Special Communication

Safety recommendations for evaluation and surgery of the head and neck during the COVID-19 pandemic

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Abstract:

Importance: The rapidly expanding 2019 novel coronavirus pandemic (COVID-19, caused by the SARS-CoV-2 virus) has challenged the medical community to an unprecedented degree. Physicians and healthcare workers are at added risk of exposure and infection during the course of the patient care. Due to the rapid spread of this disease through respiratory droplets, healthcare providers such as otolaryngologists-head & neck surgeons who come in close contact with the upper aerodigestive tract during diagnostic and therapeutic procedures are particularly at risk. Here we present a set of safety recommendations based on our review of literature and communications with physicians with first-hand knowledge of safety procedures during the 2019 COVID-19 pandemic.

Observations: A high number of healthcare providers were infected during the first phase of the pandemic in Wuhan province. Subsequently, by adopting strict safety precautions, other regions were able to achieve high levels of safety for healthcare providers without jeopardizing the care of patients. We reviewed the most common procedures related to the examination and treatment of upper aerodigestive tract diseases. Each category was reviewed based on the potential risk imposed to healthcare workers. Specific recommendations were made, based on the literature, when available, or consensus best practices. Specific safety recommendations were made for performing tracheostomy in COVID-19 patients.

Conclusions and Relevance: Preserving highly skilled healthcare work force is a top priority for any community and healthcare system. Based on the experience of healthcare systems in Asia and Europe, by following strict safety guidelines, the risk of exposure and infection of healthcare providers could be significantly reduced, while providing high levels of care. The

provided recommendations could be used as broad guidance for all healthcare workers who are involved with the care of COVID-19 patients.

The COVID-19 pandemic has put unprecedented challenges on the medical community. Physicians and other health care workers (HCW) who perform and participate in examinations and procedures within the head and neck region and airway are at particularly high risk of exposure and infection from aerosol and droplet contamination. Specific data on the risk of infection in otolaryngologists/head and neck surgeons is not available. However, one of the earliest reports from Wuhan, China, where the novel coronavirus was first identified, found 40 (29%) health care workers among the 138 patients assumed to be infected while in the hospital [1]. During the SARS outbreaks of 2003 in Canada, 51% of the 438 cases were health care workers and 3 died from SARS-related causes [2]. While the figures are worrying, other data suggest through the use of careful hygiene providers can stay safe. A case report of early COVID-19 experience from Singapore revealed that not one among 41 HCW who took care of a patient with severe pneumonia before their diagnosis of COVID-19 became positive themselves or developed symptoms. These providers had been present during intubation and extubation of the patient. They were present for at least 10 minutes at a distance of less than 2 meters from the patient [3], 85% were while wearing a surgical mask, and the remainder were wearing N95 masks.

The preservation of this highly skilled, limited work force should be a top priority of healthcare officials and policy makers. At the time of this writing, no unified, widely agreed upon protocols exist on how to perform a routine exam of the head and neck, office rigid and flexible endoscopy of the nose, sinuses, and larynx, tracheostomy and other common operations. Some health authorities and societies have developed separate guidelines[4].

The current document was prepared in consultation with otolaryngologists, head and neck surgeons and other healthcare providers in the United States, Asia and Europe, applying existing guidance from the infection control specialty to physicians potentially exposed to risk within the head and neck. As the available information evolves, we expect to modify these guidelines. We expect that each health authority or organization will make specific decisions appropriate to their community. These guidelines are developed to give broad guidance to practitioners. As per the United States Centers for Medicare and Medicaid Services, the following factors should be considered when determining whether a planned examination or surgical procedure should proceed: the current and projected COVID-19 cases in the facility and region, supply of PPE, beds, ventilators and staff in the facility and system, health and age of the patients, especially given risks of COVID-19 infection during recovery, and urgency of the procedure [5]. Here we highlight common procedures that should be considered, and provide a framework upon which to base decisions, using the best available evidence. As this is a highly fluid situation, it is likely that these recommendations will change based on emerging evidence, the infection burden, availability of the health care work force, and medical infrastructure.

General Considerations

The general care of otolaryngologic patients

Head and neck examinations are considered high-risk in patients under investigation for, positive or suspicious for COVID-19, therefore we recommend the following guidelines. Depending on the current circumstances of the local setting such as the rate of community spread and case doubling time, routine, non-urgent appointments should be postponed, to limit the chance for infection of the patient or providers during their visit to the facility. This

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may include postponing patients with benign disease (benign salivary or thyroid tumors or patients with hyperparathyroidism), or patients undergoing routine surveillance visits after treatment for head and neck cancer. In all instances, patients should be queried by phone about any new or concerning signs or symptoms that may suggest disease recurrence and/or pending issues, such as severe dysphagia or airway compromise, and current symptoms suggestive of COVID-19. Those thought to be at risk for significant negative outcomes without evaluation should be offered an in-person clinic visit. Those with symptoms suggesting possible COVID-19 disease should be directed to the appropriate self-care or triage mechanism. The use of telephone, video or telemedicine visits should be considered, to maintain relationships with patients and to support assessments that can be made without an in-person physical examination. Only patients who need a thorough head and neck examination should be seen in-person.

