Guidance for Health Care Workers Performing
Aerosol Generating Medical Procedures during the COVID-19 Pandemic
Endorsed by the CSO-HNS Executive Committee March 26, 2020

EXECUTIVE SUMMARY:

- These recommendations should serve as guidance and need to be interpreted based on local factors: prevalence of COVID-19 in the community; availability and timeliness of COVID-19 testing; accuracy of COVID-19 test results; availability of PPE including N95 (or N99) masks, negative pressure rooms and PAPRs. It will be important for the health care provider to work closely with their Infection Prevention and Control experts to determine what is most appropriate in their situation.

- Health Care Workers (HCW) seeing patients for routine assessment should wear a surgical mask and personal protective equipment (PPE) including eye protection for all asymptomatic patients when within 6 feet of contact with the patient (Level 1 PPE).

- Ideally, asymptomatic patients undergoing any Aerosol Generating Medical Procedure (AGMP) should be screened for COVID-19 pre-procedure. Notably endotracheal intubation is considered an AGMP so all patients undergoing any procedure under general anesthesia should be screened.

- HCW performing any AGMP should wear an N95 mask (BCCDC recommendation) in addition to PPE including eye protection preferably that seals to the face, gloves and a gown, even if the patient tests negative for COVID-19 (Level 2 PPE).

- Nasopharyngoscopy, an AGMP, in an asymptomatic patient is in some ways a unique situation. It is probably prudent to screen these patients for COVID-19 particularly if their symptoms for which they are being scoped could be consistent with COVID-19 infection. HCW should wear an N95 mask, eye protection preferably that seals to the face, gloves and gown (Level 2 PPE).

- Any patient who is symptomatic or who is positive for COVID-19 who is having *any AGMP procedure* performed should have the procedure performed in a negative pressure room while following standard operating procedures for their institution (Level 3 PPE). This will typically include two layers of protective equipment: a first layer of gloves, a fluid repellent surgical gown, head cover including covering the neck, and N95 mask; followed by a second layer of all three with the second mask being a regular surgical mask. Eye protection should seal to the face or less ideally using a clear plastic face shield attached to the second mask. Appropriate donning and doffing procedures must be followed.

Summary Table of Recommendations for Minimum Personal Protective Equipment for Health Care Workers during COVID-19 Pandemic:

FOR NON-AGMP PROCEDURES:			
	Level 1 PPE	**Level 2 PPE**	**Level 3 PPE**
Asymptomatic, COVID-19 negative or unknown	**X**		
Symptomatic, COVID-19 negative		**X**	
Symptomatic, COVID-19 positive or unknown		**X**	
FOR AGMP PROCEDURES:			
	Level 1 PPE	**Level 2 PPE**	**Level 3 PPE**
Asymptomatic, COVID-19 negative or unknown		**X**	
Symptomatic, COVID-19 negative		**X**	
Symptomatic, COVID-19 positive or unknown			**X**

Level 1 PPE: Surgical mask + gown + gloves + eye protection (face shield or goggles)

Level 2 PPE: N95 respirator + fluid repellent gown + head cover including neck protection + double gloves + eye protection (face shield or goggles)

Level 3 PPE: Negative pressure room with minimum personnel + powered air-purifying respirator (PAPR) (if available) OR N95 (or N99) mask with second surgical mask and attached face shield or goggles + double fluid repellent gown + head cover including neck protection + double gloves.

Appropriate donning and doffing protocols **<u>are critical</u>** and must be followed when using PPE. An appropriately fit-tested N95 respirator is equally important.

SITUATION:
Procedures performed on the upper airway in patients infected with COVID-19 carry the greatest risk of spreading infection amongst health care workers. For this reason, specific guidelines are required to protect health care workers from spread of COVID-19 during procedures on the upper airway.

BACKGROUND:
COVID-19 has a predilection for infecting the mucosa of the upper airway. Therefore, the viral load is probably greatest in the mucosa of the nasal cavities and nasopharynx, oropharynx and oral cavity and (presumably) the Eustachian tube and middle ear/mastoid mucosa.

An estimated 30% of infected people are asymptomatic, and in countries affected early by COVID-19 by the end of their pandemic an estimated 30-75% of the population have evidence of having been infected.

