

# Impact of coronavirus (COVID-19) on otolaryngologic surgery: Brief commentary

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## Abstract

**Background:** The Coronavirus disease—2019 (COVID-19) pandemic is a global health crisis and otolaryngologists are at increased occupational risk of contracting COVID-19. There are currently no uniform best-practice recommendations for otolaryngologic surgery in the setting of COVID-19.

**Methods:** We reviewed relevant publications and position statements regarding the management of otolaryngology patients in the setting of COVID-19. Recommendations regarding clinical practice during the severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome (MERS) outbreaks were also reviewed.

**Results:** Enhanced personal protective equipment (N95 respirator and face shield or powered air-purifying respirator, disposable cap and gown, gloves) is required for any otolaryngology patient with unknown, suspected, or positive COVID-19 status. Elective procedures should be postponed indefinitely, and clinical practice should be limited to patients with urgent or emergent needs.

**Conclusion:** We summarize current best-practice recommendations for otolaryngologists to ensure safety for themselves, their clinical staff, and their patients.

## KEYWORDS

coronavirus, COVID-19, otolaryngology, PPE, SARS-CoV-2, surgery

## 1 | INTRODUCTION

In December 2019, a pneumonia outbreak of unknown etiology was reported in Wuhan, Hubei province, China.<sup>1</sup> This disease was subsequently named Coronavirus disease 2019 (COVID-2019) by the World Health Organization (WHO) and has spread globally affecting over 1800000 people and resulting in >115000 deaths as of April 13, 2020.<sup>2</sup> The causative agent was determined to be a novel Coronavirus (originally called 2019 novel Coronavirus or 2019-nCoV) closely related to severe

acute respiratory syndrome (SARS) and Middle Eastern respiratory syndrome (MERS) viruses and has been named SARS-CoV-2.<sup>3</sup> Although the full route of transmission is not clear, increasing evidence suggests that otolaryngologists are at increased risk of occupational SARS-CoV-2 exposure due to the high viral load in the upper aerodigestive tract and frequent examination and instrumentation of the oral cavity, oropharynx, nasal cavity, and nasopharynx. Indeed, the first physician deaths during the COVID-19 and SARS outbreaks were otolaryngologists.<sup>4</sup> In this commentary, we provide a brief

overview of COVID-19 and provide recommendations for steps that otolaryngologists should take to ensure safety for themselves, other healthcare workers, and patients. A summary of the recommendations discussed below is provided in Table 1. Given the rapidly evolving situation, these recommendations are based on the best available data and expert opinion and may be subjected to change as the pandemic continues to develop.

Like all Coronaviruses, SARS-CoV-2 is an enveloped, positive-sense, single-stranded RNA virus. Sequence analysis has revealed 76.9% homology to SARS Coronavirus (SARS-CoV) and 96.4% homology to the bat Coronavirus BatCoV-RaTG13 (RaTG13), indicating that SARS-CoV-2 is likely the result of a zoonotic infection.<sup>1</sup> The viral *spike* (S) protein interacts with the same cellular receptor, angiotensin-converting enzyme II (ACE2), as SARS-CoV, however, the SARS-CoV-2 S protein has significant sequence divergence from all other known Coronaviruses except RaTG13. Importantly, SARS-CoV-2 appears to be highly transmissible with an  $R_0$  of 2-3, meaning that each infected person is likely to infect 2-3 additional people in a naïve population.<sup>5</sup> While respiratory droplet is presumed to be the major mode of transmission, evidence suggests that the virus may also be spread via the fecal-oral route and through the conjunctiva.<sup>6</sup> Importantly, SARS-CoV-2 appears to be highly stable in the environment. Viable virus has been recovered from aerosols for up to 3 hours, porous surfaces (cardboard) for up to 24 hours, and non-porous surfaces (stainless steel, plastic) for up to 72 hours.<sup>7</sup> This environmental stability increases the risk of nosocomial transmission and “super spreader” events, where a single individual infects more naïve individuals than expected by  $R_0$ .<sup>7,8</sup>

