by symptomatic, pre-symptomatic, and asymptomatic people. Correspondingly, contingency plans should modify recommended PPE for care of patients who are otherwise defined as low risk according to risk determined at a regional or facility level. These ANZCA guidelines use a traffic light **flow chart** with a graded risk model for both escalation and de-escalation ([Figure 1, Appendix 2](#)). Local or facility risk assessment should be based on the advice of epidemiologists, infectious diseases specialists and or public health specialists. Important local indicators may include: disease prevalence, 14-day new case rates, hospital COVID-19 case load, and staff clusters. Based on the Victorian second wave, a local prevalence of greater than 10 per 10,000 (1:1,000) confirmed active cases would indicate moderate to high community transmission risk and greater than 20 per 10,000 (1:500) may constitute high community transmission risk. At the peak of the Victorian second wave, the worst hit areas in Melbourne had a prevalence of more the 35 per 10,000. The Victorian second wave highlighted varying approaches by hospitals and anaesthesia departments. Using local prevalence some assumed highest (red) risk and others intermediate (amber).

#### 4.1.2 Patients with low risk of SARS-CoV2, but in a region with high risk of community transmission

Where patients are assessed as low risk of SARS-CoV-2 following screening questionnaire and possibly viral testing, local guidelines will determine whether airborne or droplet precautions are required for AGPs, both expected and unexpected, as well as AG-Bs. When there is not usually an expectation for AGPs and AG-Bs, droplet precautions could be used with airborne precautions readily available, in theatre or the anaesthetic room (standby).

Examples of clinical practice related to anaesthesia and or pain medicine that would not usually be expected to involve AGPs include:

- Regional anaesthesia and local infiltration.
- Conscious sedation.
- Vascular access (Peripheral intravenous, central venous catheter, arterial).
- During recovery from an AGP after an appropriate period of time has elapsed.
- Consultations including pre-operative assessments, pain management consultations and other consultations when located less than 1.5 metres from the patient.

Anticipating AGPs and AG-Bs, anaesthesia clinicians should consider using **airborne precautions** when preparing for time critical situations, such as emergency caesarean section, irrespective of the primary mode of anaesthesia.

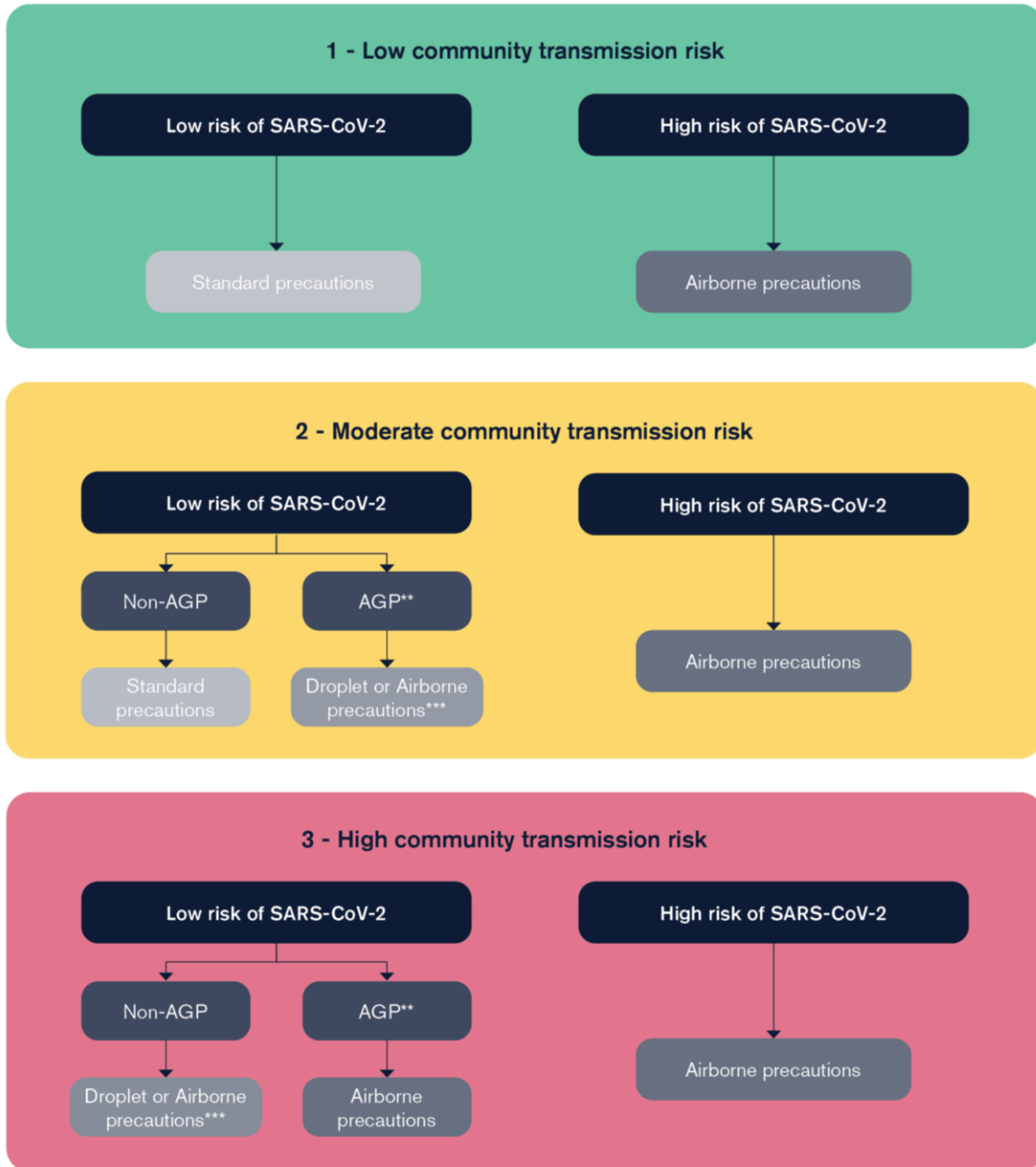
Where required, after any AGP the operating theatre should remain vacant for four to five room air changes with the theatre doors closed.<sup>12,13</sup> Aerosol clearing times should be determined according to the capacity of local facility ventilation system.