Procedures on the upper airway are at high risk of generating aerosolized particles. For instance, nasopharyngoscopy, the majority of which are performed by ENT Surgeons, using a flexible endoscope to examine the nasal cavities and nasopharynx and by extension often the hypopharynx and larynx, is the mainstay for ENT assessment of the upper airway.

Surgical procedures known to be AGMP include:

- Sinonasal surgery or procedures: often surgery requires use of suction microdebriders that probably create aerosolized particles; whether the use of suction during the procedures or applying a nasal gel barrier minimizes development of aerosolized particles is unknown. Regardless, this is surgery in the area of the patient with the highest viral load. Control of nosebleeds in the Emergency Department or Outpatient Clinic is usually associated with sneezing and coughing by the patient with the health care provider in very close proximity;
- Mastoid surgery: drilling of the mastoid bone requires irrigation that cannot be contained nor would the use of suction minimize the spread of particles. Other viruses similar to COVID-19 have been documented in the middle ear mucosa during active infections;
- Head and neck mucosal cancer surgery: as for sinonasal surgery, these are aerosolizing procedures (probably to a lesser degree than sinonasal or mastoid surgery) but on tissue with (probably) a high viral load. Non-mucosal cancer surgery (salivary gland, thyroid) does not carry the same risk;
- The act of endotracheal intubation in and by itself is an AGMP, so any guidelines created for ENT procedures need to be in agreement with guidelines adopted by Anesthesiology colleagues;

Experience from China, Italy and Iran has suggested these may be high risk procedures when performed in patients who are COVID-19 positive, but it is anecdotal, and the accuracy of these reports has been contested. For instance, there was a report that during a transnasal pituitary surgery performed in China, all 14 personnel in the operating room were infected. However, looking more closely, this case was not recognized as infected pre-operatively as it was very early

in the COVID outbreak in Wuhan. The patient infected people through his travels in the hospital during his peri-operative stay. It sounds like none of the OR staff were actually infected, including the neurosurgeon. The patient was transferred to four different wards during his stay, and infected 10 neurosurgical nurses and 4 medical staff in on three different wards - all without PPE in any of those places. Anecdotal reports from other countries also suggest ENT Surgeons are at higher risk of contracting the virus if not using appropriate Personal Protective Equipment (PPE) and they appear to be disproportionately affected in most countries with COVID-19 experience. However, we do not have systematic data on these infected personnel. The available information is all anecdotal and conceivably the risk to health care personnel could be over-reported, or conceivably it could be under-reported. We just don't know.

The above notwithstanding, the Canadian Society of Otolaryngology-Head and Neck Surgery has stated (March 18, 2020), "Surgical procedures should be performed only after ascertaining the COVID-19 status and if positive performed only with PAPR [Powered Air-Purifying Respirator]." The most recent communique from the American Academy of Otolaryngology-Head and Neck Surgery (March 23, 2020) stated, "...when a detailed examination or surgical procedure is necessary for urgent or emergent care and the COVID-19 status of the patient cannot be confirmed, then the patient should be handled as if they are COVID-19 positive. This consideration should apply regardless of whether in an office, hospital, or operating room setting." Finally, the BC Centre for Disease Control recently updated their recommendations (http://www.bccdc.ca/health-professionals/clinical-resources/covid-19-care/infection-control/personal-protective-equipment) and state, "Airborne precautions including N95 respirators with gown, gloves, surgical/procedural mask and eye protection (face shield or goggles) should be used during aerosol-generating medical procedures". Nasal scoping is specifically listed as an AGMP on their website, as are intubation and extubation procedures.

ENT Surgeons in Canada (and around the world) are acutely aware of the risks to them and to the other health care workers around them when performing these procedures. As a result, all elective and non-time sensitive procedures have been deferred. Health Care Workers (HCW) seeing patients for routine assessment wear a surgical mask and personal protective equipment (PPE) including eye protection for all asymptomatic patients when within 6 feet of contact with the patient. However, ENT Surgeons are also acutely aware of the need for health care to be provided to patients when it is urgently or emergently needed; not all procedures can be deferred for even a few weeks.

