Received: 31 March 2020 | Accepted: 7 April 2020

DOI: 10.1002/lio2.389

REVIEW

Laryngoscope Investigative Otolaryngology

Literature-guided recommendations for otolaryngologists during the COVID-19 pandemic: A contemporary review

Mausumi Syamal MD, MSE

Lehigh Valley Health Network, Division of Otolaryngology-Head & Neck Surgery (MS), University of South Florida, Morsani College of Medicine, Tampa, Florida

Correspondence
Mausumi Syamal, Lehigh Valley Health Network, 3701 Corriere Road, Suite 26, Easton, PA 18045.
Email: mausumi_n.syamal@lvhn.org

Abstract

Objective: The objective of this study was to review the current literature and guidelines on management of the novel coronavirus 2019 (COVID-19 or 2019nCoV) with respect to the field of Otolaryngology.

Design: Contemporary literature review.

Methods: Systematic literature review of global medical literature databases and communications were queried to find all available literature recommendations, research, and guidelines applicable to otolaryngologists in the COVID-19 pandemic.

Results: Guidance on personal protective equipment, office visits, and surgical scheduling, as well as recommendations for safe airway management and tracheotomy performance during the COVID-19 pandemic were compiled and interpreted.

Conclusions: Little guidance exists for otolaryngologists who are among the highest risk groups during the rapidly evolving COVID-19 pandemic. This synthesis and compilation of global resources serve as a building block for further guidance during the epidemic.

Level of Evidence: NA.

KEYWORDS

2019-nCoV, airway, COVID-19, otolaryngology

1 | INTRODUCTION

In December 2019, a mysterious and rapidly growing cluster of respiratory illnesses originating in the Huanan Seafood Wholesale Market devastated the Wuhan, Hubei Province of China.[1,2] It was not until 3 January 2020 that the illness, named the 2019 novel coronavirus (2019-nCoV or COVID-19) was identified in samples of bronchoalveolar lavage fluid from a patient in Wuhan and was confirmed as the cause of the pneumonia.[3] Genome analysis indicated that 2019-nCoVis is a distinct subset of betacoronaviruses associated with human severe acute respiratory syndrome (SARS) and Middle East respiratory syndrome.[3] The 2019-nCoV has close similarity to bat coronaviruses, and it has been suggested that bats were the primary source.[4]

The presenting symptoms are fever, cough, and shortness of breath with potential progression to acute respiratory distress syndrome (ARDS) within 2 to 8 days.[4,5] Spread occurs primarily through droplets and respiratory secretions (coughs and sneezes) placing otolaryngologists at high risk because of contact with the upper respiratory tract. The first documented global fatality of a physician was that of an otolaryngologist in Wuhan on 25 January 2020.[6] The median incubation period of the virus is estimated to be 5.1 days with 97.5% of those who develop symptoms doing so within 11.5 days.[7] Thus, there exists a time period during which patients are active viral

shedders or "silent sentinels" before they become symptomatic, keeping in mind that some exhibit no symptoms.[8] The aim of this contemporary review was to identify opportunities to prevent transmission of the virus and to protect both patients and otolaryngologists, through interpretation of the literature viewed in the light of our daily practice.

2 | METHODS

Global medical literature databases and communications were queried to find all available literature recommendations, research, and guidelines applicable otolaryngologists in the COVID-19 pandemic. Ovid MEDLINE, PubMed, and COCHRANE databases were searched for all available years first for the terms "COVID-19" or "2019-nCoV." Results including the terms "intubation" or "tracheostomy/tracheotomy" or "otolaryngology" or "airway" were then extracted. Articles for which full abstracts or papers were not retrievable or translatable were excluded. Additionally, internet Google and Bing search engine results for "COVID-19" and "otolaryngology" or "ear, nose and throat" were included. Results that were not relevant to otolaryngologists were excluded. All relevant search results were translated using translation software (whenever necessary) and sources cross-referenced.