The use of Powered Air Purifying Respirators (PAPR) vs N95 masks

In the literature, conflicting practices can be seen about the use of N95 masks and tight fitting goggles or the use of PAPR [6] [7]. PAPR reduces the risk of exposure more than N95 masks, but how much more it reduces the risk depends on the airflow setting. The assigned protection factor (APF) range is 25-1000 for PAPR, and 10 for N95 masks [8]. The most common concern about using them is their effect on the sterile field during surgery, as PAPR's do not filter the discharged air, but there is little data on the infection risk compared to other methods or to combining with the use of a mask. Nearly as important, they are also cumbersome to use. They can limit visibility if they fog up, make using a headlight impossible, and if the hooded type is used, using a stethoscope is not possible. Donning and doffing are opportunities for self-

exposure. However, ill-fitting N95 masks also increase the risk of exposure and carry their own disadvantages. Decisions about which protection to use may depend on the settings, risks, and logistics [9]. Practicing the planned tasks in the use of PAPR if it is to be used is important.

The otolaryngology-head and neck physical exam and associated examination procedures

Head and neck examination that will include the mucus membranes should be performed by maintaining the suggested level of precaution (Table). The exam preferably should be performed in a separate room, away from other patients, and only the necessary personnel should be present. The exam should be performed by the most experienced person present and might be a more focused exam, based on the judgement of the examining physician. Proper doffing and disposal of PPE is of utmost importance.

Rigid and Flexible Endoscopic Exams of the Mucosa of the Head and Neck

Endoscopic exams of the nose, sinuses, oropharynx, hypopharynx and larynx are among the most common head and neck diagnostic procedures and are routinely performed by a wide variety of practitioners and trainees. These procedures are considered Aerosol Generating Procedures (AGP)[10]. Moreover, the nose and nasopharynx have been shown to be reservoirs for high concentrations of the COVID-19 virus[11] and after manipulation, viral particles have been shown to be airborne for 3 hours or more[12]. Therefore, we recommend the same precautions adopted for mucosal surface endoscopic examinations of the head and neck as for other AGPs.

Exams should be limited to cases that have a clear indication and need. Again, the examination should be performed by the most experienced personnel available in an expedient fashion. Routine or lower priority examinations should be deferred during the pandemic. Patients should be placed in private rooms with negative pressure, if available, and the use of PPE should follow the guidance of the Table below.

Specific recommendations additionally include:

1) In awake patients, adequate topical preparation to make the exam more comfortable is important. However, use of sprays should be avoided. Carefully placed pledgets should be used to provide decongestion and anesthesia.
2) The application of topical anesthesia application process for any office-based intervention of the larynx under the guidance of a laryngoscope or strobolaryngoscope is done through application of a spray. This is considered high-risk. Therefore, office-based biopsy, injection, laser, or other procedures should be delayed, if possible.
3) A video screen should be used between to keep the providers face away from the patient.
4) Disposable endoscopes may be considered.
5) After completion of the exam, the endoscope must be appropriately handled. The endoscope should not be removed from the examination room without a protective cover.

Commonly performed otolaryngology procedures

Procedures commonly performed outside the operating room

These commonly performed inpatient, emergency department and outpatient otolaryngology procedures should be handled differently during the pandemic. Adequate

education of the healthcare providers is essential. The following are examples of procedures which in this setting are considered high risk:

- Routine suctioning of patients with a tracheotomy.
- Nasal packing placement, removal or manipulation.
- Drainage of peritonsillar abscesses. Consider avoiding through the use of antibiotic management or needle drainage instead of open drainage.
- Attempted foreign body removal: deferring may not be possible. If the location is such that it will be particularly challenging to access in an awake patient, or if the individual is particularly intolerant of manipulation, performing the removal under general anesthesia may be necessary.

Operative procedures – general considerations

A number of head and neck, otolaryngologic, and oral surgery procedures are high-risk due to exposure of airway and mucosal surfaces and the possibility of generating aerosols. During the pandemic, based on the guidelines of national and state authorities, all elective procedures that could be safely postponed, should be delayed. If an operative procedure involving the mucosa of the head and neck is planned, the following is recommended:

- **SARS-CoV-2 Status:** If possible, determine the SARS-CoV-2 infection status of the patient beforehand. If a patient is positive, a careful assessment of risk to patient and the healthcare providers should be performed by a multidisciplinary team before the operation is recommended. Operating on mucosal surfaces in a patient who is actively infected

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generates a significant risk for the entire operating room and recovery units, and may compromise the patient's ability to recover from the infection.