Guidelines have been developed by many different national and international organizations to guide ENT Surgeons how to safely perform the surgical procedures required of them to protect themselves and others. These guidelines are mostly based on anecdotal experience, sometimes on evidence if it existed and are sometimes contradictory. These guidelines may also be based on ideal recommendations assuming unlimited resources are available to the health care worker, which may not be applicable should the resources not exist in the local community or be in limited supply. For instance, implementing the PPE protocol used in Wuhan, China to control the spread of the virus would probably rapidly deplete PPE resources available to health care workers

in Canada. These recommendations also have frequently changed over time as new information emerges, time often measured in hours or days.

ASSESSMENT:
Consistent recommendations are needed to protect health care workers who are managing patients undergoing AGMP. A patient who is known to be infected with COVID-19 needs to be managed very differently than a patient who is asymptomatic or who has tested negative to COVID-19 (but conceivably may still be infected).

Any recommendations need to be interpreted based on local factors: prevalence of COVID-19 in the community; availability and timeliness of COVID-19 testing; accuracy of COVID-19 test results; availability of PPE including N95 (or N99) masks, negative pressure rooms and PAPRs. It will be important for the health care provider to work closely with their Infection Prevention and Control experts to determine what is most appropriate in their situation.

These recommendations need to consider, at a minimum, the following different factors:

- Patient-related factors:
    - Asymptomatic, no travel history, no exposure to a patient known to be infected with COVID-19, i.e. no indication they could potentially be infected with COVID-19;
    - Symptomatic but not yet tested, i.e. real possibility they are infected with COVID-19;
    - Symptomatic and positive test result for COVID-19, i.e. definitely infected with COVID-19;
- Procedure-related factors:
    - AGMP in an outpatient setting (i.e. nasopharyngoscopy, control of epistaxis);
    - AGMP in a surgical setting in a controlled environment (urgent sinus surgery, mastoid surgery or head and neck mucosal cancer surgery that are deemed “life or limb threatening” and cannot be deferred; tracheotomy).
- Health-care worker protection factors: Use of which may be determined by local availability:
    - Ability to screen patient for COVID-19;
    - Type of mask;
    - Gloves;
    - Gown (water impermeable);
    - Powered air-purifying respirator (PAPR)

RECOMMENDATIONS:
After review of available information and guidelines from other organizations as of the date of writing, the following are recommendations for protection of health care workers performing AGMP during a pandemic with COVID-19. First and foremost, the health care worker really needs to ascertain the AGMP needs to be done. If it can be delayed, or another diagnostic procedure performed instead to achieve the desired results, then this should be done.

- ***For asymptomatic patients with no COVID-19 risk factors:***
  All patients undergoing an AGMP should be screened for COVID-19. Even if they have no symptoms of or risk factors for COVID-19, patients should undergo screening for COVID-19 within a few days of the procedure, after which time they are self-quarantined until the procedure is performed.

  A single negative test does not mean the patient is not infected. Some recommend double testing, two tests separated by 24 hours pre-operatively, but currently many centres cannot obtain one test and therefore two tests may not be practical in our healthcare system at this time. Two tests 24 hours apart has been recommended given a quoted sensitivity of testing approximating 70%. For instance, if a test has a sensitivity of 0.70 (and assuming a specificity of 1.0 or 100%) and pre-test COVID-19 infection was present in 10% of the population, then the likelihood the patient was infected with COVID-19 after a negative test was 3%. If COVID-19 becomes more prevalent in the community, this may need to be revisited.

  This recommendation for screening presumes the prevalence of COVID-19 in the community served is significant. How to define "significant" is open to interpretation. Certainly, given the current number of *documented* cases in most major cities in Canada, the prevalence in these communities is significant. Outside of a major city, this would need to be determined on an individual basis.

  This recommendation would apply to *all* surgical procedures under general anesthesia given that the act of endotracheal intubation is an AGMP. This also includes patients who need assessment of their airway by nasopharyngoscopy and similar AGMP procedures in the outpatient or emergency setting (control of epistaxis).

  If the patient is test negative, standard precautions should still be followed for all AGMP, including use of an N95 (or N99 if available) mask, head cover including neck protection, eye protection preferably that seal to the face, double gloves and a water impermeable gown (Level 2 PPE).