3 | RESULTS

Initial review included 1202 abstracts. Seven articles including case reports and case series met inclusion criteria and were included in the qualitative analysis. Search engine and cross-referencing results yielded an additional 22 resources. Eight articles were obtained from colleagues in their revision stages. Thirty-seven sources were deemed to contain relevant information for this compilation.

4 | DISCUSSION

4.1 | Personal protective equipment

As there is no current vaccine for 2019-nCoV, the Centers for Disease Control and many other entities recommend that the best way to prevent infection is to avoid exposure.[9] However, avoiding exposure may not be possible or even an option. In one of the first case series documenting clinical course and a high mortality rate (15%), Huang and colleagues state "airborne precautions, such as a fit-tested N95 respirator, and other personal protective equipment (PPE) are strongly recommended. To prevent further spread of the disease in health-care settings that are caring for patients infected with 2019-nCoV."[5]

Like other CoVs, 2019-nCoV is a positive stranded RNA virus with a spiked-glycoprotein envelope that is sensitive to ultraviolet rays and heat.[10] Furthermore, this virus can be inactivated by lipid solvents including ether (75%), ethanol, chlorine-containing disinfectant, peroxyacetic acid, and chloroform except for chlorhexidine.[11] This is important to note, as many surgical centers provide the option of chlorhexidine scrubs which should not be used if COVID-19 is a concern.

The current CDC recommendations for health care workers treating suspected or confirmed COVID-19 patients echo those abroad[12] recommending (a) nonsterile disposable patient examination gloves, (b) nonsterile, disposable patient isolation gowns, and (c) a surgical N95 (also referred as a medical respirator) for those who need protection from both airborne and fluid hazards (eg, splashes, sprays).[13] The use of Powered Air Purifying Respirators (PAPR) masks, especially in the surgical setting, is controversial.[14] Given the proximity to nasal-respiratory secretions, it is prudent for otolaryngologists to wear surgical N95 masks especially if performing any aerosolizing procedures (nasal sprays, nasal and laryngeal endoscopy, etc.). In a safety consensus statement for otolaryngologists, Givi and colleagues propose a risk-stratified approach to PPE combined with masking (surgical) the patient for high-risk aerosol-generating procedures.[15] At the time of drafting this document, N95 masks were scarce, prompting the CDC to advocate re-use of unsoiled masks and the "use homemade masks (eg, bandana, scarf) for care of patients with COVID-19 as a last resort."[16] Additionally, specific protocol must be followed in removing personal protective equipment to prevent contamination in the process.

4.2 | Office/routine clinical visits

In the first directed guide for otolaryngologists during the COVID-19 pandemic, Kai and colleagues in China share that "in view of the high-risk exposure of the ear, nose, throat and neck surgical staff, the non-acute and non-critical routine outpatient and ward work should be reduced as far as possible to cooperate with the national epidemic prevention and control."[17] The rationale stems from the thought that head and neck examination can evoke coughing, pharyngeal reflexes (gagging), and sneezing thereby producing droplets that can carry the virus splashed to a distance of 1 to 2 m, and make the virus aerosolized. The authors go further to state that certain procedures are at risk of spraying, such as nasal sprays/lavage, nosebleed control, and emergency tracheotomy. Accordingly, they recommend tertiary or droplet protection if those procedures are performed. The American Academy of Otolaryngology–Head and Neck Surgery (AAO-HNS) recommends that "during in-office examinations, topical medications are more safely applied using pledgets rather than by spray."[18]

In an international consensus statement for safety recommendations for head and neck surgery, Givi and colleagues suggest "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."[13] Although there may be a benefit to delay treatment for less aggressive head and neck cancers, it is recommended that the risks of COVID-19 transmission be carefully weighed against the risk of cancer progression and survival outcomes for advanced-stage or aggressive cancers.[19]