#### 4.1.3 Patients with high risk of SARS-CoV2

The following precautions should be adopted where, after risk assessment, patients are identified as high risk for SARS-CoV-2 (suspected, probable or confirmed infection):

**Airborne precautions are recommended for all clinical care**

**Figure 1:** Recommendations for PPE according to SARS-CoV-2 case definitions and community transmission risk\*



\* Community transmission risk should be determined by public health authorities as low, moderate or high (using **national case definitions**) or with local risk matrices. This informs upgrading PPE from 'business as usual' as the risk of community transmission from asymptomatic people with SARS-CoV-2 increases in patients otherwise defined as low risk (appendix 2). This decision is based on multiple factors including changing population prevalence in geographically localised areas, and should be based on the advice of epidemiologists, infectious diseases specialists and public health specialists.

\*\* AGPs and AG-Bs (Appendix 3).

\*\*\* Depending on local policies. If droplet precautions are used, airborne precautions should be immediately available. Caution should be exercised for patients with AG-Bs (Appendix 3).

## 4.2 Safe use of PPE

Epidemiological evidence regarding HCW infections strongly links transmission risk to training and compliance with behaviours that achieve maximum benefit from PPE.<sup>14</sup>

- 4.2.1 Established categories of PPE (contact, droplet, or airborne) should be adhered to rather than novel classifications.
- 4.2.2 When PPE is used, particular attention should be paid to maintaining vigilance to avoid unintended self-contamination during wearing, donning, and particularly doffing.
- 4.2.3 N95/P2 respirators require formal **fit-testing** to comply with the Australian and New Zealand standard AS/NZS 1715:2009 and the Australian Government infection prevention and control guidelines.<sup>14,15</sup> The college recommends that organisations commit to providing fit-testing for HCWs within an ongoing program of testing and HCW education. As the minimum standard, in the first instance, HCWs should be **fit-checked** by a suitably trained person. Thereafter, clinicians should ensure they perform a fit-check (user seal check) every time they don a N95/P2 mask.<sup>14</sup>
- 4.2.4 Clinicians should be aware of the level of protection offered by N95/P2 respirators, of which there are two types: “standard” and “surgical”. Only surgical N95 respirators are fluid resistant and they represent the only suitable masks for effective protection in the clinical workplace where fluid resistance is also required and the wearer is not also wearing a face shield.<sup>16</sup>
- 4.2.5 In response to concerns about quality and effectiveness, the Therapeutic Goods Administration (TGA) is reviewing face masks included in the Australian Register of Therapeutic Goods (ARTG). They provide guidance for users of face masks on identifying compliant products, and a list of those that have been removed from the ARTG.<sup>17</sup>

## 4.3 Training and preparation

It is well recognised that donning and in particular doffing of PPE carry risks of transmission of infection from patients to healthcare workers. It is essential that all anaesthesia and pain medicine providers have received expert training on the use of PPE and managing anaesthesia related AGPs. This may take the form of watching videos and/or simulation training. There are a number of resource links for this on the college [Library Guide pages](#).