The most commonly reported presenting symptoms of COVID-19 include cough (67.8%), fever (43.8%), fatigue (38.1%), increased sputum production (33.7%), dyspnea (18.7%), myalgias (14.9%), sore throat (13.9%), and chills (11.5%).<sup>9</sup> However, some recent analyses indicate that hyposmia or anosmia and dysgeusia may be under-recognized symptoms.<sup>10,11</sup> Laboratory testing may demonstrate leukopenia (33.7%) and lymphopenia (83.2%); elevated C-reactive protein (60.7%), D-dimer (46.4%), and lactate dehydrogenase (41%) levels; transaminitis (approximately 20%); and decreased procalcitonin (5.5%). Chest CT demonstrates abnormalities in 86.2% of cases including ground-glass opacities, patchy shadowing, and interstitial changes.<sup>9</sup> SARS-CoV-2 appears to have a median incubation period of 5.1 days, with 95% of patients developing symptoms between 2.2 and 11.5 days after exposure.<sup>12</sup> However, it is extremely important to recognize that asymptomatic patients may be highly contagious,<sup>12,13</sup> highlighting the need for the use of personal protective equipment (PPE) for even routine patient evaluation.

## 2 | INFECTION CONTROL PRECAUTIONS

In the setting of the current COVID-19 pandemic, routine head and neck examinations and procedures present a significant occupational hazard for otolaryngologists. Instrumentation of the upper airway including the oral cavity, nose, naso/oro/hypopharynx, and larynx should be treated as high-risk procedures for COVID-19 transmission. Given this risk, otolaryngologic procedures should be deferred unless medically necessary or until preoperative COVID-19 diagnostic testing is performed, particularly for tier 1 and 2 patients, as defined by the American College of Surgeons.<sup>14,15</sup> However, due to the acuity in workup and treatment of airway compromise, craniomaxillofacial trauma, and head and neck malignancy, examination and intervention will remain absolutely necessary in many patients without COVID-19 testing in advance. Perhaps the most easily implemented and effective methods for limiting transmission are reducing redundant patient interactions overall and minimizing the number of practitioners present for examinations and procedures.

When examinations or procedures must be performed, it is of utmost importance that otolaryngologists and any other healthcare workers in the room practice effective use of personal protective equipment (PPE). We define “appropriate PPE” as the use of standard-of-care procedure-specific PPE for patients who are confirmed to be negative for COVID-19 following appropriate preoperative testing and quarantine. “Enhanced PPE” is defined as use of either an N95 respirator plus face shield or powered air-purifying respirator (PAPR, preferred), disposable surgical cap, disposable gown, and gloves. This should be used for any patient with unknown, suspected, or positive COVID-19 status requiring invasive examination or instrumentation of the oral cavity, oropharynx, nasal cavity, or nasopharynx. The appropriate sequence of donning and removing PPE is also of importance (<https://www.cdc.gov/hai/pdfs/ppe/PPE-Sequence.pdf>).<sup>16</sup>

There is conflicting data regarding mask protection for health care workers in the setting of airborne infections. Large meta-analyses have.<sup>17,18</sup> Regardless, N95 respirators are preferred in clinical settings when the risk of transmission is high given its superior filtration. The use of N95 respirators should be limited to health care workers who have been trained and properly mask fit tested. In general, face shields should be worn over the N95 respirator. If a full face shield is not available, standard eye protection should be worn and a standard surgical mask may be placed over the N95 respirator to prevent soiling of the respirator. If the patient wears a mask for the entire encounter and the provider remains 3-6 ft away from the patient, a surgical mask may