- **Operating room setting:** High-risk operations or operations in known SARS-CoV-2 positive patients should be performed in designated operating room with negative pressure [13]. Unprotected healthcare personnel should not be allowed in a room where an aerosol-generating procedure is/has been conducted If a patient is known positive SARS-CoV-2, or under investigation, appropriate PPE must be worn by all.
- **High risk procedures:** Considering the high viral titers in nasal mucosa, oral, pharyngeal, and pulmonary secretions, any operation that involves these surfaces is high-risk to the entire operating room personnel. Blood borne transmission has not been documented, but aerosolization of blood through the use of energy devices used for control of bleeding and in dissection has been documented [14]. These procedures should be considered higher risk. This includes the use of powered devices (drills, microdebriders, saws) or ultrasonic shears (such as the Harmonic scalpel (Ethicon) or Thunderbeat scalpel (Olympus).
- **Low risk patient:** If a high-risk operation is indicated during the pandemic in a negative patient or patient without symptoms or contact full personal protective equipment for all operating room staff is strongly recommended. Observed levels of community disease will not reflect the full prevalence.
- **Intubation and extubation:** In all operations, coordination with the anesthesia team is critical. It is advisable that during intubation, all non-essential staff leave the room and only return after the airway is secured. Additionally, all non-essential staff should be out of the room during extubation. Anybody who is present should maintain full protective gear. In

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some centers, an interval equivalent to known air exchange times for that operating room is practiced before other personnel are allowed to enter. Jet ventilation procedures pose particularly high risk and should be performed only under absolute necessity and with complete PPE, preferably in a negative pressure room.

- **Patient transport:** Adequate protection during the transfer of COVID-19 patients or unknown but high-risk patients after a high-risk procedure is critical. Clear protocols should be established with the nursing staff, recovery unit personnel, anesthesia department and infection control. Non-intubated patients could be transferred while wearing a surgical mask (not an N95) if tolerated. If oxygen is required, it can be administered by face mask over the surgical mask. Intubated patients should be transported with an ICU ventilator (dry circuit, filter in place) and not with AMBU bag which breaks the closed circuit. Full PPE protection should be maintained by all Providers participating in the transfer.

Specific procedures and scenarios:

- **Endoscopic sinonasal and skull base surgery:** Endoscopic nasal operations, including sinus surgery and trans-sphenoidal pituitary surgery, are very high-risk procedures. In general, these procedures should be postponed in COVID-19 patients or those who cannot be tested. In negative patients, full personal protective equipment for all operating room staff is recommended as per the Table [15].
- **Thyroidectomy and neck procedures**: those that do not expose mucosal surfaces are lower risk, with the caveat that the use of energy devices can result in aerosolization of virus form the bloodstream or other gastrointestinal secretions. Patients with COVID-19 are likely to

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have virus in their blood stream and feces, based on the experience from SARS, also caused by a coronavirus [16,17].

- **Ear Surgery:** whether the respiratory mucosal lining the middle ear and mastoid air cells system is involved by COVID-19 or not, is not known. But it appears likely, since the rest of the airway is involved, that the lining of the eustachian tube, middle ear, and mastoid air cell system are all contaminated [18 19]. Drilling through the mastoid creates droplets and aerosols in significant clouds which, if the virus is present, could risk infecting everyone in the operating room environment. As contaminated mists harbor viable virus for several hours, especially in enclosed spaces, caution is warranted. Mastoidectomy, therefore is considered a high-risk procedure. Ideally, any patient undergoing any ear surgery should be tested for COVID-19 preoperatively. If a patient is positive, surgery should be delayed until the patient has cleared the disease.

- **Management of facial trauma:** Management of trauma patients should be led by the trauma management team. Physicians who are called to assess trauma patients or perform specific procedures, in areas of high community spread, should be equipped with adequate PPE based on the trauma center policies. After following the trauma triage protocol, if assessment and treatment of facial trauma is needed, our recommendation is to treat unknown patients as COVID-19 positive. Treat lacerations that involve mucosal surfaces as high-risk. For injuries that require operative intervention (reduction of fractures for example) confirm the infection status of the patient first and then proceed to definitive

treatment if at all possible. In areas with significant shortage of medical capacity and personnel, consider non-operative approaches as much as medically acceptable.

