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Voice Therapy in the Context of the COVID-19 Pandemic: Guidelines for Clinical Practice

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Summary: Introduction. Since the beginning of the new pandemic, COVID-19 health services have had to face a new scenario. Voice therapy faces a double challenge, interventions using telepractice, and delivering rehabilitation services to a growing population of patients at risk of functional impairment related to the COVID-19 disease. Moreover, as COVID-19 is transmitted through droplets, it is critical to understand how to mitigate these risks during assessment and treatment.

Objective. To promote safety, and effective clinical practice to voice assessment and rehabilitation in the pandemic COVID-19 context for speech-language pathologists.

Methods. A group of 11 experts in voice and swallowing disorders from five different countries conducted a consensus recommendation following the American Academy of Otolaryngology-Head and Neck Surgery rules building a clinical guide for speech-language pathologists during this pandemic context.

Results. The clinical guide provides 65 recommendations for clinicians in the management of voice disorders during the pandemic and includes advice from assessment, direct treatment, telepractice, and teamwork. The consensus was reached 95% for all topics.

Conclusion. This guideline should be taken only as recommendation; each clinician must attempt to mitigate the risk of infection and achieve the best therapeutic results taking into account the patient's particular reality.

Key Words: COVID-19—Phoniatrics—Speech-language pathology—Telepractice—Voice disorders—Voice therapy.

INTRODUCTION

As a result of the COVID-19 pandemic, health services have had to face a new scenario regarding patient care due to the rapid advance of the virus and the large number of patients requiring medical care and hospitalization.^{1,2} Clinicians who work in the context of voice disorders such as phoniatrists³ and speech-language pathologists (SLPs) must continue providing health services to patients in need. Stopping this type of health benefit could affect the professional duties and emotional lives of people with voice disorders.⁴

In this context, voice therapy faces two challenges: intervention via telepractice which is a feasible and useful

alternative,^{4–8} and the challenge of increased demand for services due to a growing population of patients who are at risk of vocal impairment due to the COVID-19 disease itself,⁹ or secondary to invasive mechanical ventilation (IMV) in severe cases of the disease. The evidence indicates that the duration of intubation is associated with the prevalence and severity of laryngeal injuries resulting in a higher risk of dysphonia (76%) and dysphagia (49%), after extubation.¹⁰ Moreover, Lechien et al have estimated that a quarter of the patients with COVID-19 have presented with symptoms of mild to moderate dysphonia.⁹ According to the study, this could be related to unpublished data from the Anatomy Department of the University of Mons: the vocal folds' epithelium in subjects with COVID-19 was found to present a high expression of angiotensin-converting enzyme 2 (ACE-2). This data could explain the etiology of vocal fold edema of the dysphonia related to COVID-19.⁹

Since the severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2) is transmitted through droplets, clinicians who provide voice therapy, require an in-depth understanding of this disease to mitigate personal exposure and transmission of the virus.^{9,11–14} This risk increases during procedures such as voice evaluation and therapy. Regular speech, loud speaking, and singing generate air particles with an emission rate depending on the vocal intensity which could affect the probability of transmission of respiratory infectious diseases.^{15–17}

Knowledge about this pandemic is constantly changing and guidelines are quickly being created and updated. However, very little has been written about voice therapy during

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this period. Furthermore, clinical guidelines on upper airway management in the COVID-19 context are limited and mainly directed at Ear, Nose, and Throat specialists for patients with a tracheotomy, anesthesia procedures, and intensive care.^{11,18,19} Nevertheless, it is important that patients who were in treatment prior to the pandemic can continue with voice therapy.

PURPOSE

This guideline aims to promote safety and effective clinical practice to voice assessment and rehabilitation in the pandemic COVID-19 context for SLPs and phoniatricians. Specific objectives are (1) to provide essential guidance related to voice assessment and intervention via telepractice, (2) to give recommendations to SLPs and phoniatricians who work with patients that need postacute care secondary to IMV in the ICU (Intensive Care Unit), and (3) to contribute to reduce the risk of transmission of SARS-CoV-2 from patient to professional. Recommendations were organized by personal protection and prevention measures, telepractice and voice therapy, the clinical approach after IMV, and psychosocial considerations related to voice therapy and teamwork.