**TABLE 1** Summary of recommendations

| Section | Measure/procedure                                 | Recommendation  |
|---------|---|---|
| 2       | Infection control precautions                     | <p>Standard infection control precautions should be instituted including restricting patient encounters to urgent or emergent issues, minimizing contact between patients, appropriate hand hygiene, and disinfection of examination spaces</p> <p>Patients infected with COVID-19 may be contagious prior to the development of symptoms. Consider use of enhanced personal protective equipment (PPE)<sup>a</sup> for asymptomatic patients with unknown COVID-19 status when examining or instrumenting the oral cavity, oropharynx, nasal cavity, or nasopharynx</p> <p>Encounters for patients with suspected or known COVID-19 requiring examination within 3 ft should proceed only with enhanced PPE<sup>a</sup></p>  |
| 2       | Surgical scheduling and operating room management | <p>All elective surgical cases, including dental procedures, should be postponed indefinitely pending control of the COVID-19 pandemic</p> <p>For procedures that cannot be delayed COVID-19 testing should be performed 48 h prior to surgery whenever possible. Patients should be strictly quarantined until the time of surgery. If available, rapid testing should be repeated on the day of surgery. When possible, surgery should be postponed for patients testing positive for COVID-19</p> <p>Emergent surgical cases should be performed under the presumption that patients are COVID-19 positive. Enhanced PPE<sup>a</sup> should be used by all clinical staff for procedures involving the upper aerodigestive tract</p> <p>For patients with unknown, suspected, or positive COVID-19 status requiring operative intervention staff should be limited to essential personnel (ie, senior attending anesthesiologist, experienced attending surgeon, senior surgical resident/clinical fellow, surgical technologist, and registered nurse) using enhanced PPE<sup>a</sup>. Procedures should be performed in a negative pressure operating room with HEPA filtration</p>  |
| 3.1     | Airway management and tracheotomy                 | <p>High flow nasal cannula is contraindicated in patients with unknown, suspected, or known COVID-19 status</p> <p>Enhanced PPE<sup>a</sup> should be used during intubation and extubation of patients with unknown, suspected, or positive COVID-19 status</p> <p>Intubation of patients with unknown, suspected, or positive COVID-19 status should be performed by the most senior practitioner available</p> <p>Video laryngoscopes and disposable laryngoscopes should be used to maximize intubation success and minimize infectious spread</p> <p>Awake fiberoptic intubation should be performed with extreme caution, but is preferable to open surgical airway procedures</p> <p>Difficult airway should be managed per published difficult airway algorithms with the exception that emergent extracorporeal membrane oxygenation (ECMO), if available, may be preferred over emergent tracheotomy for patients with unknown, suspected, or positive COVID-19 status</p> <p>Extreme caution should be utilized when performing emergent tracheotomy in patients with unknown, suspected, or positive COVID-19 status due to the risk of virus aerosolization. Enhanced PPE<sup>a</sup> should be utilized. Indications include obstructive laryngeal lesions, severe trismus precluding the ability to perform direct laryngoscopy, and massive oropharyngeal bleeding</p> <p>Tracheotomy techniques in patients with unknown, suspected or positive COVID-19 status include avoiding electrocautery to minimize virus aerosolization, advancing the endotracheal tube prior to incising the anterior tracheal wall to prevent cuff rupture and maintain a closed circuit, and holding ventilation until a non-fenestrated tracheotomy tube has been placed in the tracheal lumen and the cuff has been inflated</p> <p>Elective tracheotomy and percutaneous dilation tracheotomy are contraindicated in the setting of unknown, suspected, or positive COVID-19 status due to the high risk of virus aerosolization</p> |
| 3.2     | Endonasal surgery                                 | <p>Elective sinonasal cases should be postponed pending control of the COVID-19 pandemic</p> <p>Urgent sinonasal cases mandate preoperative COVID-19 testing 48 h prior to surgery with strict quarantine pending until the date of surgery. If available, rapid testing should be repeated on the date of surgery. Patients testing positive for COVID-19 should be rescheduled if possible</p>  |

(Continues)