## 4.4 Wellbeing and workforce

During the pandemic it is important that clinicians actively manage their own wellbeing and contribute to the wellbeing of others. Buddy systems, mental health advice access and virtual social events, among other initiatives, may assist everyone to recognise signs of stress and support colleagues to develop coping strategies. There are a number of resource links for this on the college [Library Guide pages](#).

This is a stressful time and clinicians need to stay well to be able to lead their departments and hospitals through this crisis. Workforce constraints will undoubtedly limit services. A range of organisational strategies are considered beneficial in minimising HCW infection including case load management, environmental controls and surge planning.

#### **4.5 PPE Supplies**

The college is aware that the PPE supply may vary. While the college cannot control PPE supply, ANZCA categorically supports the need for healthcare workers to be protected from the risk of transmission and is actively consulting with fellows and government to ensure that government strategies are informed by up to date information and in the best interests of anaesthesia and pain medicine providers across all regions and sectors. Timely and accurate information about local patterns of disease will improve clinician/institution engagement and help to embed agreed PPE guidelines.

### **5 Further Resources**

The college has created a COVID-19 section in **Library Guide pages** on the college website. This has a wide range of guidelines and advice documents, classified under tabbed categories for ease of searching. It includes advice and guidance on well-being, curated by the **Wellbeing Special Interest Group** and the resources on the site are actively curated to ensure they are up-to date.

### **6 Acknowledgements**

ANZCA acknowledges and thanks the following people and groups for their important contributions to this document: ANZCA COVID 19 Clinical Expert Advisory Group, **ANZCA Safety and Quality Committee**, Dr Rod Mitchell (Immediate Past President, ANZCA), Professor Tomas Corcoran (Fellow WA).

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## **7 Disclaimer**

The Australian and New Zealand College of Anaesthetists (“The College”) has issued this statement as guidance for its members and for the wider clinical community and is based on the best evidence at the time of publication. The College accepts no liability for any harm or adverse outcomes resulting from actions taken on the basis of this statement.

## Appendix 1: Classification of infection control precautions

Personal Protective Equipment (PPE) refers to any device, garment or appliance designed to be worn or held by an individual for protection against one or more health and safety hazards. In the setting of healthcare, PPE refers to protective clothing, helmets, gloves, face shields, goggles, facemasks and/or respirators or other equipment designed to protect the wearer from injury or the spread of infection or illness. The term “precautions” can be used synonymously with “protection”, however, it also refers to the broader suite of measures (behavioural, environmental and organisational) required to protect patients and healthcare workers: hierarchy of control measures.