  If the patient cannot be tested either due to the urgency/emergency of the required medical procedure or due to the timeliness of available COVID-19 testing, then all patients undergoing an AGMP procedure should be managed *at a minimum* using Level 2 PPE, including use of an N95 (or N99 if available) mask, head cover including neck protection, eye protection preferably that seal to the face, double gloves and a water impermeable gown. If any of these are not available, the health care worker should use the most protective gear that is available to them. These patients *may warrant* Level 3 PPE usage should local resources allow it.

  Appropriate donning and doffing protocols must be followed when using PPE.

  Additional preventative measures should also be followed: the number of people exposed should be limited to as few as possible; standard protocols should be followed in addition to PPE, including for instance immediate cleansing of instruments, flushing of any lumens of

instruments to decrease the bioburden, immediate soaking in viricidal solutions (even soap and water), cleansing of the room after assessment, etc.

- ***For symptomatic patients:***
  All procedures should be delayed, if possible, until testing for COVID-19 is performed and/or the patient's symptoms have resolved. If another diagnostic procedure could be performed instead to achieve the desired results, then this should be done instead.

  If the procedure is emergent and cannot be delayed awaiting COVID-19 test results, then full protective protocols should be followed (Level 3 PPE).

  If the AGMP must be performed urgently but can be delayed, the approach to the patient is dependent on the COVID-19 testing results:
  - If testing is negative, and the procedure is truly deemed to be urgent and cannot be delayed until resolution of symptoms, then standard precautions should be followed (Level 2 PPE), including use of an N95 (or N99 if available) mask, head cover including neck protection, eye protection preferably that seal to the face, double gloves and a water impermeable gown. Appropriate donning and doffing protocols must be followed. If any of these PPE are not available, the health care worker should use the most protective gear that is available to them.
  - If testing is consistent with active infection, then full protective protocols should be followed (Level 3 PPE).

  If any of these PPE are not available, the health care worker should use the most protective gear that is available to them. Appropriate donning and doffing protocols must be followed.

- ***For patients known to be infected with COVID-19***
  These recommendations apply to all AGMP procedures performed, and the healthcare worker should follow local hospital protocols closely. In short, if the procedure is urgent/emergent and cannot be delayed until the infection resolves, then procedures should be Level 3 PPE:
  1. Carried out in a negative-pressure room;
  2. Performed with only the minimal number of staff should be involved;
  3. Many/most guidelines recommend powered air-purifying respirator (PAPR) during these procedures. However, these are not widely available nor practical for some procedures (when using surgical loupes or an operating microscope);
  4. Personnel, at a minimum, should wear two layers of protective equipment, a first layer of gloves, fluid repellent surgical gown, head cover including covering the neck, goggles and N95 mask, followed by a second layer of all three with the second mask being a regular surgical mask with possibly an attached clear plastic face shield. Appropriate donning and doffing procedures must be followed.
  5. An N99 respirator is usually recommended. Recognizing N99 may not be available in some/most hospitals, a decision will need to be made whether or not to transfer that patient to a hospital that has the proper protective gear recognizing most probably

the next hospital will not be better equipped and transferring patients increases the risk of spread of the COVID-19 virus. An N95 mask with a second surgical mask with protective clear, plastic eye shield would be next most appropriate.

- ***Flexible endoscopy of the upper (and probably lower) airway:***
  Nasopharyngoscopy and flexible bronchoscopy through the nasal cavities are probably an AGMP that in some respects are unique. These are common AGMP performed by HCW, so warrant special consideration. Similarly, endotracheal intubation by an Anesthesiologist is comparable: perhaps lower risk but performed more frequently.

  First and foremost, the health care provider really needs to ascertain the procedure needs to be done. If it can be delayed, or another diagnostic procedure performed instead, then this should be done. For instance, would a CT scan of the neck give enough information to evaluate a laryngeal cancer such that nasolaryngoscopy would not be necessary? Although probably not "standard of care" would this be adequate in the face of a respiratory pandemic?

  In an ideal world, patients undergoing these procedures should be screened for COVID-19 as conceivably the symptoms for which they are being scoped could be consistent with COVID-19 infection; this may not be possible with resources available. At a minimum, Level 2 PPE precautions should be followed, including use of an N95 mask (or N99 if available).