TABLE 1 (Continued)

| Section | Measure/procedure   | Recommendation  |
|---------|---|---|
|         |   | <p>pending resolution of the infection. Due to the possibility of false-negative testing, enhanced PPE<sup>a</sup> should be used for all operating room personnel even for patients testing negative for COVID-19</p> <p>Emergent sinonasal surgery on patients with unknown, suspected, or positive COVID-19 status requires enhanced PPE<sup>a</sup> for all operating room personnel with a strong preference for the use of PAPR</p> <p>Enhanced PPE<sup>a</sup> must be utilized for bedside endonasal procedures on patients with unknown, suspected, or positive COVID-19 status</p>  |
| 3.3     | Craniofacial trauma and urgent otolaryngologic conditions | <p>Enhanced PPE<sup>a</sup> should be used for management of acute facial trauma involving the nose, oral cavity, and oropharynx</p> <p>Preoperative COVID-19 testing should be performed 48 h prior to operative intervention with the patient in strict quarantine until the day of surgery. If available, rapid testing should be repeated on the day of surgery. Consideration to delayed operative intervention should be given in cases of positive COVID-19 testing</p>  |
| 3.4     | Head and neck oncology                                    | <p>Telemedicine should be employed to discuss pathology results and radiographic imaging findings with patients as well as continue important longitudinal cancer care</p> <p>Oncologic surgery should not be postponed longer than necessary</p> <p>Multidisciplinary evaluation of individual patients with cancer should be performed to determine optimal treatment strategies</p> <p>Preoperative COVID-19 testing should be performed 48 h prior to operative intervention with the patient in strict quarantine until the day of surgery. If available, rapid testing should be repeated on the day of surgery. Consideration to delaying surgery should be given in case of positive COVID-19 testing</p> |
| 3.5     | Nasal endoscopy and flexible fiberoptic laryngoscopy      | <p>Elective flexible laryngoscopy and nasal endoscopy should not be routinely performed in the office or inpatient settings</p> <p>If endoscopic evaluation is necessary in the urgent or emergent setting enhanced PPE<sup>a</sup> should be utilized</p> <p>Nasal sprays are contraindicated for patients with unknown, suspected, or positive COVID-19 status. Disposable cotton pledgets should be used for application of decongestants and topical anesthesia</p>   |

<sup>a</sup>Enhanced PPE for patients with unknown, suspected, or positive COVID-19 status includes an N95 respirator plus face shield or powered air-purifying respirator (PAPR; preferred), disposable surgical cap, disposable gown, and gloves. Standard, procedure-appropriate PPE may be used for patients with confirmed negative COVID-19 testing within 48-hours of surgery who have been subjected to strict quarantine pending test results.

constitute sufficient PPE, however this is not feasible for many otolaryngology clinical encounters. A patient with suspected or known COVID-19 status requiring examination within 3 ft should proceed only with use of an N95 respirator or PAPR.<sup>19</sup>

With the current widespread shortage in supply of N95 respirators, the CDC has suggested using these respirators past their shelf life. Components of the respirators degrade over time; however, US stockpiles have been found to perform in accordance with the National Institute of Occupational Safety and Health (NIOSH) performance standards.<sup>19</sup> Extended use may be preferable to limited reuse to decrease touching of the respirator, but both strategies are viable options. An exception to this is following an aerosol-generating procedure (ie,

tracheotomy, sinus surgery, oropharyngeal surgery, etc.), where it is recommended to discard the N95 respirator. Given the high viral load seen in the upper airway of patients with COVID-19 infection, the use of a PAPR instead of an N95 respirator has been advocated.<sup>20-22</sup> In a patient with unknown COVID-19 status requiring an upper airway procedure in the acute setting, enhanced PPE should be used *even in the absence of suspicion for COVID-19 by history alone* given that patients may be asymptomatic carriers or may be contagious prior to the development of symptoms.<sup>12,13</sup> Consideration should be given to excluding otolaryngologists or other healthcare workers who are of older age or have chronic medical conditions from interacting with patients with COVID-19. During severe resource limitations when respirators are

unavailable, convalescent physicians may be designated to provide care for patients with COVID-19, although immunity following infection has not yet been confirmed and there is at least one report of disease recurrence in a convalescent patient.<sup>19,23</sup>

