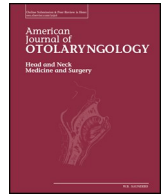




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## Brief guideline for the prevention of COVID-19 infection in head and neck and otolaryngology surgeons

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### ABSTRACT

**Importance:** Anatomically, viral density is greater in the nasal cavity and the nasopharynx. It is to be expected that instrumentation in or through those areas will entail a higher risk of transmission. That's why head and neck and otolaryngologist surgeons are among the most vulnerable health professionals.

**Observations:** Surgeons should essentially perform procedures they require. Surgeries should be performed with personal protective equipment suitable for the high risk of aerosolization: goggles, N95 face mask, facial mask, blood-repelling gown and gloves. It is advisable to have the cooperative COVID-19 test in all patients. Telemedicine is a useful resource if resources allow it.

**Conclusions and relevance:** Otolaryngologists and related specialists are among the groups at higher risk when performing surgeries and upper airway examinations. There are no emergencies in a pandemic. The care of health professionals is crucial to combating this health situation.

## 1. Introduction

### 1.1. Epidemiology and pathogenesis

Coronavirus disease (COVID-19) is caused by the SARS-Cov 2 virus. The World Health Organization (WHO) gave this disease the name of COVID-19 on February 11th 2020. Outbreaks due to coronavirus had occurred before, such as the Severe Acute Respiratory Syndrome (SARS) Cov in 2003 and the Middle East Respiratory Syndrome (MERS) Cov in 2012. The current pandemic originated in a market selling seafood and other animals in Wuhan, province of Hubei, China, at the end of 2019, thus denoting the zoonotic origin of this disease [1,2]. Genomic sequencing of the COVID-19 virus showed an 88% similarity with two SARS-like coronaviruses, harbored by bats [3].

As this brief guide was being prepared, the CSSE (Center for System Sciences and Engineering) at Johns Hopkins University Hospital [4] published the following number of cases worldwide: 746,342 confirmed

cases, 52,892 deaths (5827 in US, 3318 in China and 13,915 in Italy) and 212,015 cases that recovered. In Argentina up to date, 843 cases have been confirmed and 34 have died due to COVID-19.

At this point, the challenge is how to adapt the international measures to the local epidemiologic situation, which is dynamic. The recommendations issued by the Ministry of Health are the first reference to be considered. In Argentina, under the present epidemiologic situation, patients are categorized as suspicious of COVID-19 and non-suspicious of COVID-19 according to their symptoms and epidemiologic links. The National Ministry of Health has determined that asymptomatic persons with an epidemiologic link are banned from circulating and from receiving routine care with the exception of urgent circumstances.

## 2. Methods

A search was conducted using the PubMed Central and Cochrane Library databases for studies published in English and other languages

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from November 2019 to February 2020, using the search terms COVID-19, head and neck surgery, otolaryngologist and ear-nose-throat (ENT). In turn, the websites of related scientific societies are inspected and the guides present on these pages were included.

### 3. Observations

#### 3.1. Transmission and protection of head and neck surgeons and otolaryngologists in the context of their practice

The transmission of SARS-Cov 2 occurs either directly, by Flüggé's microdroplets through sneezing or cough, or indirectly, when the droplets remain in fomites and persons come into facial contact (similar to the transmission of the Influenza virus). Anatomically, viral density is greater in the nasal cavity and the nasopharynx. It is to be expected that instrumentation in or through those areas will entail a higher risk of transmission.

In our field of work, evidence is now showing that otolaryngologists (ORL) and related specialists are among the groups at higher risk when performing surgeries and upper airway examinations. A high transmission rate of COVID-19 has been detected in health care professionals in China, Italy and Iran, many of whom have died [5]. Hence, focus should be placed especially on procedures that generate particles (aerosolization), that could include open tracheostomies and possibly flexible laryngoscopies [5,6].

The current COVID-19 pandemic in China and previous experiences with SARS throughout the world have led to recommend the mandatory use of surgical gowns, head covers, eye protection, gloves and N95 face masks by all head and neck, maxillofacial and otolaryngology surgeons when caring for ambulatory patients [7]. These new gowning standards are cumbersome and uncomfortable. However, asymptomatic carriers of the virus have a mean incubation period of 5.2 days (95% of the distribution in 12.5 days) [7,8]; hence these preventive measures are absolutely necessary.

#### 3.2. Medical offices, elective surgeries and urgencies

Surgery and endoscopic exams performed in these areas of the body and their connections (e.g., mastoid and rhinopharynx) typically entail maneuvers that may lead to aerosolization of viral particles in the mucosa. The use of drills, microdebriders or electrocautery during surgical procedures promotes even further the possible spreading of infectious microdroplets throughout the operating room or medical office [9].

Therefore, given the current health emergency, the recommendation is to completely discontinue these procedures. Urgent consultations should be addressed by the Emergency Department. It would be advisable to discontinue all in-person consultations of the mentioned specialties, when they entail the maneuvers previously described.

Regarding elective surgeries, the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) issued a statement [10] reporting that they are collecting scientific information about COVID-19, to understand the particular risks faced by ORL and related specialists, which should be considered when making decisions about the care of patients and health care personnel.