Pre-screening procedures become mainstay, with pre-visit questionnaires inquiring about recent travel, fever, cough, or shortness of breath, with patients answering positively directed to COVID-19 testing sites or self-quarantine and symptom monitoring.[6] A unique symptom that may present to the otolaryngologist is anosmia. Evidences from South Korea (30% as major presenting symptom), Italy, China, Iran, France, and Germany (60% in 2019-nCoV+ patients) have all reported anosmia.[20]

If exposure to a COVID-19 positive patient is known after an encounter, the CDC recommends a "conservative approach to…monitoring and restriction from work (14 days after last exposure)" with high and medium risk exposures (stratified based on PPE present on the provider and facemask on the patient).[9] If signs and symptoms develop, otolaryngologists should immediately report to their health facility as well as state and local health authorities who will direct further consultation and testing.

4.3 | Surgical cases

Echoing the recommendations of Centers for Medicare and Medicaid Services and the American College of Surgeons, the AAO-HNS released a statement on 19 March 2020, recommending "limiting all non-essential planned surgeries and procedures, including dental, until further notice."[14] Cases were to be performed based on a tiered surgical framework created by Sameer Siddiqui MD, FACS, at St Louis University which stratifies procedures based on acuity, with only high acuity cases being performed.[21] Regarding pediatric otolaryngologic surgical cases, Parikh and colleagues suggest that cases are deemed "urgent if postponement of surgery could negatively impact a child's overall health or developmental outcomes, and a delay of 6 weeks could result in those outcomes being measurably worse."[22]

The AAO-HNS statement also acknowledged the evolving evidence that otolaryngologists are among the highest risk group when performing upper airway surgeries and examinations, stating a high rate of transmission of COVID-19 to otolaryngologists has been reported from China, Italy, and Iran, many resulting in death. It is believed that viral density is greatest in the nose and nasopharynx and instrumentation in and through these areas would expectedly lead to increased risk.

Otologic procedures which require drilling, aerosolize virus particles in an enclosed space, making mastoidectomy procedures as high-risk as sinonasal procedures.[13,23] As such Saadi and colleagues recommend the use of PAPR if high-speed drills are required as well as preoperative testing 48 hours prior to surgery, strict quarantine pending test results, and repeat testing on the day of otologic surgery.[24]

Although the AAO-HNS's recommendations do not address procedures such as flexible laryngoscopy with or without stroboscopy and nasal endoscopy specifically, they can be reasonably extended to require "extreme caution" when proceeding through a transnasal or trans-oral route. Surgical procedures should be performed only after ascertaining the COVID-19 status and if positive performed only with PAPR.

Front of neck procedures such as thyroidectomy and neck dissection procedures are considered low risk only if they do not violate the mucosa with added caution to the use of electrocautery which can aerosolize virus present in the bloodstream.[13,15] Notably, facial trauma such as "lacerations that involve mucosal surfaces should be treated as high risk."[14]

4.4 | General airway management

As COVID-19 has spread from the epicenter in China, several global colleagues developed airway consensus statements and guidelines to address the rate-limiting factor in transmission: respiratory droplet spread. Droplets are affected by gravity and may cause direct transmission from close contact or contribute to surface contamination (where the virus may remain active for hours to days).[25] As many airway management procedures can generate aerosols composed of smaller virus containing particles suspended in air such as coughing, sneezing, positive pressure ventilation, high flow nasal oxygen including OptiFlow devices, nebulization of medications, cardiopulmonary resuscitation, tracheal suction, and tracheal extubation.[26] Specific procedures cited as high vulnerability to aerosolization include laryngoscopy, intubation, bronchoscopy, gastroscopy, tracheotomy, and cricothyroidotomy.[18]

In a consensus statement for airway management during the COVID-19 pandemic, Brewster, as well as colleagues in China, Boston, and Oregon, stress the importance of early intubation by the most experienced professional (avoid trainees) with a video laryngoscope with only the necessary team members in the room using full droplet PPE.[27,28] They recommend a minimum of 5 minutes pre-oxygenation with a "(V-E) grip to maximize the facemask" seal while avoiding a high flow. A critical component of the airway circuit is the presence of a viral filter between the facemask/endotracheal tube and remainder of circuit. It is also recommended that manual ventilation is minimized unless required for rescue. Rapid sequence intubation was the recommended[29] and default technique, achieving neuromuscular blockade with rocuronium (>1.5 mg/kg IBW) or suxamethonium (1.5 mg/kg TBW).[18]