### 3 | SPECIAL CONSIDERATIONS

#### 3.1 | Airway management and tracheotomy

Patients presenting with acute airway obstruction should be managed as if they are COVID-19 positive because diagnostic testing is not feasible in an emergent clinical situation. All clinical personnel should wear enhanced PPE. The use of high-flow nasal cannula is contraindicated in patients with unknown, suspected, or positive COVID-19 status due to high risk of virus aerosolization.<sup>24,25</sup> Extreme caution should be utilized when performing awake fiberoptic intubation due to instrumentation of the nasopharynx and the potential for aerosol generation, however intubation via any means is preferable to emergent tracheotomy. For mask ventilation, a high-efficiency hydrophobic filter should be placed between the face mask and breathing circuit or reservoir bag, the patient should be pre-oxygenated while breathing spontaneously whenever possible, and rapid sequence intubation techniques should be used to minimize viral particle aerosolization.<sup>25</sup> When available, video laryngoscopes should be used to maximize intubation success rate and disposable laryngoscopes to minimize infectious spread.<sup>24,25</sup>

To minimize intubation time and exposure to the oropharynx, the 2015 Difficult Airway Society Guidelines<sup>26</sup> should be followed with the exception that intubation should be performed only by the most senior practitioner available using enhanced PPE. Second-generation laryngeal mask airways should be used, if indicated, as these provide an improved seal compared to first-generation devices.<sup>25</sup> If a “can’t intubate, can’t oxygenate scenario” is declared, emergent extracorporeal membrane oxygenation (ECMO) may be preferred over emergent surgical airway to reduce the risk of virus aerosolization, though this may not be readily available. Indications for primary emergent tracheotomy include obstructive laryngeal lesions, severe trismus precluding the ability to perform direct laryngoscopy, massive oropharyngeal bleeding, other conditions precluding intubation, and other emergent conditions anticipated to require long-term means to secure the airway where ECMO would not be appropriate.

When caring for a patient with unknown, suspected, or positive COVID-19 status, clinical staff should be limited to essential personnel (ie, senior attending

anesthesiologist, experienced attending surgeon, senior surgical resident/clinical fellow, surgical technologist, and registered nurse) fully equipped with enhanced PPE in a negative pressure operating room with HEPA filtration.<sup>24</sup> Technical pearls to consider when performing tracheotomy in a patient with unknown, suspected, or positive COVID-19 status include avoiding electrocautery usage to minimize aerosolization of viral particles, advancing the endotracheal tube prior to incising the anterior tracheal wall to prevent cuff rupture and maintain a closed circuit, and holding ventilation until a non-fenestrated tracheotomy tube has been placed within the tracheal lumen and the cuff has been inflated. Further details regarding safe tracheotomy have been outlined by Wei et al and Harrison et al.<sup>27,28</sup>

Postoperatively, the tracheotomy tube should not be changed or manipulated until the COVID-19 status of the patient has been determined. Routine tracheotomy tube care as delineated by ENT-UK should include maintenance of a closed circuit, exclusively in-line suctioning, frequent cuff leak checks, and avoiding humidification.<sup>28</sup> At this time elective tracheotomy is contraindicated for patients with unknown COVID-19 status and should only be performed once COVID-19 status has been determined with appropriate quarantine and the merits of tracheotomy are discussed as it is a high-risk, aerosol-generating procedure.<sup>29</sup> Likewise, percutaneous dilation tracheotomy is contraindicated in patients with unknown, suspected, or positive COVID-19 status. This contraindication is due to the need for simultaneous bronchoscopy (itself a high-risk procedure), and longer period of exposure to an open tracheostomy site during serial dilation resulting in increased risk of virus aerosolization.