With the goal of caring for the medical staff, patients and resources, and to expand the capacity during the pandemic, the Centers for Disease Control and Prevention (CDC) recommends: a) Postponing all elective ambulatory visits b) rescheduling of all elective and non-urgent admissions c) postponing elective surgeries of patients, whether in-hospital or ambulatory and d) postponing all routine eye and dental exams. Hence, the AAO-HNS [10] recommends ORL specialists to limit their patient care activities to urgent and emergency cases. However, they do not list the type of disorders included in those categories and recognize that decisions should be made based on medical judgement, patients' clinical condition and social circumstances. The California



**Fig. 1.** Personal protective equipment (PPE) for COVID-19 for head and neck and otolaryngology surgeons. A. Frontal view. B. Lateral view. The recommendation is to use maximum protection due to the risk of aerosolization (for procedures involving aerosols and critical care units): N95 mask, blood-proof gown, cap, glasses, eye protection and gloves.

Dental Association (CDA) and the AAO-HNS [11] recommend stopping non-urgent surgeries. Among our medical team, the following are considered maxillofacial urgencies: odontogenic abscesses, temporomandibular joint dislocation requiring reduction, and facial trauma.

Therefore, considering that COVID-19 may complicate the post-operative course, increase diagnostic difficulty and entails a potential risk of death [12], our team recommends to perform only urgent surgical procedures or oncological surgeries that are markedly invalidating or with an aggressive biologic behavior.

#### 3.3. Teamwork and virtual meetings

Under the present circumstances, more than ever, teamwork becomes essential. Active listening, respect for the ideas of others, cordial attitudes and solidarity prove essential in times of a crisis. If the appropriate resources are available, it is advisable to hold virtual meetings with the Division Head or leader in charge. Such meetings not only allow to continue with the team's functioning, and favor fluid communication among its members, but also provide psychological support and help them to cope with stress and burn-out. We should be respectful and remember that each member of the team is entitled to his/her opinions and that this situation may affect every person differently.

#### 3.4. Intubation in patients undergoing head and neck surgery with procedures at high risk of aerosolization or suspicious/confirmed cases of COVID-19 [13,14]

All personnel involved should be previously informed about the plan to be followed, and should have been trained for this situation, as

**Table 1**  
Actual recommendations to prevent COVID-19 infection in head & neck surgeons and otolaryngologists.

Author	Publication date	Country	General recommendations	Surgeries	Types	High risk procedures (AGP)	PPE	PT	TM
Xu K et al. [16]	02 F 2020	China	NA	NA	NA	NA	NA	NA	NA
Chan JYK et al. [17]	20 M 2020	Hong Kong	Redistribution of manpower and resources Maximize hospital bed availability	Emergency Oncologic	NA	Tracheostomy Laryngoscopy	N95 Gown Cap Eye protection Gloves	NA	NA
SEORL-CCC	22 M 2020	Spain	Reduction of surgical procedures Preserve the safety of patients and health workers, maintaining the necessary resources	Emergency Oncologic Postoperative	Otitis or complicated sinusitis Sudden deafness Surgical complications Cervical infections Air way obstruction Trauma	Nasofibroscopy	-N95 -blood proof gown -N95, FFP2 o 3 -eye protection-Two pairs of gloves	Yes	Yes
AAO-HNS	26 M 2020	United States	When COVID-19 status of the patient cannot be confirmed the patient should be handled as if it were COVID-19 positive	Emergency	NR	Tracheostomy	N95 respirator masks with either goggles or a face shield (laryngoscopy)	NR	NR
Vukkadala N et al. [18]	26 M 2020	United States	Our institution promotes early intubation to avoid emergent intubations, which would allow intubation planning and enough time to properly done PPE	Malignancy Air way risk	NR	Tonsillectomy Mastoid drilling Sinus surgery, -other airway procedures	N95 Gown Face shield (laryngoscopy)	Yes	Yes
Liers JC et al. [19]	26 M 2020	Germany	NA	NA	NA	NA	NA	NA	NA
Boccalatte LA et al	2 A 2020	Argentina	The key point is the care and training of the human resource in the correct use of PPE	Emergency	Odontogenic abscess Cervical infections Air way obstruction Trauma	Tracheostomy -laryngoscopy Oral surgery Upper aerodigestive tract procedures	N95 Gown Cap Glasses Eye protection Gloves	Yes <sup>&gt;</sup>	Yes

AGP: aerosol-generating procedures; PPE: personal protective equipment; PT: preoperative test; TM: telemedicine; SEORL-CCC: Spanish Society of Otolaryngology and Head and Neck Surgery; AAO-HNS: American Academy of Otolaryngology-Head and Neck Surgery; F: February; M: March; A: April; NA: no available; NR: No reported; > : Our team suggest preoperative COVID-19 test for all patients. However, the availability in Latin America is low and the access is complicated, like other countries in this area.

well as for the placement and withdrawal of the equipment. Also, during these procedures it is essential for the staff to use adequate protective equipment: goggles, N95 face mask, facial mask, blood-repelling gown and gloves. We need to remember that hearing may be diminished when wearing personal protective equipment (PPE), and speak up, but without yelling. If possible, the use of both non-invasive ventilation (NIV) or high flow nasal cannula (HFNC) is discouraged, due to the risk of virus aerosolization. If supplemental oxygen administration through a low-flow cannula is required, the recommendation is for the patient to wear a surgical mask. Also, intubation should be planned and performed early; urgent or emergency intubation should be avoided. Awake intubation should be avoided due to the risk of viral aerosolization.