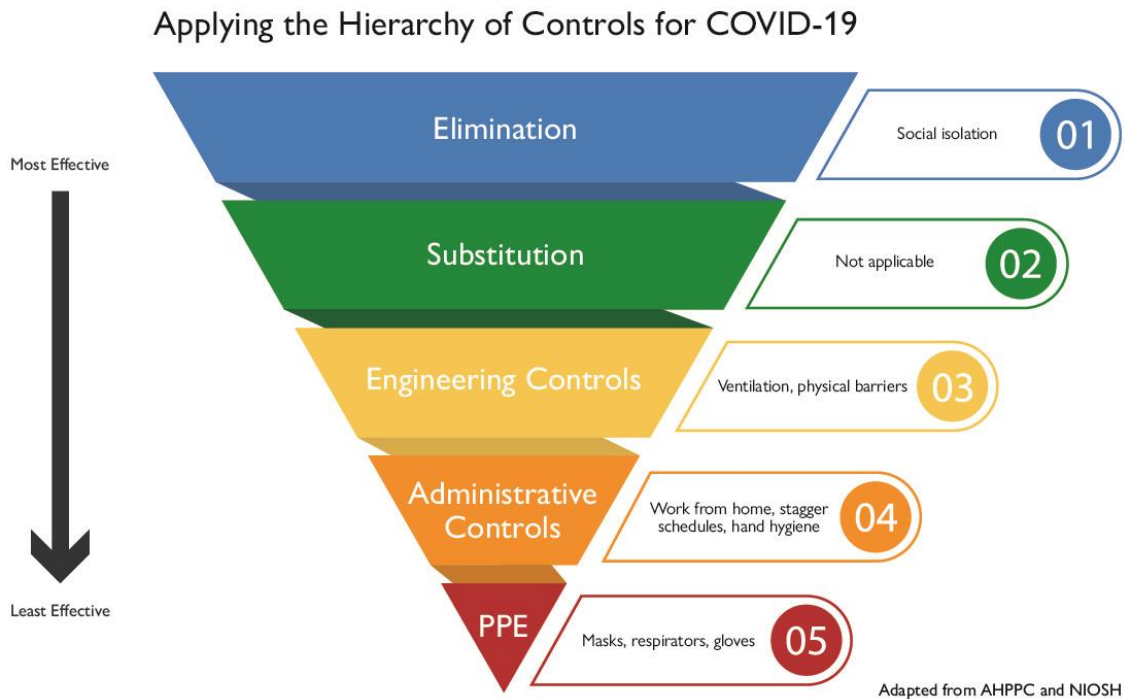


Figure 2: Hierarchy of Controls model applied to preventing COVID-19.

Source: *Worksafe Tasmania*

PPE is one component of a hierarchy of protective measures (precautions) for healthcare workers. The broad classification of these measures is specified as follows<sup>14</sup>:

- a. **Routine (standard) precautions** provide a basic level of protection and should be used for all patients regardless of risk stratification. Standard precautions are outlined in ANZCA professional document *PS28 Guideline on Infection Control in Anaesthesia*.<sup>7</sup>

Standard precautions include a range of behavioural, environmental and equipment related measures, including hand hygiene, cough etiquette, environmental cleaning and aseptic precautions. Specific items of PPE should be fit for purpose and relevant to the situation and may include: sterile or non-sterile gloves, protective eyewear or face shields and surgical masks.<sup>9</sup> Gloves, mask and eye protection are generally employed as the minimum measures and PPE for procedures undertaken in the course of anaesthesia and pain medicine where there is the likelihood for splashing, splattering or spraying of blood or body fluids.

The use of sterile or non-sterile **gowns** or plastic aprons should be guided by the likelihood of splashing, splattering or spraying of blood or body fluids.

- b. **Transmission-based precautions are used in an escalating and cumulative fashion in addition to standard precautions** where the suspected or confirmed presence of infectious agents represents an increased risk of transmission
- I. **Contact precautions** comprise the use of gloves, a theatre scrub suit or protective gown and/or apron.
  - II. **Droplet precautions** comprise a surgical mask (minimum level 2 barrier), eye shield or goggle protection, an impervious apron or long sleeve gown and gloves.
  - III. **Airborne precautions** for the primary airway proceduralist and team include N95/P2 respirator, eye shield/goggle protection, long-sleeved fluid impervious gowns, gloves +/- double gloves for intubation. The use of powered air purifying respirators (PAPRs) and elastomeric respirators may also be considered but it is acknowledged that their use requires specific training in donning, doffing and cleaning, and that supply may be limited. It is imperative that disposable headwear be worn in operating theatres and if required by local infection control policy and discarded safely after any case. Local guidelines on treatment of footwear should be followed, as these vary considerably.

Recommendations regarding specific items of PPE for the three levels of transmission-based precautions are generally consistent across infection prevention and control guidelines.

**Infographics** may be useful as a guide to the minimum PPE required however clinicians should be aware of specific PPE requirements relevant to their national and jurisdictional health departments and hospitals.

## Appendix 2: Risk stratification and case definitions

Risk stratification of patients is a key component of strategies aiming to minimise transmission of infection between patients and HCWs. Early identification of high risk patients is essential. In this document, patients are empirically classified into high or low risk using established case definition and risk stratification criteria.

### a. High risk patients

High risk patients are those meeting case definition criteria for: **suspected, probable, under investigation (NZ only) or confirmed case**. As risk stratified case definitions and criteria vary slightly between agencies, it is important to be familiar with relevant guidelines as outlined in the **Australian Government COVID-19 National Guidelines for Public Health Units**<sup>18</sup> and the **New Zealand Ministry of Health guidelines**<sup>8</sup>, in addition to jurisdictional guidelines.