There is limited information regarding management of patients with tracheotomy no longer requiring ventilator support in the setting of COVID-19. The use of filters over the open tracheotomy, such as humidification-moisture exchangers (HMEs), preferably with an integrated antimicrobial filter, may be beneficial and reduce aerosolization. Alternatively, Chan et al describe using a closed circuit system identical to that used for a mechanical ventilator for all patients with tracheotomy, including those not requiring ventilator support.<sup>4</sup> Ultimately, the choice of device may be dependent on the COVID-19 status of the individual patient and the ability to provide appropriate isolation to minimize the spread of aerosols.

#### 3.2 | Endonasal surgery

At this time, several national and regional otolaryngology organizations have released statements regarding endonasal and nasopharyngeal surgery (functional endoscopic



sinus surgery, endonasal skull base surgery, adenoidectomy, etc.) and the risk of COVID-19 spread.<sup>30,31</sup> In a preliminary study of 17 symptomatic patients with COVID-19, high viral loads were detected soon after symptom onset, with higher viral loads in the nasopharynx compared to the oropharynx.<sup>22</sup> Increasing reports of hyposmia and anosmia as cardinal symptoms of COVID-19 further suggest that the virus is highly active in the nasal cavity.<sup>11</sup> Aerosolized viral particles are viable for up to 3 hours and may be disseminated by sinus instrumentation such as balloons, drills, microdebriders, and suction electrocautery.<sup>7,32</sup> Due to the high risk of occupational COVID-19 exposure during endonasal surgery, elective sinonasal cases should be postponed until the COVID-19 pandemic has been controlled. Urgent endonasal surgery cases mandate preoperative COVID-19 testing 48 hours prior to the procedure with the patient remaining in strict quarantine until the day of surgery. When possible, rapid COVID-19 testing should be repeated on the day of surgery. For patients found to be negative for COVID-19, appropriate PPE should be used by all operating room staff. However, consideration may be given to the use of enhanced PPE given the high risk for occupational exposure during endonasal procedures and the possibility of false-negative test results. Consideration should be given to postponing surgery for patients with COVID-19-positive. Finally, emergent sinonasal cases require enhanced PPE, with a strong preference for the use of PAPR, for all operating room staff until further information is available.<sup>32</sup>

### 3.3 | Craniomaxillofacial trauma and urgent otolaryngologic conditions

As emergency departments across the United States continue to serve patients with urgent medical needs, individuals who present with facial trauma, uncontrolled epistaxis, abscesses, and other conditions will require urgent management by otolaryngologists, including bedside procedures or operative intervention. Given our current understanding of COVID-19, the nasopharynx and nasal cavity harbor the highest viral load and protective precautions must be enforced with addressing injuries or urgent conditions in this location. We recommend the use of enhanced PPE for providers performing bedside procedures on patients with unknown, suspected, or positive COVID-19 status including repair of facial lacerations, management of animal bite wounds, control of epistaxis, peritonsillar abscess drainage, or any other condition requiring invasive examination or instrumentation of the oral cavity, oropharynx, nasal cavity, or nasopharynx. Enhanced PPE is indicated due

to the increased risk aerosolization of saliva and nasal secretions in this setting. Patients presenting with operative facial fractures (eg, orbital, mandibular, nasal, Le Fort pattern fractures, etc.), should undergo preoperative COVID-19 diagnostic testing 48 hours prior to proceeding with elective surgical intervention with the patient kept in strict quarantine until the day of surgery. When possible, rapid COVID-19 testing should be repeated on the day of surgery. In scenarios warranting emergent surgical intervention (eg, rectus muscle entrapment, retrobulbar hemorrhage, flail mandible fractures, etc.) all operating room staff should utilize enhanced PPE as the COVID-19 status for these patients is unknown and should be presumed positive.