Like many other health professionals, it is known that SLPs and phoniatricians' scientific background and practices may vary significantly from country to country.^{20–22} Local considerations, such as access to resources and prevalence of disease, should be considered.

METHODS

This manuscript was based on the recommendations of the American Academy of Otolaryngology-Head and Neck Surgery (AAO-HNS) for designing clinical guidelines,²³ and was carried out by a group of experts in voice and swallowing disorders. The criteria for including the experts were (1) to have more than 10 years of experience in the field, (2) to have a graduate education, and (3) to be currently working in a clinic, hospital, or academic institution. Eleven clinicians were finally included from various countries of Latin America: Argentina, Brazil, Chile, Colombia, Mexico. One Chilean SLP and one Argentine SLP, residing in the United States were also included.

A literature review was conducted in PubMed and Embase databases, using the following terms: "COVID-19," "SARS-CoV-2," "personal protective equipment," "PPE," "voice disorders post-IMV," "swallowing disorders post-IMV," "voice therapy" and "telepractice." The search was centered on a period of 20 years, mainly to cover the highest possible literature linked to telepractice. Boolean operators "AND" and "OR" were used to specified queries. Also, the clinical guidelines of international societies and groups (eg, American Speech-Language-Hearing Association [ASHA], Speech Pathology Australia [SPA], Occupational Safety and Health Administration [OSHA], Centers for Disease Control and Prevention [CDC], Ear, Nose & Throat - Royal College of Surgeons [ENT UK]) were reviewed.

The recommendations were elaborated considering the scientific evidence related to the topic and taking into account the researchers' professional experience. Developing consensus recommendations were decided to be a priority, given the urgent nature of the guidance. It was decided that an 80% agreement was required to approve each of the recommendations described in this clinical guide. To avoid the "bandwagon effect" (the phenomenon in which the rate of adoption of beliefs, ideas, or trends increases when they have already been adopted by others),²⁴ this procedure was carried out through a blinded vote, in order not to affect the decision-making. Sixty-five recommendations were made. The consensus reached 95% for all topics.

PERSONAL PROTECTION AND PREVENTION MEASURES

SARS-CoV-2 is a type of coronavirus that produces COVID-19 disease. Person-to-person transmission can occur when an infected individual emits particles containing the virus by coughing, sneezing, talking, and singing.^{15,25} These particles fall onto the respiratory or conjunctival mucosa of the other person, usually up to a distance of 1.8 meters (70.8 inches, even more).²⁶ In the same way, droplets can be deposited on object surfaces, where the virus can be transmitted to other people when it comes into contact with them. Therefore, it is crucial to consider the potential risk of transmission by contact with aerosol residues on surfaces, where the virus can live for up to 9 days; that time can be reduced in temperatures higher than 30°Celsius.²⁷ In the case of aerosols, the half-life of the SARS-CoV-2 virus can range from 1.1 to 1.2 hours, with persistent activity 3 hours after generation.²⁸

According to the World Health Organization (WHO), aerosol-generating procedures (AGPs) are defined as any clinical procedure that produces particles in the environment (aerosols),²⁹ such as voice therapy, and instrumental voice evaluation.³⁰ Considering the risk of contagion of COVID-19, clinicians must adopt the necessary personal protection measures to decrease the risk of spread. These measures include the rational and appropriate use of personal protective equipment (PPE), that is, the right sequence for donning and doffing PPE, clinical judgment to postpone nonurgent interventions, and thorough cleaning of instruments or items in contact.

Considerations associated with voice procedures

Considering the classification of risk levels for occupational exposure to SARS-CoV-2 proposed by OSHA,³¹ clinicians may be at medium to very high risk.³¹ The medium level consists of interaction with patients who do not know their contagious state or with patients suspected of having COVID-19. The very high level consists of performing procedures that, for example, induce cough in patients confirmed or suspected of having COVID-19. Table 1 shows an organization of procedures related to voice assessment and therapy categorized by risk level.