Looking with a fiberoptic flex scope prior to intubation is not recommended. It does not change management in a suspected COVID-19 patient and risks avoidable exposure to aerosolization. If an irreversible obstruction to the airway is present (stenosis, laryngeal tumor, etc.) that prevents intubation, then tracheotomy should proceed according to COVID-19 status.[30] Avoidance of laryngeal de-bulking or airway manipulation is recommended by both the United Kingdom and South African Otolaryngology associations.[22,31] Additionally, Brewster and colleagues suggest that minimizing cuff leaks (this might mean accepting higher-than-normal cuff pressures or using a larger tube than we would normally suggest) to prevent aerosolization. There is also universal agreement that extubation must proceed with the same precautions as intubation.

4.5 | Tracheotomy

In one of the largest cohorts of critically ill patients, Yang and colleagues studied 710 patients with COVID-19 pneumonia comparing

survivors to non-survivors.[32] With 67% developing ARDS with a median time from admission to ICU to death being 7 days, an early tracheotomy procedure is not clinically indicated for COVID-19 positive patients and may results in vast consumption of PPE due to aerosolization during the procedure.[24] Tay and colleagues recommend that tracheotomy "procedures should be avoided or delayed (even well beyond 14 days)…until such time as the acute phase of infection has passed."[33] Conversely, Balakrishnan et al suggest that in COVID-19 positive patients at "risk of failed primary extubation, cuffed tracheostomies allow better infection control than aerosol-generating extubations, involving CPAP/high flow oxygen, and urgent re-intubation."[34] If a tracheotomy is needed in a known COVID-19 positive patient, it is recommended that the performing surgeon discuss the necessity with the requesting consultant and weigh the risks and benefits.

In the event a tracheotomy is needed electively, both United Kingdom (ENT UK) and The South African Society of Otorhinolaryngology (drafted from UK guidelines) recommend "COVID-19 testing to be performed in all patients prior to elective tracheostomy" during the pandemic. If status is negative, tracheotomy should proceed according to standard operating procedures. This is concordant to the AAO-HNS's stance that "surgical procedures should be performed only after ascertaining the COVID-19 status."[14]

If COVID-19 status is unknown and intubation cannot be performed, then a tracheotomy should be performed in the same manner as if the patient were positive—utilizing surgical N95 masks and fluid-resistant gown and full face shield and visor.[22] Performance of the tracheotomy may be in a negative-pressure operating room, or at the bedside in the ICU in negative-pressure rooms to reduce unnecessary transport.[29] Tracheotomy steps cited by Harrison and Ramsden were as follows:

- Most skilled anesthesia and otolaryngology staff perform the procedure, to ensure that the procedure is safe, accurate, and swift.
- Reduce team members to essential staff.
- Use mask, full face visor, fluid resistant gowns for all, consider double gloving.
- A cuffed, non-fenestrated tracheotomy tube should be used to avoid aerosolizing the virus.
- Every effort should be made not to pierce the cuff of the endotracheal tube.
- Advancement of the endotracheal tube should be performed prior to making the tracheotomy window.
- If possible, cease ventilation while the window in the trachea is being performed, and check that the cuff is still inflated before resuming ventilation.
- Ventilation should cease prior to tracheotomy tube insertion and ensure swift and accurate placement of tracheotomy tube with prompt inflation of the cuff.
- Confirm placement with end tidal CO_2.
- Ensure that there is no leak from the cuff and that the tube is secured in position.
- Cuff pressures should be maintained between 25 and 30 cm H_2O.[26]
- Heat and moisture exchanger (HME) or viral filter should be placed on the tracheotomy to reduce shedding of the virus should the anesthesia tubing be disconnected.[35]
- Avoid disconnecting HME but, if necessary, disconnect distal to HME.