Importantly, as few people as possible should remain in the room during the procedure. The intubation should be performed by the staff member with most expertise. Preoxygenation with 100% oxygen shall be administered for 3 min, with a facial mask sealed over the patient's face. Alternatively, 8 deep respirations with 10–12 L/min flow will be administered. A high-efficiency hydrophobic filter shall be placed between the facial mask and the corrugated tubing. During intubation, the goal should be to achieve success during the first attempt. A videolaryngoscope with a separate screen shall be used, so the physician can avoid close contact with the patient's face. Following its use, the laryngoscope's blade will be wrapped with a clear double bag, before carrying it to the washing area.

Rapid sequence intubation is recommended, with induction plus a neuromuscular relaxant agent (Succinylcholine or Rocuronium at a dose of 1.2 mg/kg). The mask shall remain adequately sealed over the patient's face. Spontaneous ventilation and cough shall be avoided due to the risk of viral aerosolization. Care must be taken to open the patient's mouth with his/her head in hyperextension, and to avoid introducing a hand inside the patient's mouth during the maneuver of mouth opening. For intubation and extubation maneuvers, people not involved in the procedure should leave the room.

Once intubation has been performed, the endotracheal tube will be connected to the ventilator's circuit and the cuff or balloon will be inflated; subsequently, ventilation will be initiated. Gauze pads should be placed around the tube to absorb oral secretions. Eye protection should be optimized to avoid contact with the patient's tears. The outer pair of gloves should be removed and replaced by a new pair.

The recovery period entails the highest risk, since during this period the patient will probably present with cough and eliminate sputum. Implementing effective antiemetic treatment is fundamental. Prior to extubation, oral secretions have to be adequately suctioned. Extubation shall be performed with the endotracheal tube connected to the ventilator's circular circuit, en bloc. Gauze pads must be placed immediately over the patient's mouth, to limit expulsion of droplets with coughing. Once the patient is conscious, with good ventilatory mechanics and no cough, he/she will be fitted with a surgical mask. Nursing staff in the operating room will then begin with the usual post-anesthetic recovery protocol.

Patient who requires continued intubation shall be transported to the appropriate facility according to the hospital referral protocol for patients with suspicion/diagnosis of COVID 19. The anesthesiologist in charge of the mentioned transport shall do so gowned with the same operating room gear. Those clothes will be removed in the patient's room, once the transfer and patient handover has been completed. A high-efficiency filter should be placed between the endotracheal tube and the self-inflatable manual ventilation bag. Importantly, in these cases the operating room should not receive positive pressure and at least 2 h should elapse before positive pressure is restarted following a positive or suspicious case.

### 3.5. Simulation workshops on surgical gowning

Primary prevention of surgeons is paramount. Personal protective equipment should consist of: a) pair of gloves or mitts b) sterile blood-

repellent surgical gowns c) goggles or facial mask with a visor and d) surgical mask or N95 mask for procedures that cause aerosolization. For head and neck surgeons, ORL and maxillofacial surgeons, our team recommends the use of maximum protection, due to the high risk of particle aerosolization (Fig. 1).

A key point is to train all the surgical team in the correct gowning procedures (training should include nurses, secretaries, scrub nurses, etc.), with one member acting as a supervisor to avoid mistakes in gowning, and especially in removing the surgical gear and to avoid subsequent contamination. Simulation workshops are encouraged, since they offer an ideal pedagogic strategy.

### 3.6. Telemedicine

For Institutions with resources that allow implementing teleconsultations, such option is valid as a primary approach to urgent consultations and to recommend a visit to the emergency room when appropriate, as well as to help oncological patients who are being regularly followed [15].

Unfortunately, given the social and economic conditions in Latin America, only a few centers can offer those services. Human resources trained for telemedicine services and the necessary technology are not always available, but if a particular hospital has access to such resources, they can certainly be useful. However, under the present epidemiological context, the recommendation is not to assign health care personnel to telemedicine tasks or training activities.

### 3.7. Actual recommendations

Table 1 shows recommendations to prevent COVID-19 infection of head & neck surgeons and otolaryngologists [16–19].

## 4. Conclusions

Surgeons should essentially perform procedures they require. Surgeries should be performed with personal protective equipment suitable for the high risk of aerosolization: goggles, N95 face mask, facial mask, blood-repelling gown and gloves. It is advisable to have the cooperative COVID-19 test in all patients. Telemedicine is a useful resource if resources allow it.

There are no emergencies in a pandemic. The care of health professionals is crucial to combating this health situation.

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