TABLE 1.
Evaluation and Voice Therapy Procedures Organized According to Risk Levels for Occupational Exposure to COVID-19 Proposed by the OSHA

Risk	Procedure	Justification
Low risk	Telepractice Perceptual assessment	OSHA classifies occupational activities that do not require contact with people known to be, or suspected of being infected with COVID-19. Therefore, there is minimal occupational contact with the public and other coworkers. Examples include clinicians who do not have frequent close contact with coworkers, patients, or the public (visual and perceptual observations), and healthcare workers providing only telemedicine services.
Medium risk	Electroglottographic assessment (using mask). Acoustic assessment	Occupational activities that require frequent/close contact with people who may be infected, but who are not known to have or suspected of having COVID-19, including clinicians who may have contact with the general public at busy staff work areas within a healthcare facility.
High risk	Voice therapy in office. Voice therapy during hospitalization. Aerodynamic assessment.	Clinicians with a high potential for exposure to known or suspected sources of COVID-19 include: Voice procedures in patients who are hospitalized (not for COVID-19) who may be suspects and are under therapy. In this category are also included not involving aerosol-generating procedures with known or suspected COVID-19 patient.
Very high risk	Laryngeal endoscopic evaluation by rigid or flexible laryngoscopy)	Clinicians with a very high potential for exposure to known or suspected sources of COVID-19 during specific clinical procedures, including performing aerosol-generating procedures (endoscopic laryngeal assessment or aerodynamic evaluation) on known or suspected COVID-19 patients.

In line with occupational health and safety recommendations, to control the spreading of SARS-CoV-2, three elements are considered (1) engineering controls, (2) administrative controls, and (3) use of PPE.^{32,33} Engineering controls include physical barriers or partitions, and the adequacy of Airborne Infection Isolation Rooms with adequate ventilation.³⁴ Within the administrative controls, it is suggested to restrict the number of people in offices and rooms. Additionally, clinicians should be trained in the appropriate use of PPE and have safe work practices.^{30,35,36} These practices include working from clean to dirty areas and limiting contact with contaminated areas or objects (eg, touching the mask to adjust it when in contact with the patient or touching your face after contact with contaminated surfaces). It is also important to avoid cross-contamination by touching surfaces with contaminated gloves.³⁴

Regarding the use of PPE, the Standard 1910 (Occupational Safety and Health Standards), which is part of the 29 Code of Federal Regulations published by OSHA regulates the use of these elements. In its subpart I, the Standard 1910, mentions that health workers should use PPE when in contact with suspected or confirmed patients with COVID-19 or other sources of SARS-CoV-2. The OSHA recommends the use of NIOSH-certified N95 and PPE respirators. It is important to note that before the use of PPE, fit testing and usage training should be performed to instruct the clinician how to appropriately handle PPE before, during, and after procedures and to ensure adequate fit of the mask.³⁷

The use of N95 masks or PPE respirators for voice clinicians is considered mandatory for aerosol producing

procedures for two fundamental reasons (1) the presence of anosmia and dysgeusia in patients with COVID-19 suggests a high viral load within the nasal cavity and nasopharynx, and (2) cough droplets are between 0.1 and 100 μm in size,³⁸ which regular masks do not filter adequately.³⁹ Even though it remains unclear if ocular exposure is a source of transmission,⁴⁰ eye protection is recommended in healthcare environments with a moderate risk of viral transmission. The use of the facemask prevents contact of the virus with the face of the clinician, and therefore, contamination of the subject during and after procedures. The positioning and removal of PPE can cause contamination if not done correctly.

Some of the tasks that can be found in a standard upper airway and voice evaluation can be defined as AGPs.³⁵ Such tasks include loud voicing, singing, specific voice assessment tasks, and instrumental respiratory and aerodynamic function testing. For example, when measuring maximum phonation time (MPT) in a patient with a hyperirritable larynx syndrome, a cough can readily be induced.

The CDC has made recommendations regarding PPE for AGP.³⁴ The following suggestions for voice assessment are extrapolated from the CDC recommendations:

- Clinicians in the room should wear an N95 or higher level respirator, face shield, gloves, and a long-sleeved gown.
- The number of clinicians present in the room should be limited to only those essential for patient care and procedure support. Visitors should not be present for the procedure.