In a 2003 series of three SARS coronavirus patients requiring tracheotomy (one urgent and two at day 14 of intubation) during which no medical team member was infected, the techniques were similar to those discussed above with additional tips to avoid diathermy which "can produce small particles that may act as a vehicle for the virus" and to perform only closed system suctioning with a viral filter.[36]

Postoperatively, patients with a tracheotomy may be covered with a closed system identical to that used when a patient is connected to a mechanical ventilator to minimize the aerosol generation, especially given the suction requirements.[6] The Royal College of Anesthetists suggests avoiding humidified wet circuits which risk contamination if there is an unexpected circuit disconnection. Additionally, United Kingdom recommends avoiding changing the tracheotomy tube until COVID-19 has passed. It also advised to meticulously check the cuff for leaks and prevent any circuit disconnections. Only closed, in-line suctioning was recommended. In a series of six tracheotomy procedures performed on COVID-19 positive patients, post-tracheotomy outcomes were mixed (two deaths, two comatose, and two remain hospitalized).[37] Notably no otolaryngologists were infected this series by Cui, and all tracheotomies were performed with PAPR.

5 | CONCLUSIONS

The COVID-19 pandemic has fostered a great need for international medical collaboration. Although existing studies and consensus are emerging, the need for guidance for otolaryngologists is critical, as we are inevitably on the frontlines. As in any battle, armor is critical. As shortages of N95 masks and gowns emerge, the need to run PPE-lean systems requires planning, care, and education. As recommended by numerous agencies, elective and nonessential procedures and visits should be curtailed to preserve resources for those most at risk. Procedures contacting the areas of respiratory secretions where viral load is highest must be minimized. Exponential propagation of a pandemic occurs not by the "Symptomatic Sams." or those who exhibit symptoms, but rather through the "Silent Sentinels," those who shed the virus asymptomatically. It is hoped that this compilation will provide a foundation for guidance in a rapidly evolving landscape of the novel coronavirus pandemic and that it will help otolaryngologists by emphasizing our special risks, as well as the fact that our afebrile, asymptomatic patients may have and spread the virus. We should approach all patients as if they have COVID-19 until the pandemic has ended.

AKNOWLEDGMENTS

The author would like to acknowledge all the Otolaryngologists that have served and continue to serve on the frontlines of the COVID-19 pandemic. A special thank you to Robert T. Sataloff, MD, for his insights and guidance in the reviewing and editing process.

CONFLICTS OF INTEREST

The authors declare no potential conflict of interest.

