Aerosol-Generating Procedures and Patients with Suspected or Confirmed COVID-19

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Some procedures performed on patients are more likely to generate higher concentrations of infectious respiratory aerosols than coughing, sneezing, talking, or breathing. These aerosol-generating procedures (AGPs) may put health care workers (HCWs) at an increased risk for exposure to SARS-CoV-2 and infection. Limited data are available to evaluate which procedures may generate potentially infectious aerosols and pose a risk of transmission to HCWs. This statement is a summary of the evidence surrounding AGPs and the current Centers for Disease Control and Prevention (CDC) guidance.

Aerosol-generating procedures and COVID-19

- Minnesota Department of Health (MDH) and CDC currently recommend that HCWs wear an N95 respirator or higher-level respirator, eye protection, gown, and gloves when performing an AGP on patients with known or suspected COVID-19.¹
- AGPs should be performed in airborne infection isolation rooms (AIIR), if available.
- Per CDC guidance, the following procedures should be considered AGPs, due to the creation of uncontrolled respiratory secretions:²
  - Open suctioning of airway secretions
  - Sputum induction
  - Cardiopulmonary resuscitation
  - Endotracheal intubation and extubation
  - Noninvasive positive pressure ventilation (NIPPV) (e.g., BiPAP, CPAP)
  - Bronchoscopy
  - Manual ventilation
- There are limited data on whether other procedures may generate infectious aerosols and represent a transmission risk. These may include, but are not limited to:
  - Nebulizer administration
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- High-flow oxygen delivery
- Tracheostomy
- Nasal endoscopy or endoscopic sinus surgery
- Flexible laryngoscopy
- Transsphenoidal surgeries
- Nasogastric or nasojejunal tube placement

Nebulizers and infection transmission risk

- A 2012 review article on aerosol-generating procedures concluded that there was no significant evidence of transmission risk related to nebulizers, utilizing evidence from the SARS outbreak.\(^3\)
- A 2004 study performing polymerase chain reaction (PCR) air sampling around a patient with SARS undergoing nebulizer treatment found no evidence of virus.\(^4\)
- Current UK guidance on infection prevention for COVID-19 does not list nebulizers as a potential transmission risk, due to the fact that the aerosol generated by the device is derived from the medication fluid within the nebulizer chamber and not the patient.\(^5\)
- A recent literature review by the U.S. Veterans Health Administration concluded that while concern exists for the transmission risk of SARS-CoV-2 with nebulizers, the specific evidence for transmission remains inconclusive.\(^6\)
- Based on these data, nebulizer administration likely represents a lower infection risk than other AGPs, but close-range viral aerosol generation remains a possibility.
- Based on this potential risk, MDH recommends the following to minimize risk to HCW:
  - If patient can tolerate, switch to metered-dose inhalers with a dedicated spacer.
  - CDC recommends HCW who enter the room of a patient with suspected or confirmed SARS-CoV-2 infection use a NIOSH-approved N95 or higher-level respirator, gown, gloves, and eye protection.
  - Close patient’s door when providing nebulizer treatment.
  - Upon set-up of nebulizer, have HCWs maintain a safe distance (6 feet or greater), possibly outside the door, if safe to do so.
  - Patients do not need to be transferred to a higher-level of care solely for the purpose of providing nebulizer treatment.
Noninvasive positive-pressure ventilation (NIPPV) and infection transmission risk

- Based on clinical experience from China and the U.S., high-flow nasal cannula (HFNC) are preferred over NIPPV for patients with hypoxemic respiratory failure from COVID-19. This is due to reports of lack of efficacy of NIPPV as a rescue therapy for those with respiratory failure and a higher likelihood in general of progression to intubation.

- If HFNC are not available, consider a short trial of NIPPV with frequent patient reassessment, but providers should not delay intubation if the patient is not improving.

- When patients are on NIPPV, HCWs should take the following precautions:
  - CDC recommends HCW who enter the room of a patient with suspected or confirmed SARS-CoV-2 infection use a NIOSH-approved N95 or higher-level respirator, gown, gloves, and eye protection.
  - Close a patient’s door when providing NIPPV treatment.
  - Upon set-up of NIPPV, have HCW maintain a safe distance (6 feet or greater), possibly outside the door, depending on patient’s clinical stability and need for reassessment.

Cardiopulmonary resuscitation (CPR) in patients with known or suspected COVID-19

- The administration of CPR involves performing numerous high-risk aerosol-generating procedures, including chest compressions, positive pressure ventilation, and establishment of an advanced airway.

- Clinicians should initiate discussions about advance care directives and goals of care with all patients (or their authorized decision-maker) on arrival to an acute or long-term care facility or with any significant change in clinical status such as an increase in level of care.

- When providing CPR to patients with COVID-19, clinicians should follow guidance from the American Heart Association (AHA) and consider the following principles:
  - Reduce provider exposure to COVID-19 and other hazards to staff:
    - All HCWs involved in providing CPR should wear all appropriate PPE as described above for AGPs (N95 or higher-level respirator, eye protection, gown, and gloves).
    - Where possible, CPR should be performed in an AIIR with the door closed.
    - Limit personnel in the room to only those essential for patient care.
  - Where possible, prioritize oxygenation and ventilation strategies with lower aerosolization risk:
    - Utilize a closed-circuit ventilation strategy as described in guidance referenced above from AHA to decrease the risk of particle aerosolization.
▪ Attach a HEPA (high efficiency particle air) filter, if available, to any manual or mechanical ventilation device in the path of exhaled gas.

▪ A cuffed endotracheal tube is preferable if intubation is necessary.

▪ Once on a closed circuit, minimize disconnections to reduce aerosolization.

▪ Minimize the likelihood of failed intubation attempts by assigning the provider with the best chance of first-pass success to intubate, and pause chest compressions during intubation attempts.

▪ Consider video laryngoscopy, if available, to reduce intubator exposure.

▪ Consider the appropriateness of starting and continuing resuscitation:

  ▪ The mortality for critically ill COVID-19 patients is high and rises with increasing age and co-morbidities.

  ▪ Palliative care consultation should be offered where available to assist with determining an appropriate care plan.

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**Dental health care settings**

▪ A comprehensive list of AGPs for dental health care settings does not exist due to a lack of data on which procedures may generate potentially infectious aerosols and their potential for infectivity.

▪ Commonly used dental equipment known to create aerosols and airborne contamination include:
  - Ultrasonic scaler
  - High-speed dental handpiece
  - Air/water syringe
  - Air polishing
  - Air abrasion

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**Other procedures**

▪ Due to limited data and lack of expert consensus, it is not possible to develop a definitive and comprehensive list of procedures that should be considered aerosol-generating for the purposes of PPE recommendations.  

▪ Research on this issue is ongoing, but in the absence of data, some level of uncertainty is unavoidable.

▪ When PPE supplies are short, facilities should work with their clinicians and infection preventionists to identify which procedures may be safely postponed so that N95 or higher-level respirators may be prioritized for those AGPs as defined by CDC.

▪ Providers are strongly encouraged to monitor MDH communications, CDC, and other guidance for additional updates on this issue.
References


