

CANADIAN ASSOCIATION OF EMERGENCY PHYSICIANS

COVID-19

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Recommendations for PPE in the Emergency Department During COVID-19

This document outlines current information on AGMPs in the context of COVID 19, and makes recommendations on Emergency Department PPE, with a focus on cardiopulmonary resuscitation. It is recognized that the science is limited, changing rapidly and as further information becomes available it should be incorporated into existing guidelines and caregivers' decision strategies.

Definitions

AGMP; Aerosol Generating Medical Procedure

EMS: Emergency Medical Services

LMA; Laryngeal Mask Airway

N95; A mask that, if properly fitted, blocks at least 95 percent of very small (0.3 micron) test particles.

PPE; Personal Protective Equipment

RCT: Randomized controlled trial

ROSC; Return of Spontaneous Circulation

VSA: Vital signs absent

Introduction

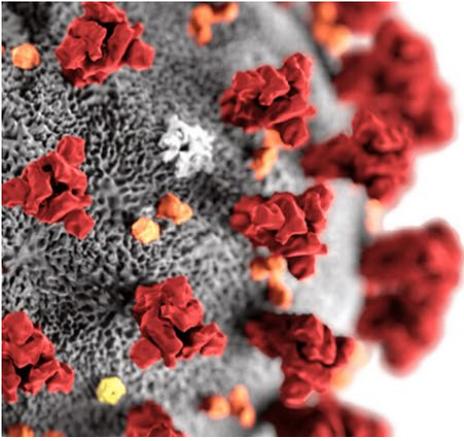
A major factor affecting the transmission of viral particles is their size. There is general consensus that Coronaviruses, in their natural droplet state, are typically not detected further than 2 m away from the patient. It is important to recognize that lack of detection does not mean absence, but the likelihood of transmission by droplet beyond this range is significantly lower.

It is known that some procedures can change the transmissibility of viral particles from droplet to airborne. This process of aerosolization causes an infectious particle, that normally would be transmitted by droplets alone, to spread through the air in particles small enough to persist suspended for a prolonged period of time and over distances larger than 2 meters from the patient. The persistence and distribution of these particles is a product of their size (less than 5 μm) and the ambient environment, particularly airflow.

All potential COVID patients require some level of PPE. An aerosolized smaller particle poses a higher transmissibility risk and, as such, requires a higher level of PPE than usual droplet precaution, including a gown that is certified for airborne precautions and an N95 mask or better.

Because of the high risk of working in an environment with possible airborne pathogens, extra care must be taken in donning and, particularly, doffing PPE, leading to a possible delay in providing care to the patient. It is well established that in some clinical scenarios a delay to intervention can lead to an increase in mortality. This delay needs to be balanced against caregiver safety.

There is a significant research gap regarding the epidemiology of respiratory transmission from patients to health-care workers during aerosol-generating medical procedures.¹ The basis for determining which AGMPs pose infection risk is a



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mix of basic science, small current reviews, older studies and expert opinion. In the current pandemic context, it is not safe or reasonable to wait for a large well-organized study to provide more certainty with respect to AGMP risk and PPE requirements.

The risk of aerosolized viral particles and caregiver infection is a continuum from low to high, with some situations in which the risk is intermediate, or unclear. That said, there are some Emergency Department procedures that clearly are AGMPs and others that, to the best of current knowledge, are not.

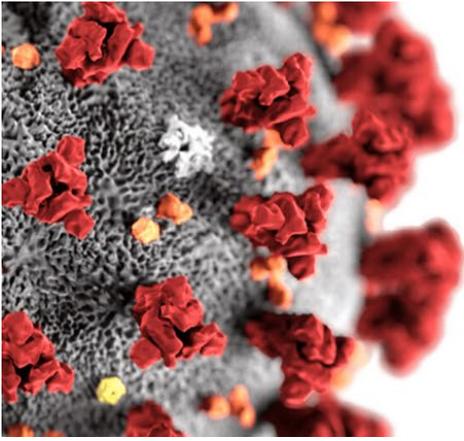
Complicating the decision of risk, every potential AGMP exists within a community and clinical scenario with a varying a-priori likelihood of COVID, differing need for rapid intervention and differing likelihood of the intervention having a significant clinical impact. For example, current data suggests a very low likelihood of survival with a good neurologic outcome for COVID-19 patients who arrest in the hospitalⁱⁱ. Similarly, for patients arriving VSA from the field who have not had a ROSC after appropriate resuscitation efforts, the likelihood of survival is low regardless of their COVID status. In these situations, where the likelihood of futility is significantly higher, it is less reasonable for health care workers to expose themselves to infection without taking the time to don higher level PPE. In contradistinction, patients with witnessed VF arrest are known to benefit by immediate intervention.