ORCID

Mausumi Syamal https://orcid.org/0000-0003-4525-4920

BIBLIOGRAPHY

1. Lu H, Stratton CW, Tang YW. Outbreak of pneumonia of unknown etiology in Wuhan China: the mystery and the miracle. *J Med Virol*. 2020;92:401-402. https://doi.org/10.1002/jmv.25678.
2. Wuhan Municipal Health Commission. Report of clustering pneumonia of unknown etiology in Wuhan City. 2019. http://wjw.wuhan.gov.cn/front/web/showDetail/2019123108989
3. Zhu N, Zhang D, Wang W, et al. China Novel Coronavirus Investigating and Research Team. A novel coronavirus from patients with pneumonia in China. *N Engl J Med*. 2019;382:727-733. https://doi.org/10.1056/NEJMoa2001017.
4. Wang D, Hu B, Hu C, et al. Clinical characteristics of 138 hospitalized patients with 2019 novel coronavirus-infected pneumonia in Wuhan, China. *JAMA*. 2020;323(11):1061-1069.
5. Huang C, Wang Y, Li X, et al. Clinical features of patients infected with 2019 novel coronavirus in Wuhan, China. *Lancet*. 2020;395:497-506.
6. Chan JYK, Wong EWY, Lam W. Practical aspects of otolaryngologic clinical services during the 2019 novel coronavirus epidemic: an experience in Hong Kong. *JAMA Otolaryngol Head Neck Surg*. 2020;20. https://doi.org/10.1001/jamaoto.2020.0488.
7. Lauer SA, Grantz KH, Bi Q, et al. The incubation period of coronavirus disease 2019 (COVID-19) from publicly reported confirmed cases: estimation and application. *Ann Intern Med*. 2020. https://doi.org/10.7326/M20-0504.
8. Cheng X, Liu J, Li N, et al. Providers must be alert for mild and asymptomatic COVID-19 patients. *Otolaryngol Head Neck Surg*. 2020. https://doi.org/10.1177/0194599820920649.
9. National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases. Coronavirus disease 2019 (COVID-19). https://www.cdc.gov/coronavirus/2019-ncov/. Accessed March 20, 2020.
10. Perlman S, Netland J. Coronaviruses post-SARS: update on replication and pathogenesis. *Nat Rev Microbiol*. 2009;7(6):439-450.
11. Cascella M, Rajnik M, Cuomo A, et al. Features, evaluation and treatment coronavirus (COVID-19). Istituto Nazionale Tumori - IRCCS - Fondazione Pascale, Via Mariano Semmola 80100, Napoli. Italy. Internet StatPearls.
12. Liang T. *Handbook of COVID-19 Prevention and Treatment*. Zhejiang, China: The First Affiliated Hospital, Zhejiang University School of Medicine; 2020.
13. Centre for Health Protection. Recommended personal protective equipment (PPE) in hospitals/clinics under serious/emergency response level. https://www.chp.gov.hk/files/pdf/recommended_ppe_for_nid_eng.pdf. Accessed March 20, 2020.
14. Roberts V. To PAPR or not to PAPR? *Can J Respir Ther*. 2014;50(3):87-90.
15. Givi B, Schiff BA, Chinn SB, et al. Safety recommendations for evaluation and surgery of the head and neck during the COVID-19 pandemic. *JAMA Otolaryngol Head Neck Surg*. 2020;31. https://doi.org/10.1001/jamaoto.2020.0780.
16. National Center for Immunization and Respiratory Diseases (NCIRD), Division of Viral Diseases. Crisis capacity strategies. https://www.cdc.gov/coronavirus/2019-ncov/hcp/ppe-strategy/face-masks.html. Accessed March 20, 2020.
17. Xu K, Lai XQ, Liu Z. Recommendations of the surgical staff of the otolaryngology and neck on the protection of the new coronavirus infection. *Chin J Otolaryngol Neck Surg*. 2020;55:E001.
18. The American Academy of Otolaryngology-Head and Neck Surgery. Coronavirus-2019 update. http://msg.entnet.org/q/1tdYo6AUWhB4tC0osR8A1ZfJ/wv. Accessed March 20, 2020.
19. Werner MT, Carey RM, Greer Albergotti W, Lukens JN, Brody RM. Impact of the COVID-19 pandemic on the management of head and neck malignancies. *Otolaryngol Head Neck Surg*. 2020.
20. Hopkins C, Kumar N. Loss of sense of smell as marker of COVID-19 infection. ENTUK Royal College of Surgeons. https://www.entuk.org/loss-sense-smell-marker-covid-19-infection. Accessed March 21, 2020.
21. Siddiqui S. Elective Surgery Acuity Scale (ESAS). St Louis University. Cited by CMS & ACS https://www.facs.org/about-acs/covid-19/information-for-surgeons/triage. Accessed March 20, 2020.
22. Parikh SR, Bly RA, Bonilla-Velez J, et al. Pediatric otolaryngology divisional and institutional preparatory response at Seattle Children's Hospital after COVID-19 regional exposure. *Otolaryngol Head Neck Surg*. 2020.
23. Pitkäranta A, Jero J, Arruda E, Virolainen A, Hayden FG. Polymerase chain reaction-based detection of rhinovirus, respiratory syncytial virus, and coronavirus in otitis media with effusion. *J Pediatr*. 1998;133(3):390-394.
24. Saadi RA, Bann DV, Patel VA, et al. A commentary on safety precautions for otologic surgery during the COVID-19 pandemic. *Otolaryngol Head Neck Surg*. 2020.
25. Environmental Cleaning and Disinfection Recommendations: Interim Recommendations for US Households with Suspected/Confirmed Coronavirus Disease 2019. https://www.cdc.gov/coronavirus/2019-ncov/community/home/cleaning-disinfection.html. Accessed March 20, 2020.
26. Brewster DJ, Chrimes NC, Do TBT, et al. Consensus statement: Safe Airway Society principles of airway management and tracheal intubation specific to the COVID-19 adult patient group. *Med J Aust*. 2020; [Epub ahead of print].
27. Meng L, Qiu H, Wan L, et al. Intubation and ventilation amid the COVID-19 outbreak: Wuhan's experience. *Anesthesiology*. 2020; [Epub ahead of print].
28. Zucco L, Levy N, Ketchandji D, et al. Recommendations for Airway Management in a patient with suspected coronavirus (2019-nCoV) infection. The Anesthesia Patient Safety Foundation (APSF). Adapted from Kamming D, Gardam M, Chung FI. Anaesthesia and SARS. *Br J Anaesth*. 2003;90:715-718.
29. Zuo MZ, Huang YG, Ma WH, et al. Recommendations for tracheal intubation in critically ill patients with noval coronavirus disease 2019. Chinese Society of Anesthesiology Task Force on Airway Management. *Chin Med Sci J*. 2020.
30. Harrison L, Ramsden J. Guidance for surgical tracheostomy and tracheostomy tube change during the COVID-19 pandemic. ENTUK Organization. The Royal College of Surgeons. https://www.entuk.org/tracheostomy-guidance-during-covid-19-pandemic. Accessed March 2, 2020.
31. The South African Society of Otorhinolaryngology published guidelines for tracheostomy and tracheostomy tube changes during the COVID-pandemic; 2020.
32. Yang X, Yu Y, Xu J, et al. Clinical course and outcomes of critically ill patients with SARS-CoV-2 pneumonia in Wuhan, China: a single-centered, retrospective, observational study. *Lancet Respir Med*. 2020. pii: S2213-2600(20)30079-5. https://doi.org/10.1016/S2213-2600(20)30079-5.

