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FOCUS ON

(ARCHIVED) COVID-19: Aerosol Generation from Coughs and Sneezes

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Background

This document complements Public Health Ontario's (PHO) previous list of aerosol generating medical procedures (AGMPs),[1] and provides further clarification of what constitutes an AGMP and how it differs from an airborne disease. It should be noted that a cough or sneeze is not considered an AGMP and thus procedures that may cause a cough or sneeze would not be classified as AGMPs.

The safety of health care workers and first responders is of utmost importance. This technical brief provides the rationale as to why a cough, sneeze or absolute presence of aerosols does not qualify a procedure as an AGMP.

What is an Airborne Infection?

An airborne infection is a pathogen that via small particles can disseminate over larger distances and can remain suspended in the air for a prolonged period of time.[2,3] An example of this is measles. The use of a respirator with high filtering capacity is recommended because of the size, concentration and persistence of the pathogen in the air.

In contrast, most other viral infections that are excreted in respiratory secretions show much less rapid distribution and transmission. These viruses have been demonstrated to be controlled with hand hygiene and use of Contact and Droplet Precautions.[2] Thus, routine protection is through a surgical mask and eye protection along with gown, gloves and meticulous hand hygiene. Multiple factors contribute to transmission of coronaviruses including room temperature, humidity, airflow, droplet size, and type of aerosol generation; studies sampling patient rooms have predominantly demonstrated that aerosols are not detected at distances beyond 2 metres from the patient, and where detection occurs are PCR-positive but not viable, or found in extremely low counts that have not been attributed to disease transmission.[3-12] However, coronavirus has been found on surfaces and may remain in high numbers for approximately 3 hours and very small numbers of virus remain at up to 72 hours on plastic surfaces if not cleaned.[13-15]

What is an Aerosol Generating Medical Procedure?

The meaning of 'aerosol generating' medical procedures has been subject to misinterpretation. The medical procedures that are listed as AGMPs are supported by epidemiological data that indicate these procedures may significantly increase risk of infection to health care workers within close range of the procedure and thus N95 respirators are required as a minimum level of respiratory protective equipment (as well as eye protection). These procedures artificially manipulate the airway and secretions therein. If an infection is present in the airway the procedure would agitate and dramatically increase the aerosols generated. The operator (such as during intubation) is in very close proximity to the airway and especially if the procedure is complicated or lengthy.

In the context of coronaviruses, and in particular COVID-19, the epidemiology of the infection has been demonstrated **not** to be airborne.[16] Routine care of patients who cough or sneeze are sufficiently managed through Routine Practice and Droplet Precautions as indicated by clinical data comparing use of N95 respirators and surgical masks for the care of patients with acute respiratory infections.[2,17-20]

Aerosol Generation from Coughs and Sneezes

Coughs, sneezes, and even breathing generate aerosols.[21,22] These activities can result in spread of aerosols (small liquid droplets) in the air over various distances, and in some cases distances greater than two metres. Depending on the room's airflow, small droplets in rooms with no airflow can remain suspended for periods of seconds to minutes, but with proper airflow (engineering controls) these droplets are displaced and diffused even faster.[5,6,10,12] As discussed above, many factors contribute to the lack of airborne spread of SARS-CoV-2.

The infectious dose required to become infected with COVID-19 in unknown. Because of the potential to be exposed to droplets, surgical masks and eye protection is essential if within two metres of the patient and may be advisable if in close proximity to a coughing or sneezing patient.

Evidence for Respiratory Protection against Coronavirus

While laboratory studies indicate N95 respirators offer better protection for total inward leakage under experimental conditions, clinical data of past coronavirus outbreaks and other related acute respiratory infections indicates that these microorganisms have been managed in routine care with no evidence of a statistically significant difference using either N95 respirators or surgical masks.[17,19]

Further, current epidemiological reports have demonstrated lack of transmission from patient to health care workers during routine care while using surgical masks, eye protection, and proper hand hygiene.[18,20] One small cohort study also identified a lack of transmission following close proximity care of patients during AGMPs either wearing surgical masks or N95 respirators; however despite this real world study we would recommend the precautionary principle be applied and continue to recommend N95 respirators plus eye protection for AGMPs.[18]

Current List of Procedures that are not AGMPs

According to the Provincial Infectious Diseases Advisory Committee (PIDAC) the following medical procedures have been reviewed and deemed not to be classified as AGMP, based on the evidence outlined above:

- Collection of nasopharyngeal or throat swab
- Ventilator circuit disconnect
- Chest compressions
- Chest tube removal or insertion (unless in setting of emergent insertion for ruptured lung/pneumothorax)
- Coughing, expectorated sputum
- Oral suctioning
- Oral hygiene
- Gastroscopy or colonoscopy
- Laparoscopy (gastrointestinal/pelvic)
- Endoscopic retrograde cholangiopancreatography
- Cardiac stress tests
- Caesarian section or vaginal delivery of baby done with regional anaesthesia
- Any procedure done with regional anaesthesia
- Electroconvulsive therapy
- Transesophageal echocardiogram
- Nasogastric/nasojejunal tube/gastrostomy/gastrojejunostomy/jejunostomy tube insertion
- Bronchial artery embolization
- Chest physiotherapy (outside of breath stacking)
- Oxygen delivered at less than or equal to 6 liters per minute by nasal prongs and less than or equal to 15 liters per minute by Venturi masks and non-rebreather masks
- Intranasal medication administration such as naloxone

Conclusions

At this time evidence indicates that patients with COVID-19 who cough and sneeze can be cared for while wearing a surgical mask and eye protection, and that procedures that may result in patient coughing are not classified as aerosol generating medical procedures

PHO will continue to monitor evidence for various medical procedures and update the AGMP list as new evidence arises.

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