  Also, the HCW should consider what else can be done to limit aerosolizing particles: Cover the patient's mouth with a mask to minimize spread during coughing and sneezing. Do not spray the nose with anesthetic or decongestant, instead use cotton pledgets (these recommendations would also apply to management of a patient with epistaxis).

  Immediately after use of the endoscope, the endoscope should be wiped with an appropriate enzymatic decontaminating solution followed by soap and water (which should be done regardless of COVID-19). Flush lumens of suctions immediately to decrease the bioburden within the suction. Clean the room thoroughly, which is facilitated by having the minimal amount of equipment (and personnel) in the room used for the procedure. Consider having one room to use for procedures and another used for donning PPE. Remember the virus may linger in the air for hours and on surfaces for days afterwards, especially if you are not in a negative pressure room (very few are). If possible, use a third room for removal of PPE and follow proper donning and doffing protocols.

Guidance: PPE for Otolaryngology / ENT Procedures

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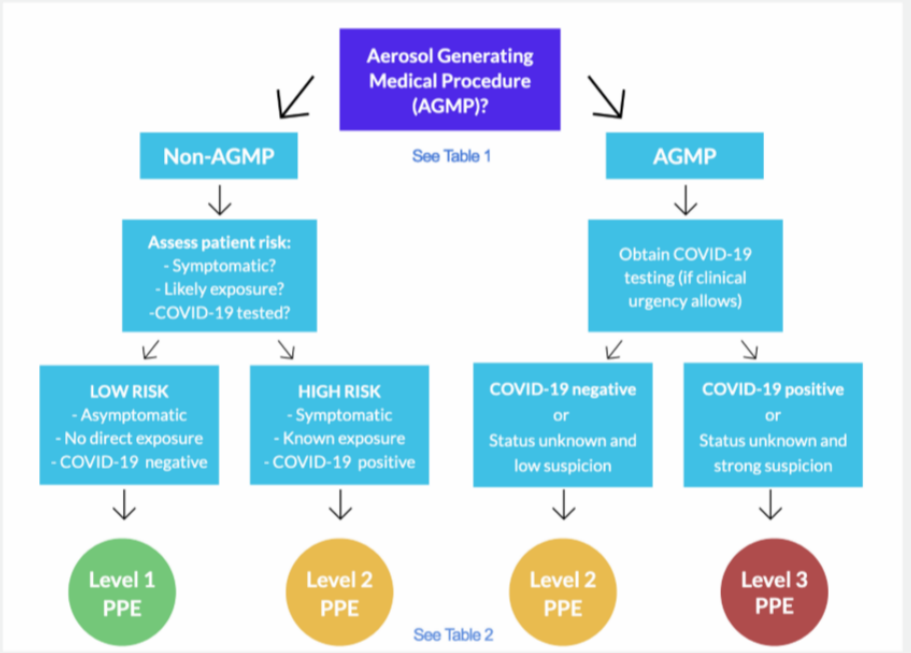

Table 1

Aerosol Generating Medical Procedures (AGMPs) in Otolaryngology / ENT:

- Airway procedures (including laryngo-bronchoscopy)
- Intra-nasal or sinus surgery (including nasendoscopy)
- Head and neck mucosal surgery (including tracheostomy)
- Mastoid surgery

Table 2

Level 1 PPE	Level 2 PPE	Level 3 PPE
- Surgical mask - Isolation gown - Gloves - Eye protection	- N95 respirator - Disposable fluid-repellent gown - Gloves - Eye protection (face shield or goggles) - Consider head cover (including neck) and double gloves	- Negative pressure room - Minimum personnel - PAPR (if available) or - Double disposable fluid-repellent gown - Head cover (including neck) - Double gloves -N99 or N95 mask with second surgical mask and attached face shield or goggles

Based on guidelines and position statements from: BC Centre for Disease Control; CSO-HNS, AAO-HNS, ENT-UK

Disclaimer

The Canadian Society of Otolaryngology - Head & Neck Surgery (CSO-HNS) has developed this information as guidance for its members. This is based on information available at the time of writing (March 26, 2020) and the Society recognizes that the situation is evolving rapidly, so recommendations may change. The guidance included in this document does not replace regular standards of care, nor do they replace the application of clinical judgement to each individual presentation, nor variations due to jurisdiction or facility type.

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