- c. Voice evaluation can ideally take place in an airborne infection isolation room.³⁴
- d. Clinicians and patients should keep a 1.8 m (70.8 inches) distance with a sneeze guard or plexiglass between them. These can work as barriers to reduce droplets from a sneeze or cough to spreading on a person on the other side of the plexiglass.
- e. The microphone should rest in a stand on the patient's side of the plexiglass with a standard distance of 30 cm (11.8 inches) from the patient's mouth.⁴¹ Headsets are not recommended at this time.
- f. Visual and perceptual observations should be performed standing/sitting at 1.8 m (70.8 inches) from the patient. Avoid removing the mask during evaluation. If essential to developing a clinical impression, assessments that require removing the mask should continue via telepractice.
- g. Clinicians should consider whether laryngeal palpation can be performed with modifications (standing to the side or from the back) and appropriate PPE.
- h. Clinicians should consider strategies for limiting interaction to 15 minutes or less since part of the evaluation can continue via telepractice.
- i. Clinicians should reduce any assessment tools that cannot be adequately cleaned between patients, for example, paper forms.
- j. The procedure room surfaces, and evaluation tools, even electronic devices such as computers or tablets, should be promptly cleaned and disinfected.
- k. Whenever possible, modifying the activity/task to reduce aerosolization is strongly recommended.
- l. Clinicians should exercise hand hygiene before and after each patient or even in between procedures.
- m. At this time, no guidelines regarding instrumental aerodynamic voice assessment are included given that the systems utilized are in close contact with the patient's mouth/nose, and its cleaning would require the turnover of multiple parts of the system.
- n. In the case of hospital based clinicians, follow the recommendations of centers in which they provide services, and try to keep good communication with infection control. For independent professionals, try to keep updated on risk and protective protocols.
- o. It is essential to consider the local reality, favoring the rational use of resources to ensure a sustainable supply of PPE, always taking into account the risk associated with the procedures described.

Considerations associated with the laryngeal endoscopic procedures

As previously stated in section 4, respiratory aerosols are droplet nuclei less than $5 \mu\text{m}$ in size.⁴² Therefore, laryngeal endoscopy (rigid or flexible, with or without stroboscopic light) represents a high-risk procedure since it requires a short physical distance between patients and the clinician. Moreover, during the endoscopic study, sneezing and

coughing can occur with the consequence of the potential transmission of the virus. In addition, considering that there are higher levels of spread and viral loads in the nose, the use of anesthetic sprays can aerosolize these viral particles. This situation can increase exposure to SARS-CoV-2 since the virus can remain in the air for more than 3 hours.⁴³ Even though The Royal College of Surgeons of England recommends performing endoscopies with a monitor (not through the eyepiece), there is a lack of consensus on whether to use rigid or flexible laryngoscopy.⁴⁴ Following standards of sterilization and disinfection procedures for endoscopes immediately after completing the laryngeal endoscopic procedure is warranted.⁴⁴

In addition to recommendations on section 4.1, guidelines for laryngeal endoscopies include:

- a. Clinicians should apply local anesthesia in the nose by placing soaked pledgets through the nares, avoiding sprays, which are AGP.
- b. For patients that will undergo a procedure that requires disrupting tissue (like an intratracheal injection of lidocaine, for example), COVID-19 test results are mandatory. Therefore, if this is a scheduled procedure, the patient must take the COVID-19 testing with enough time to get result prior to the procedure and practice self-isolation after the testing until he/she comes into the office.⁴⁵ If this procedure is decided during the visit, and the patient does not have the COVID-19 test results, the procedure should be rescheduled until test results are available.

TELEPRACTICE, GENERALITIES

The constant changes in the health sector obligate the clinician to adapt their practice to new scenarios.^{1,46} Telehealth, once seen as an excellent opportunity to bridge service gaps,⁴⁷ became the principal way to provide support to patients currently under speech therapy or new patients seeking it.^{48–50} This modality is a useful option, even for patients who may have been admitted to inpatient rehabilitation in the past,^{48,51} or for those who do not have voice disorders related to COVID-19. Besides, our social brain is connected, and during isolation, a virtual connection can help the patient recover, improve the quality of life even in limited hospital conditions, and bring the patient closer to family and loved ones to support the difficulties.