33. Tay JK, Khoo ML, Loh WS. Surgical considerations for tracheostomy during the COVID-19 pandemic: lessons learned from the severe acute respiratory syndrome outbreak. *JAMA Otolaryngol Head Neck Surg*. 2020. https://doi.org/10.1001/jamaoto.2020.0764.
34. Balakrishnan K, Schechtman S, Hogikyan ND, et al. COVID-19 pandemic: what every Otolaryngologist–Head & Neck surgeon needs to know for safe Airway Management. *Otolaryngol Head Neck Surg*. 2020.
35. Zhonghua J. Expert consensus on preventing nosocomial transmission during respiratory care for critically ill patients infected by 2019 novel coronavirus pneumonia. *Zhonghua Jie He He Hu Xi Za Zhi*. 2020;17:E020.
36. Wei WI, Tuen HH, Ng RW, Lam LK. Safe tracheostomy for patients with severe acute respiratory syndrome. *Laryngoscope*. 2003 Oct; 113(10):1777-1779.
37. Cui C, Yao Q, Zhang D, et al. *Approaching Otolaryngology Patients during the COVID-19 Pandemic*. Otolaryngol Head Neck Surg; 2020. https://doi.org/10.1177/0194599820919751.

How to cite this article: Syamal M. Literature-guided recommendations for otolaryngologists during the COVID-19 pandemic: A contemporary review. *Laryngoscope Investigative Otolaryngology*. 2020;5:432–437. https://doi.org/10.1002/lio2.389