

Infection Prevention and Control

Aerosol-generating procedures in relation to COVID-19

Background and purpose

COVID-19 is a respiratory tract infection caused by SARS-CoV-2 which is predominantly transmitted by large droplets.^{1,2} [Contact and droplet precautions](#) are therefore recommended during routine care of patients with suspected, probable or confirmed COVID-19.^{1,2,3} Aerosol-generating procedures (AGPs) may need to be performed during the care of these patients. AGPs produce droplet nuclei (< 5 micrometres in size) or airborne particles (aerosols) due to air or gas flowing rapidly over a moist or wet surface.⁴ There are many procedures that may be “aerosol generating” but whether they lead to an increased risk of transmission of infection is a different and important question.

The purpose of this document is to provide guidance to health workers in NSW about risks associated with transmission of SARS-CoV-2 when conducting respiratory aerosol-generating procedures on patients with suspected, probable or confirmed COVID-19, and appropriate transmission-based precautions to reduce this risk.

Transmission of SARS-CoV-2

In addition to the nature of the procedure itself, the overall risk of transmission of SARS-CoV-2 is also associated with the viral load in the body fluid potentially being aerosolised, and whether the virus is intact and capable of causing infection (which is an important distinction, since many body fluid, air-sampling and environmental studies use methods that detect viral RNA rather than intact, infective virus). Studies have shown that SARS-CoV-2 is most commonly detected in respiratory tract samples (lower greater than upper respiratory tract) in those who are infected⁵; thus procedures involving potential exposure to respiratory tract secretions or tissues are of particular relevance with respect to the risk of SARS-CoV-2 transmission. SARS-CoV-2 has also been detected in non-respiratory specimens, in particular stool and to a lesser extent blood and ocular secretions, but the role of these sites in transmission is uncertain. Of note, faecal-oral transmission has not been clinically described, and does not appear to be a significant factor in the spread of infection.⁶

High and low risk AGPs

With respect to COVID-19, high risk AGPs are those associated with production of respiratory tract-generated aerosols. These procedures have the potential to pose an airborne transmission risk of SARS-CoV-2 and therefore, in addition to [contact and droplet precautions](#), [airborne precautions](#) are recommended and the procedure to be conducted in a negative pressure room or if unavailable, a single room with the door closed. Note that other procedures that may cause aerosolisation of fluid or tissues that are not from the respiratory tract or lungs are not considered high risk AGPs for transmission of COVID-19.

Some considerations include:

- High risk AGPs should be performed with a minimum number of staff present and where possible, the most qualified person should carry out the procedure. In circumstances where there may be an ongoing need for the AGP (e.g. non-invasive ventilation), it is recommended that a plan for review and discontinuation of the AGP is put in place.

- Low risk AGPs for SARS-CoV-2 transmission or procedures not associated with the potential to produce aerosols, can be performed using contact and droplet precautions, as would be indicated for the routine care of suspected, probable or confirmed cases of COVID-19.
- In general, it is recommended that **nebulised medication** is avoided and alternative means of delivering medication (such as pressurised metered-dose inhaler or a spacer) should be used. If the use of a nebuliser cannot be avoided in a patient with suspected, probable or confirmed acute respiratory viral illness (including COVID-19) then:
 - Isolate the patient
 - Use a negative-pressure room, if available. If not available, use a single room with the door closed
 - Health workers administering nebulisers should wear airborne precaution PPE, including an impervious gown and gloves, P2/N95 respirator (mask) and protective eyewear. If staying in the room, depending on the air changes per hour, continue these precautions for at least 30 minutes after the nebuliser treatment. See link here: [CDC Air Changes](#)
- If a patient with confirmed COVID-19 requires a high risk AGP, the procedure should be performed with institution of appropriate infection prevention and control precautions which will minimise risk to health workers.

See **Table 1** for examples of AGPs of varying risk based on current evidence and expert opinion, including considerations of biological plausibility^{7,8} This list is not intended to be exhaustive. It must be noted that at present, the evidence is limited and these classifications may change as new data emerge. In addition, health workers should perform a risk assessment based on the intensity, proximity and duration of exposure to respiratory tract secretions when deciding whether a procedure is high or low risk for an individual patient undergoing a specific procedure. For guidance regarding other specialised procedures related to **allied health interventions**, refer to other CEC guidance which can be found [here](#). For guidance to dental procedures, refer to CEC guidance which can be found [here](#).