According to ASHA,⁵² telepractice is an appropriate service delivery model for speech therapists during this pandemic. A systematic review with 31 articles regarding adult telepractice services found that about 3% correspond to voice clinical practice.⁵³ Although telepractice is somehow the most appropriate approach during a pandemic scenario, it may not be appropriate in all circumstances or for all conditions that the patient presents. In this sense, the eligibility for the provision of services using this modality must be well considered before starting. Cultural issues, education level, age group, and other characteristics of the user/patient

(and even caregivers/tutors, if applicable) can influence the therapy outcome.

Forms of telepractice may be synchronous, asynchronous, or a hybrid approach.⁵³ Those modalities can be used for the assessment and treatment. Synchronous methods are known as real-time interactions using telepractice between patient and clinician. Asynchronous methods involve the storage of information that can be accessed by the patient and the clinician. Such information may include patient voice recordings, audio or video examples of voice treatment targets, daily practice schedules, vocal hygiene diaries, voice evaluation of acoustic, aerodynamic and perceptual measures, and tele-biofeedback of voice performance through remote monitoring. Hybrid methods may include a combination of synchronous and asynchronous approaches. In addition, one can combine online and in-person services.⁸

Legal framework and ethical challenges

Voice assessment and rehabilitation face many challenges during pandemic times. It is the consensus that before administering voice therapy, clinicians should perform laryngoscopy for medical diagnosis or functional evaluation. Laryngeal examination prior to voice therapy is the ideal situation to promote the most effective treatment of patients with voice complaints. This is clearly stated at the latest update on clinical practice guideline on dysphonia.⁵⁴ This practice as a clinical routine has to be encouraged to avoid treatments in situations that are not recommended or subject to improvement with vocal rehabilitation. However, laryngoscopy is an invasive examination and may not be readily available for patients in pandemic times. On the other hand, voice specialists are trained to take the history of the case, to assess vocal function, and to offer clinical judgment on the other two critical laryngeal functions; breathing and swallowing.

This fact allows us to propose, in this particular pandemic situation, that voice therapy can be implemented even without laryngeal examination in certain cases. The history of the problem, the laryngeal functions assessment, and the voice's plasticity may rule out conditions nonamenable to be treated by voice rehabilitation. There is a strong recommendation for advocating for voice therapy,⁵⁴ considering that this choice of treatment improves the quality of life and effective communication. Therefore, the decision as to whether a patient will benefit from voice therapy can be made by the voice specialist even when laryngeal visualization is not available. Any suspicious signs or symptoms should be considered to determine if immediate laryngeal medical evaluation is warranted.⁵⁴

If there is no possibility of having a laryngeal endoscopic examination due to the COVID-19 pandemic, clinicians may still perform a voice assessment and voice therapy, taking into account and discussing with the patient some of the following considerations:^{52,55}

- a. Possible etiologies of the current voice complaints.

- b. A possible response to therapeutic procedures.
- c. To take into consideration all risks and benefits of a voice treatment without a laryngeal endoscopic examination.
- d. Commitment to receive a laryngeal examination as soon as possible.
- e. If the degree of dysphonia is mild and the patient's history and onset do not reveal any ominous symptoms or risk factors that would require an immediate laryngeal imaging exam, then telepractice could be started while waiting for future availability for a laryngeal exam.
- f. If the degree of dysphonia is moderate or severe, the suggestion is to start voice assessment and therapy only after a promptly scheduled laryngeal endoscopic examination. Some degree of relative voice rest until then may be suggested.
- g. If there is any unexpected change in voice quality or self-reported information during the voice therapy period, it is recommended to consider an immediate laryngeal examination if possible.