In the context of ED care known AGMPs requiring higher level PPE include:^{iii iv v}

1. Oxygen therapy above 5 liters per minute by nasal prongs or 15 liters by Venturi masks and non-rebreather masks
2. Noninvasive ventilation/ CPAP
3. Provision of nebulized medication
4. Intubation, extubation and related procedures-- for example, manual ventilation and open suctioning of the respiratory tract.
5. Tracheotomy or tracheostomy (insertion, open suctioning or removal).
6. Bronchoscopy
7. Procedures that induce coughing or expectorated sputum^{vi}

Presumed non AGMPs requiring only droplet precautions are:^{vii}

1. Collection of nasopharyngeal or throat swab
2. Chest tube removal or insertion (unless in setting of emergent insertion for ruptured lung/pneumothorax)
3. Oral hygiene
4. Any procedure done with regional anaesthesia
5. Chest physiotherapy (outside of breath stacking)
6. Oxygen delivered below 6 liters per minute by nasal prongs or 15 liters by Venturi and non-rebreather masks
7. Intranasal medication administration, such as naloxone



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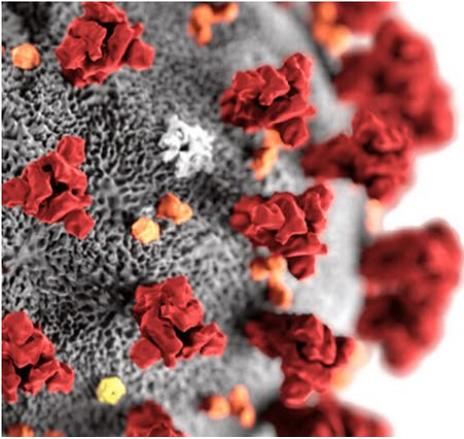
Procedures where there is limited evidence as to the aerosol risk and the choice of PPE is less clear or not known include:

1. Ventilator circuit disconnect
2. Chest compressions in a non-intubated patient^{viii ix}
3. Oral suctioning
4. Defibrillation of a non-intubated patient^{iv}
5. Thoracostomy and other trauma management procedures
6. Nasogastric tube insertion in a non-intubated patient

Of these procedures, the most controversial is chest compressions in the non-intubated patient. Some agencies have categorically stated that this is an AGMP^x while others, equally categorically, have stated that it is not^{xi}. Some of this difference stems from different COVID prevalence in varying communities and part reflects the absence of robust evidence. We believe the most reasonable current approach is to assume the existence of airborne viral particles and don appropriate PPE wherever possible. The rationale for this recommendation is further articulated below.

Positions and Recommendations

1. Health care workers take upon themselves the risks of illness and injury inherent in the provision of patient care. These risks are taken with the understanding that they are, to the greatest extent possible, well defined, quantifiable, and can be mitigated by appropriate countermeasures.
2. COVID-19 is a novel pathogen with high infectivity and significant risk of serious illness or death, where, in certain clinical scenarios, the risk of caregiver infection and level of PPE required is not clear.
3. Emergency Physicians will always provide care to their patients but must also protect themselves and their teams, using the best knowledge and equipment available, in order to be available to provide care to others.
4. PPE is of paramount importance in order to secure the health and trust of the emergency workforce. No health care worker should be asked to provide care without appropriate PPE.
5. Donning and doffing of PPE are procedures that may put health care workers at risk of inadequate protection or self-contamination. Any PPE used by caregivers must be accompanied by appropriate training and education.
6. Expert-based, standardized recommendations for PPE must be developed and disseminated across the country. Such recommendations must be based on an abundance of caution rather than availability of supplies.
7. Where there is no current evidence regarding appropriate PPE, or evidence is limited, the principle of caution should be exercised. The choice of PPE in these situations should be made by the caregiver taking into consideration the clinical scenario and the risks and benefits of intervention.
8. During this pandemic, CPR in the emergency department should be considered as an AGMP requiring appropriate levels of PPE.
9. Recognizing the finite supply of PPE available, limited supplies should not be used in likely-futile resuscitative efforts. This principle should apply to all resuscitative equipment.



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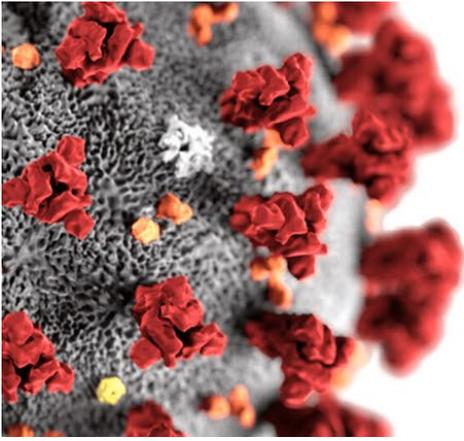
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10. Within the context of the above statements and, recognizing the limited supply of PPE, care should be taken not to use higher levels of protection in low risk clinical scenarios without regard to the impact this will have on the overall PPE supply.
11. All effort should be made to develop sufficient Canadian manufacturing capability to meet or exceed the national PPE requirements in times of high need.
12. All efforts should be made to support COVID research and develop a national registry related to COVID patients in the ED.