Tracheostomy

Performing tracheostomy on suspected or confirmed COVID-19 patients imposes unique challenges not only on otolaryngologists-head and neck surgeons, but the entire healthcare team[20]. In non-emergent situations, all cases should be reviewed by a multidisciplinary team and risks versus benefits of the procedure, for the patient, and the entire healthcare team, should be carefully assessed. Additionally, a detailed post-procedure care plan should be established to ascertain the protection of other patients and the healthcare providers. The accompanying paper by Tay et al outlines many of these considerations [6]. In general, most tracheostomy procedures should be avoided or delayed (even well beyond 14 days), due to the high infectious risks of the procedure and subsequent care, until such time as the acute phase of infection has passed, when the likelihood of recovery is high, and when ventilator weaning has become the primary goal of care. Avoiding early tracheostomy in COVID-19 patients is suggested, because of the higher viral load which may be present at this time. In addition, early tracheostomy has not been associated with improved mortality or reduced length of ICU stay in a randomized trial of mechanically ventilated patients [21].

We suggest the following additional guidelines:

1. Select the patients carefully. If due to anatomy, history, comorbidities, etc., the tracheostomy is assessed as difficult, consider postponing the procedure.

2. Consideration may be given to percutaneous dilational tracheostomy if the patient's anatomy and proceduralist expertise allow it to be done safely with minimal or no bronchoscopy, endotracheal suctioning, and disruption of the ventilator circuit.
3. Adequate sedation including paralysis should be given to eliminate risk of coughing during the procedure. Ventilation should be paused (apnea) at end-expiration when the trachea is entered, and any time the ventilation circuit is disconnected.
4. Choose non-fenestrated, cuffed, tracheostomy tube on the smaller side to make the tracheostomy hole smaller overall (Shiley size 6 for both men and women is adequate). Keep the cuff inflated to limit spread of virus through the upper airway.
5. Perform tracheostomy suctioning using a closed suction system with viral filter.
6. Use an HME device instead of trach collar during weaning to prevent virus spread or reinfection of patients.
7. Avoid changing tracheostomy tube until viral load is as low as possible

Conclusion:

We acknowledge that these challenging times require extraordinary efforts. Maintaining the health and strength of our clinical workforce is critical to avoiding collapse of our healthcare system. However, the experience of our colleagues in Singapore and Hong Kong in protecting their healthcare providers is quite reassuring[22]. By following carefully planned routines and procedures, we will be able to provide excellent care and guarantee the safety and health of our colleagues.

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Table 1. Summary of head and neck examination and procedure recommendations.

Non procedure encounters in non-immunocompromised patients If immune compromised (in active chemotherapy, radiation, immunotherapy, <1 year of solid organ transplant, chronic immunosuppression therapy, pregnant) both patient and provider should wear surgical mask unless patient is high risk.		
Risk and Definition	Patient wears	Provider/Staff wear
High risk to provider: Any exam in: • Active COVID-19+ patient • Influenza like symptoms • Patients under investigation for COVID-19	Surgical mask When feasible	Single use N95 mask Goggles or face shield Gown Gloves
Moderate risk to provider: Exam of ear, nose mouth or throat in: • Asymptomatic, untested, or COVID-19-negative patients	nothing	Surgical mask (possibly with face shield to allow for reuse of mask) Gloves
Low risk to provider: Other exam in: • Asymptomatic, untested, or COVID-19-negative patients	nothing	Mask optional Gloves
Aerosol Generating Interventional Procedures, including but not limited to: Intubation, extubation, office nasal and laryngeal endoscopy, bronchoscopy, GI endoscopy, drainage of peritonsillar abscess, placement of nasal packing, foreign body management in the nose or airway, tracheostomy, tracheostomy care, powered instrumentation in mucosal head and neck surgery, possibly laparoscopic surgery Patients undergoing these procedures should, if feasible, undergo testing within 48 hours prior to the procedure. OR staff not wearing PPE should, if possible, leave the room for intubation and extubation.		
Risk and Definition	Patient wears	Provider/Staff wear
High risk to provider: Consider delaying or discussing • Active COVID-19+ patient • Influenza like symptoms • Patients under investigation for COVID-19	Surgical mask	PAPR or single use N95 mask Goggles or face shield Gown Double Gloves
Low risk to provider: • Asymptomatic, untested patients or COVID-19-negative in 48 hours preceding surgery. • If possible, test patients within 48 hours of procedure	nothing	N95 (may be appropriate to reuse– must use face shield to allow re-use) If unavailable, surgical mask with goggles or face shield Gown Double Gloves
Non Aerosol Generating Interventional Procedures Soft tissue surgery exposes blood, which can have a viral count, but unless aerosolized by the use of energy devices would be expected to be lower risk. Suctioning away smoke and aerosolized tissue is recommended. The infectiousness of aerosolized blood with the novel coronavirus is not yet known, that we are aware of.		
Risk and Definition	Patient wears	Provider/Staff wear
High risk to provider: Consider delaying or discussing • Active COVID-19+ patient • Influenza like symptoms • Patients under investigation	Surgical mask	Single use N95 mask Goggles or face shield Gown Gloves
Low risk to provider:	nothing	Surgical mask Goggles or face shield

Asymptomatic patients or COVID-19 negative in last 48 hours.		Gown Gloves