Voice assessment

Voice assessment can be divided into three general categories: auditory-perceptual assessment, acoustic analysis of voice, self-assessment. To begin, information can be obtained through two simple tasks in the clinical assessment, which are:

- a. Clinicians could evaluate aerodynamic parameters of voice function by means of MPT and s/z ratio. These measurements provide an approximate indication of respiratory control and phonatory function.^{56,57}
- b. Clinicians could evaluate the laryngeal capacity through vocal range and flexibility with ascending/descending glissandos.⁵⁸

Auditory-perceptual assessment

Regarding perceptual voice evaluation, although there is still insufficient evidence on instrumentation in telepractice, the following is recommended:

- a. Clinicians must carry out an exhaustive clinical history.⁴¹
- b. Clinicians could perform a perceptual evaluation, for example, GRBAS or CAPE-V, during the history, as well as request audio samples that can be recorded with and sent through mobile devices.^{59,60}
- c. Clinicians must provide clear and accurate instructions to patients regarding recordings.
- d. A sample of automatic speech task (eg, counting from 1 to 10) and reading is suggested for the assessment of pneumophonic coordination, prosody, loudness, resonance, and articulation.⁶¹

Acoustic analysis of voice

There is controversy about the reliability of voice recording using mobile phones.^{59,62–64} There is still no evidence that such voice samples captured with cell phones can be analyzed reliably. The diversity of mobile technology does not allow a standardized approach to the recording process.⁶⁵ Jannetts et al reports that jitter and shimmer cannot be analyzed effectively; however, fundamental frequency (*f*₀) can be acceptably analyzed.^{60,63}

Although evidence is insufficient to support objective voice assessment during telepractice, there are some recommendations that could provide a better voice analysis quality:

- a. Clinicians can use voice samples recorded through a cell phone to obtain *f*₀.^{59,60}
- b. Keep in mind that the vocal parameters obtained through mobile devices and nondiagnostic computers should only be used for individual patient monitoring, following progress during treatment and monitoring normal and pathological voices.⁶⁴
- c. Clinicians must always control background noise.⁶³
- d. Ask the patient to keep the cell phone microphone 15 cm from the mouth while recording voice samples,⁶⁶ and always record their voices from the same distance and in the same room.

Self-assessment

Quality of life is affected by the COVID-19 pandemic.⁶⁷ Vocal self-assessment instruments can demonstrate changes in voice-related quality of life. Good choices would include instruments specific to voice perception related physical symptoms, such as coughing and sore throat. This would include Voice Symptom Scale (VoiSS),⁶⁸ Vocal Tract Discomfort Scale (VTDS),⁶⁹ or Vocal Fatigue Index (VFI).^{70–72} As far as their use is concerned, the following is recommended:

- a. Clinicians should apply the instrument three times during therapy; at the beginning, in the middle and at the end. The objective is to obtain more specific information to guide voice therapy and improve adherence outcomes.
- b. It is advisable to use protocols that have been validated for use in the home country.⁷³ If not possible; the clinicians should use instruments with the sensitivity and reliability for the country's official language.

Voice therapy

Since the nature of voice rehabilitation is audiovisual, it seems that telepractice is a suitable way to deliver rehabilitation for patients with voice disorders. Even though more evidence-based studies in telepractice are still needed, to date, the literature suggests that quality of service through telepractice in voice rehabilitation produces similar clinical outcomes when compared with face-to-face treatment.

Voice rehabilitation through telepractice has been explored in a variety of voice disorders.^{8,74} Most of the studies focus on voice problems caused by Parkinson's disease using Lee Silverman Voice Treatment, revealing successful outcomes.^{66,75–78} Other studies have investigated the effectiveness of telepractice in subjects with vocal fold nodules, muscle tension dysphonia, vocal fold dysfunction, and other voice disorders.

Fu et al reported significant improvements in perceptual, acoustic, physiological, laryngoscopic, and voice-related quality of life measures after eight sessions of therapy via telepractice in patients with vocal nodules.⁵ Positive results were also found in a study by Rangarathnam et al, who treated patients diagnosed with muscle tension dysphonia with Flow Phonation via telepractice.⁶ Findings were statistically equivalent across telepractice and face-to-face groups. Preliminary results have been reported in a retrospective study with patients with vocal fold dysfunction.⁷ Clinical improvement was observed, and cost was less than traditional face-to-face services. Other studies have demonstrated no significant difference in outcome measures comparing face-to-face and telepractice for patients with a variety of voice disorders.⁷⁹ Telepractice can also be used in a pediatric population.^{80,81}

Voice therapy with telepractice is evolving. Continuous training and study are necessary to increase experience and understanding of its potential and limitations. Individual clinicians may need to determine their comfort level and which techniques can be effectively used. It is preferable not to recommend procedures that may cause discomfort when performed by the patients themselves, such as manual laryngeal therapy, circumlaryngeal massage, and repositioning laryngeal maneuvers.