Specific Clinical Scenarios

1. At a minimum, contact and droplet precautions must be used by health care workers for all interactions with suspected, presumed or confirmed COVID-19 patients.
2. A “Protected Code Blue” or similar process needs to be in place for all intubations, including precautions to avoid multiple intubation attempts. Physicians who are skilled and experienced in airway management, and utilization of simulation or other modes of staff preparation are recommended. Educational resources can be found on the [CAEP website](#).
3. Prior to intubation there should be no ventilation with BVM unless apneic and a second rescuer can assure a constant 2-handed seal, in which case ventilation can be considered.
4. Once patients are securely intubated with a closed ventilator circuit and a viral filter droplet precautions are reasonable.
5. An LMA in-situ is a temporizing measure that decreases the risk of aerosolization but less so than intubation.
6. For emergency defibrillation of a patient who is known or suspected to be COVID positive: if caregivers are only wearing droplet level PPE, the patient’s mouth and nose should be covered by a mask or equivalent. Furthermore, the use of adhesive pads is recommended, such that that defibrillation can be delivered without direct contact and minimal proximity between the defibrillator operator and patient.
7. In providing compression-only CPR to a patient who is known or suspected to be COVID +ve, the risk level is controversial. If caregivers choose to provide CPR prior to donning higher level PPE they should ensure that the patient’s mouth and nose are adequately covered by a mask or equivalent until such time as all staff in the room are wearing airborne precautions.
8. In-hospital, non-intubated cardiac arrest care should ideally be conducted in a negative pressure room. Failing this, room doors should be shut prior to any intervention. Access to the room from that point would be through an airlock if this is possible.
9. In an arrest with a non-shockable rhythm, it is reasonable to consider no intervention.
10. Base hospital physicians should consider field pronouncement and not transporting to hospital of patients who remain VSA after appropriate resuscitation efforts by EMS.
11. If transported to hospital without ROSC, the patient should be assessed in the ambulance bay by a physician wearing appropriate PPE, with consideration of pronouncement in the ambulance if appropriate, rather than bringing the patient into the ED.



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- ⁱ World Health Organization. Infection prevention and control of epidemic- and pandemic-prone acute respiratory infections in healthcare. Geneva: WHO; 2014. http://apps.who.int/iris/bitstream/10665/112656/1/9789241507134_eng.pdf?ua1/41
- ⁱⁱ In-hospital cardiac arrest outcomes among patients with COVID-19 pneumonia in Wuhan, China, Fei Shao Shuang Xu Xuedi Ma Zhouming Xu Jiayou Lyu Michael Ng Hao Cui Changxiao Yu Qing Zhang Peng Sun Ziren Tang <https://doi.org/doi:10.1016/j.resuscitation.2020.04.005>
- ⁱⁱⁱ Airborne transmission and precautions: facts and myths W.H. Seto* *Journal of Hospital Infection* 89 (2015) 225e228
- ^{iv} Ferioli M, Cisternino C, Leo V, et al. Protecting healthcare workers from SARS-CoV-2 infection: practical indications. *Eur Respir Rev* 2020; 29: 200068 [https://doi.org/10.1183/16000617.0068-2020].
- ^v Recommended PPE for healthcare workers by secondary care inpatient clinical setting, NHS and independent sector - Public health England/National Health Service <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/covid-19-personal-protective-equipment-ppe#ppe-guidance-by-healthcare-context> accessed 20-4-2020
- ^{vi} Zayas, G., Chiang, M.C., Wong, E. et al. Cough aerosol in healthy participants: fundamental knowledge to optimize droplet-spread infectious respiratory disease management. *BMC Pulm Med* 12, 11 (2012). <https://doi.org/10.1186/1471-2466-12-11>
- ^{vii} Public Health Ontario focus on COVID-19: Aerosol Generation from Coughs and Sneezes April 10, 2020
- ^{viii} COVID-19 infection risk to rescuers from patients in cardiac arrest. Consensus on Science with Treatment Recommendations [Internet] Brussels, Belgium: International Liaison Committee on Resuscitation (ILCOR), 2020 March 30. Available from: <http://ilcor.org>
- ^{ix} Edelson et al.: Interim Guidance for Life Support for COVID-19 10.1161/CIRCULATIONAHA.120.047463
- ^x Ontario MOHLTC Joint Statement: COVID-19 and Health and Safety Measures, including Personal Protective Equipment http://www.health.gov.on.ca/en/pro/programs/publichealth/coronavirus/2019_covid_joint_statement.aspx accessed 20-4-20
- ^{xi} Recommended PPE for healthcare workers by secondary care inpatient clinical setting, NHS and independent sector - Public health England/National Health Service <https://www.gov.uk/government/publications/wuhan-novel-coronavirus-infection-prevention-and-control/covid-19-personal-protective-equipment-ppe#ppe-guidance-by-healthcare-context> accessed 20-4-2020