Consultation with local infectious diseases clinicians will guide risk stratification and management of patients whose risk of community-acquired transmission is uncertain and who may warrant consideration within the *suspect case* definition. Taking the most precautionary position, these would currently include a patient with at least one of the following respiratory symptoms: cough, sore throat, shortness of breath, coryza, anosmia or fever.<sup>19</sup>

The risk screening and nasopharyngeal testing advice is changing in both countries, especially for asymptomatic patients located in areas with clusters of community-acquired infection. Clinicians should base their risk stratification on the most recent case definitions and local specialist infectious diseases advice. However, access to infectious diseases advice is limited in some areas, specifically some rural/regional communities. In these circumstances, decisions need to be made using the most appropriate information available, including public health data on geographical clusters.

### b. Low risk patients

In this document, patients who do not meet any of the above criteria are considered low risk.

### **Appendix 3: Aerosol generating procedures (AGPs) and aerosol generating behaviours (AG-Bs)**

There is broad consensus that SARS-CoV-2, like most respiratory viral infections, is transmitted by droplets or viral fomites, the latter being transmitted via hands to respiratory or conjunctival mucosa following their contact with contaminated surfaces.<sup>14</sup> As of September 2020, ICEG advised ANZCA that they continue to conclude airborne transmission is unlikely to be significant in many settings. However, they consider the risk is higher when AGPs are performed and now also recognise risk when patients have AG-Bs such as calling out when confused<sup>9</sup> (see below).

Some debate surrounds the designation of procedures as AGPs due to scant evidence and varying degrees of convergence of expert opinion.

Based to an extent on a systematic review by Tran et al<sup>20</sup> there is consensus<sup>9</sup> that the following are AGPs:

- a. Bag and mask ventilation
- b. Tracheal intubation and extubation
- c. Ventilation via supraglottic airways (including insertion and removal)
- d. Non-invasive ventilation including CPAP and BiPAP

While these AGPs are often planned, they can also be unplanned, this particularly applies to bag and mask ventilation.

The college concludes there is sufficient convergence of expert opinion to categorically support the following as being AGPs<sup>9</sup>:

- e. High flow nasal oxygen therapy
- f. Use of nebulisers
- g. Suctioning of ETTs via open circuits
- h. Intentional or inadvertent disconnection/reconnection of closed ventilator circuit
- i. Upper and lower gastro-intestinal endoscopy<sup>21</sup>
- j. Diagnostic and therapeutic instrumentation of the airway including bronchoscopy and tracheostomy
- k. Surgical procedures or procedures involving high speed drilling within the upper respiratory tract.

#### **Other potential AGPs**

Experts taking a precautionary approach<sup>13</sup> might also consider the following to be AGPs: collection of induced sputum; chest physiotherapy; transoesophageal echocardiography; thoracic surgery in which the lung is entered; and insertion of intercostal catheters.

#### **Aerosol Generating Behaviours (AG-Bs)**

Victorian experience has highlighted patient AG-Bs that may increase the risk of SARS-CoV-2 transmission. These include: screaming, shouting, crying out, and vomiting.<sup>12</sup>

### **Aerosolisation risk posed by labour**

The Royal Australian and New Zealand College of Obstetricians and Gynaecologists (RANZCOG) currently concludes: “Labour and birth are primarily associated with surface and droplet exposure but they are potentially aerosol-generating behaviours (AGB)”<sup>22</sup>. Therefore, when providing care for women in labour, PPE use should be guided by both the risk of SAR-CoV-2 in the individual patient and the community transmission risk assuming there is a risk of aerosol transmission (Figure 1).

Again, the college recommends patient care is based on best practice.

### **Cardiopulmonary resuscitation (CPR)**

Recent Australasian College for Emergency Medicine (ACEM) guidelines<sup>23</sup> note defibrillation is not considered an AGP, and compression-only cardiopulmonary resuscitation is thought to be a low risk procedure that can be safely initiated with the patient’s mouth and nose covered. All other resuscitative procedures should be considered aerosol generating. ANZCA recommends that the suggestions in Figure 1 based on community prevalence and patient risk also apply to CPR. However, as ACEM notes, the risk for an individual patient may not be known, in which case the patient should be assumed to be high risk. ANZCA suggests anaesthesia providers should assume they will be involved in AGPs during CPR.

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