Setting up a telepractice session

Nowadays, there is evidence that supports that clinicians have sufficient comfort level with technology to provide telepractice.⁸ Future research is required to identify how clinicians develop rapport in this modality.⁸²

Regarding the therapeutic setting through telepractice, the following suggestions should be considered:

- a. Clinicians should check the quality of the session connection before starting the activity. A stable internet connection with adequate speed (clinician and patient) is necessary.
- b. Use a quiet and well-illuminated space.
- c. Use an external microphone (adjustable and removable) to reduce ambient noise and optimize the auditory feedback.
- d. Make sure that the patient has good sound reception.⁵
- e. Speak clearly, following vocal hygiene parameters.
- f. Use short sentences with easy to understand information.
- g. Maintain a proper posture in front of the computer.

- h. Use the chat feature to reinforce information when the internet connection is not stable.

EARLY APPROACH AFTER INVASIVE MECHANICAL VENTILATION

Orotracheal intubation can cause voice and swallowing disorders.⁸³ The evidence clearly indicates that the duration of intubation (greater than 48 hours) is associated with the prevalence and severity of laryngeal lesions after extubating.¹⁰ A high incidence of Postintubation Phonatory Insufficiency occurs with prolonged intubation, and may occur alone or in combination with other common laryngeal lesions.^{10,84–91} Other risk factors are emergency intubation, tube size, and reintubation.⁸⁶ Prone positioning during IMV can increase the risk of laryngeal complications as well.^{92,93}

Some specific recommendations in early voice intervention in an ICU setting are:

- a. Perform a risk-benefit analysis about the best moment to intervene. Prioritize cases of severe laryngeal damages, which could extend the inpatient length of stay.
- b. Verify the time between the admission and initial consultation as viral load does decrease with time.
- c. Reduce time of visits with efficient and effective intervention.
- d. Tubes, straws, and respiratory devices should be disposable (one-time use).
- e. Clinicians should use short questionnaires or specific questions to help detect pathology efficiently. Consider concurrent dysphagia and airway issues as well.
- f. Clinicians should use MPT to help assess voice function, which not only provides information about glottal closure defects, but can be predictive of swallowing disorders.^{57,94–96}
- g. Clinicians should evaluate general respiratory coordination to assess airway protection during swallowing.^{97,98}
- h. Clinicians could use Semi-Occluded Vocal Tract Exercises (SOVTE). SOVTE affect subglottic pressure and glottal adduction depending on the degree of airflow resistance.⁹⁹ Resonant voice exercises (eg, /m:/, /n:/, and /z:/) could promote a relatively large-amplitude and low-impact vocal fold oscillation. These exercises may attenuate acute vocal fold inflammation.¹⁰⁰
- i. The exercise dose should be of low intensity and short duration (maximum 4 minutes). These exercises can be repeated several times a day with at least 15 minutes rest between each attempt.¹⁰⁰ It is important to assess the patient's ability to produce an effortless voice before recommending the exercises.
- j. Caution must be used when performing water resistance therapy (a type of SOVTE). There is a risk of potential aerosolization with splashing bubbles out of the container. Also, unintended fluid ingestion could cause aspiration. The clinician should dye the water and use transparent tubes.
- k. In some cases, voice exercises could be performed as a complement to swallowing therapy.
- l. When the patient has postintubation phonatory insufficiency, and there is no acute inflammation of the upper airway, clinicians should incorporate exercises that favor glottal closure, seeking to improve swallowing and phonatory function.⁹⁰ Such techniques include pharyngeal squeeze maneuver, falsetto, selected pushing exercises, and Effortful Pitch Glide.^{94,101–103} Clinician should be cautious with these exuberant techniques so as not to induce additional trauma or maladaptive hyperfunction.
- m. Clinicians should avoid exercises that trigger cough or excess droplets such as tongue and lip vibrations. Optional exercises, such as hand-over-mouth,¹⁰⁴ cup phonation technique,¹⁰⁵ or the semi-occluded face mask, may be good alternatives to avoid the spreading of particles.
- n. Clinicians must provide vocal hygiene habits to patients.¹⁰⁶ Excessive voice usage, and acid reflux are risk factors for developing abnormalities after extubation, principally granulomas.