Cardiopulmonary resuscitation

Cardiopulmonary resuscitation (CPR) is complex in terms of assessing AGP risk. While many procedures (e.g. intubation) undertaken during the course of CPR on a patient with suspected, probable or confirmed COVID-19, are considered high risk AGPs, there is no consensus about whether chest compressions result in aerosol generation or transmission of COVID-19. There is a paucity of data in the current literature concerning this issue.^{7,9} In many reports, it appears likely that there was simultaneous exposure to airway manoeuvres, such that the isolated effect of chest compressions could not be reliably identified. In contrast there is consensus that defibrillation is not an AGP and it is known that early chest compressions and defibrillation may improve survival. This uncertainty has led to variations in National and International guidelines about the use of personal protective equipment (PPE), particularly for first responders.

Given the uncertainty of transmission of SARS-CoV-2 via chest compression and the need to provide clear and unambiguous advice ensuring that health workers are protected and patients receive timely resuscitation, we recommend that for patients with suspected, probable or confirmed COVID-19, airborne (in addition to contact and droplet) precautions are used when doing cardiac compressions or airway manipulation. If a first responder enters the room using droplet and contact precautions, then oxygen via a mask can be placed on the patient and defibrillation can be performed. It is critical that all health workers who are responders for cardiac arrests have practised the safe, effective and rapid donning of PPE required for contact, droplet and airborne precautions.

TABLE 1 – Examples of aerosol-generating procedures (AGPs) classified according to risk of airborne transmission of SARS-CoV-2

Procedure	High risk AGPs	Low risk AGPs or not AGPs
Precautions for COVID-19	See Contact, droplet and airborne	See Contact and droplet
Airway interventions	<ul style="list-style-type: none"> • Tracheal intubation or extubation* • Manual mask ventilation* • Non-invasive ventilation* (e.g. bi-level positive airway pressure ventilation (BiPAP) and continuous positive airway pressure ventilation (CPAP)) • Tracheostomy/tracheotomy (insertion and removal)* • Laryngeal mask/supraglottic airway • Intentional or inadvertent disconnection/reconnection of closed ventilator circuit • High flow nasal cannula† • Open-suctioning of airways 	
Procedures involving the respiratory tract	<ul style="list-style-type: none"> • Sputum induction§ • Bronchoscopy • Thoracic surgery involving the lung • Maxillofacial surgery • Ear, nose and throat procedures that involve suctioning or high-speed drilling, including transphenoidal surgery 	<ul style="list-style-type: none"> • Swabbing of upper respiratory tract • Examination of the throat, eyes or ears without invasive instrumentation • Nasendoscopy
Other procedures	<ul style="list-style-type: none"> • Procedures that involve open suctioning of the upper airways (e.g. gastroscopy or transoesophageal echocardiography with suctioning) • Dental procedures with high-speed devices * € • Post-mortem procedures involving high-speed devices on the respiratory tract 	<ul style="list-style-type: none"> • Insertion of a nasogastric tube • Colonoscopy



Precautions for non- COVID-19	For clinical care of, or procedures on, patients who are NOT suspected of having COVID-19 the usual infection prevention and control precautions, including PPE if required, should be observed according to clinical circumstances. Additional COVID-19 specific precautions are not required.
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* Evidence for AGP being associated with transmission of acute respiratory infections⁷

€COVID-19 guidelines for public dental services

† High flow nasal cannula is a specific form of non-invasive respiratory support which delivers high flow gas (usually air plus supplemental oxygen) via large diameter nasal cannula which is humidified and heated. Flow rates can be given up to 60L/min in adults and 25L/min in children with an oxygen/air blender supplying oxygen at 21-100%.

§ Sputum induction is classified as a high risk AGP as it is performed using an ultrasonic nebuliser. It is the nebuliser that makes it an AGP, not the fact that the procedure induces coughing in the patient.

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