### 3.4 | Head and neck oncology

At tertiary referral centers, many patients with head and neck cancer have traditionally traveled far distances for oncologic care. In the setting of the COVID-19 pandemic, concerns exist for exposing patients to the disease in the hospital setting. Retroactive to January 27, 2020, the federal government expanded telemedicine services under Medicare and Medicaid with HIPAA flexibilities.<sup>33</sup> This provides the ability to discuss pathology results and radiographic imaging findings with patients without direct contact, as well as continue important longitudinal cancer care. The more difficult decisions include delay of treatment for patients who are currently undergoing or starting chemoradiation. For patients with solid tumors, radiant adjuvant therapy with or without curative intent should proceed, despite the threat of COVID-19 infection during treatment.<sup>34</sup> As outlined in the CMS Adult Elective Surgery and Procedures Recommendations, cancer surgery is categorized as a tier 3a procedure and should not be postponed.<sup>15</sup> Although oncologic procedures may continue as scheduled with preoperative COVID-19 diagnostic testing and quarantine, operative intervention requires prioritization; for example, definitive radiation therapy for a T1/T2 laryngeal carcinoma instead of a high-risk microscopic laryngeal resection using CO<sub>2</sub>/KTP laser may be appropriate for some patients during the COVID-19 pandemic. Additional consideration may be given to patients undergoing resections requiring microvascular reconstruction due to anticipated postoperative hospitalization and use of hospital resources. Continued multidisciplinary discussions regarding all head and neck oncologic patients are essential. Similar to other otolaryngology procedures in patients with suspected or confirmed COVID-19, enhanced PPE should be used at all times.

### 3.5 | Nasal endoscopy and flexible fiberoptic laryngoscopy

The impact of COVID-19 on clinical activity at an academic otolaryngology department is expected to be substantial. Over a 9-week period during the SARS outbreak, weekly outpatient clinic visits at the Prince of Wales Hospital in Hong Kong declined by 59%, the number of operations performed dropped by 79%, the average hospital capacity rate reduced by 79%, and the daily admission rate diminished by 84%.<sup>35</sup> Furthermore, as viral density has been shown to be the highest in the nasal cavity and nasopharynx, elective diagnostics such as flexible laryngoscopy and nasal endoscopy should not be routinely performed in the office or inpatient setting. If endoscopic evaluation is required in the urgent or emergent setting, this should be only be performed using appropriate PPE and disposable nasal pledgets for decongestion and local anesthesia. A clinical study of 1491 otolaryngology service consultations at Duke University from 2017 revealed 995 (66.7%) consultations resulted in a bedside procedure and 243 (16.3%) consultations required operative intervention. In comparison to the emergency department, inpatient services more frequently requested consultation for airway evaluation (362 [47.3%] vs 143 [19.7%]) and nasal evaluation (79 [10.3%] vs 18 [2.5%]). During these evaluations, flexible fiberoptic laryngoscopy (554 [55.7%]) and rigid nasal endoscopy (109 [11.0%]) were two of the most commonly performed bedside procedures. In the operating room, direct laryngoscopy (47 [11.3%]), bronchoscopy (47 [11.3%]), and tracheotomy (41 [9.9%]) were three of the most commonly performed operations.<sup>36</sup> Continued demand for these critical services during the COVID-19 pandemic must be carefully evaluated by otolaryngologists on a case by case basis in light of CMS and AAO-HNS recommendations against elective endoscopy to mitigate risk of infectious spread and ensure patients who require such evaluations are carefully assessed using the proper precautions and appropriate PPE.

## 4 | CONCLUSION

The COVID-19 pandemic is a global health emergency. Worldwide, the number of afflicted patients continues to rise and as of April 13, 2020 is placed at 1883119 cases with over 117569 deaths.<sup>2</sup> As members of the highest-risk surgical community, it is our responsibility to be aware of the aforementioned signs and symptoms and to promptly escalate suspected cases, particularly in those patients who require

urgent or emergent otolaryngologic intervention. This discussion highlights important facts regarding COVID-19 for medical students, trainees, and surgeons and serves as a centralized resource for policymakers, health administrators, and hospital leadership as the medical field tirelessly combats this unprecedented viral outbreak.

### CONFLICT OF INTEREST

The authors declare no conflicts of interest.

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