PSYCHOSOCIAL CONSIDERATIONS LINKED TO VOICE THERAPY AND TEAMWORK

In the International Classification of Functioning, Disability, and Health framework, it is important to consider patients' psychosocial factors as physical and mental health issues can contribute to vocal dysfunction.¹⁰⁷

In the context of the pandemic, social distancing, changes in work patterns, and health and economic insecurity could affect the psyche of both patients and health professionals. It is possible to find stressors associated with the COVID-19 pandemic context that negatively affect voice quality, as mentioned by Avi Besser et al in an online synchronous study of lecturers.⁶⁷ Authors suggest that high levels of stress can change lecturing modalities resulting in vocal symptomatology.⁶⁷ Therefore, establishing rapport and trust with the patient is important for therapeutic success. The following recommendations are suggested.^{50,108}

For the clinician-patient relationship:

- a. Clinicians should create a dynamic that encourages patients to talk and express their thoughts and concerns.
- b. Clinicians should educate about maintaining healthy living behaviors that support the rehabilitation process.
- c. Clinicians should prescribe tasks that are easy to remember and include the participation of family or caregivers.
- d. Clinicians should consider referral for psychotherapy when appropriate.

TABLE 2.
General Considerations to Emphasize According to the Modality of the Therapy, and According to Assessment, Intervention or Prevention

Modality	Classification	Comments in the COVID-19 Context
Face-to-face	Assessment and treatment	It is essential to approach the assessment and treatment of hospitalized patients early to encourage communication.
Face-to-face	Personal protection and prevention	Take all possible care in face-to-face therapy and assessment due to the risk of aerosol particles that voice tasks and exercises present. This risk increases by vocalizing for longer periods of time in closed, smaller places.
Face-to-face	Personal protection and prevention	Professional safety is first; if there is no access to the necessary PPE, attention would be postponed. Efforts to mitigate transmission must be both individual and collective; do not forget that these measures may reduce the risk of transmitting SARS-CoV-2 but do not eliminate the risk.
Face-to-face	Assessment and treatment	It is needed to teach the patient and family to value signs of voice, swallowing, and respiratory problems.
Telepractice	Assessment and treatment	It is recommended to perform telepractice after the patient's discharge.
Telepractice	Assessment and treatment	It is essential that all the resources necessary for good quality assessment and treatment are in place.
Telepractice	Assessment and treatment	Telehealth can help to monitor caregivers at home and make sure that recommendations are properly understood and taken into consideration.
	General notes	Voice therapy is not urgent in the face-to-face modality; the risks, benefits, and best time to perform it must be analyzed.

For the interprofessional relationship:

- a. Teamwork and communication between healthcare providers is essential. One should seek help when needed.
- b. Clinicians should always confirm receipt of texts, emails, and other nonverbal forms of communication.
- c. Keep in mind that stress levels are high in the health-care environment. Consider that in the current COVID-19 pandemic, pressure conditions in health-care equipment are higher than usual.

CONCLUSION

As we learn more about the natural history and laryngeal sequelae of the COVID-19 pandemic, clinical guidance continues to evolve. These clinical guidelines were designed to provide immediate guidance for voice therapists treating patients during this time. The authors included recommendations related to the use of PPE, techniques to reduce the risk of spreading virus, and performing voice assessment and treatment in the hospital setting and through telepractice. The authors emphasize that recommendations are based on clinical experience as scientific evidence to date is still limited. As a summary of the general considerations, [Table 2](#) highlights some key points to note.

One limitation related to the design of this guide is that no patients or other health professionals were included in the group of authors, as indicated by the AAO-HNS guidance. This was due to the urgency of designing this document.

Further clinical guidelines should overcome this limitation. Long-term follow-up studies related to the evolution of patients discharged from the ICU and response to voice therapy through telepractice is also necessary.

CONFLICT OF INTEREST

Authors declare no conflicts of interest.

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