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Tele-rehabilitation in voice disorders during the pandemic: a consensus paper from the French Society of Phoniatrics and Laryngology

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Abstract

Objectives To establish a consensus protocol for telerehabilitation in speech therapy for voice disorders.

Methods The study was conducted according to a modified Delphi method. Twenty speech therapist or laryngologist experts of the French Society of Phoniatrics and Laryngology assessed 24 statements of voice telerehabilitation with a 10-point visual analog scale ranging from 1 (totally disagree) to 10 (totally agree). The statements were accepted if more than 80% of the experts rated the item with a score of ≥ 8/10. The statements with ≥ 8/10 score by 60–80% of experts were improved and resubmitted to voting until they were validated or rejected.

Results The French Society of Phoniatrics and Laryngology experts validated 10, 6, and 2 statements after the first, second and third voting round, respectively. Seven statements did not reach agreement threshold and were rejected. The validated statements included recommendations for setting ($N=4$), medical/speech history ($N=2$), subjective voice evaluations ($N=3$), objective voice quality measurements ($N=3$), and voice rehabilitation ($N=5$). The experts agreed for a follow-up consisting of combined telerehabilitation and in-office rehabilitation. The final protocol may be applied in context of pandemic but could be assessed out of pandemic period for patients located in rural regions.

Conclusions This Delphi study established the first telerehabilitation protocol of the French Society of Phoniatrics and Laryngology for patients with voice disorders. Future controlled studies are needed to assess its feasibility, reliability, and the patient perception about telerehabilitation versus in-office rehabilitation.

Keywords Voice · Swallowing · Larynx · Laryngeal · Rehabilitation · COVID-19 · Pandemic · Consensus · Guidelines · Otolaryngology · Head–neck surgery

Robin Baudouin and Stephane Hans similarly contributed to the paper and are joined as co-first authors.

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Introduction

The coronavirus disease 2019 (COVID-19) pandemic led to more than 500 million infected and 6 million deaths worldwide [1]. In the onset of the pandemic, many countries imposed quarantine, which substantially reduced the access to hospitals and private offices [2]. Thus, many patients did not accede to care, especially 'non-vital' care, such as speech therapy [3]. In this context, the telerehabilitation appeared as an important alternative approach to take care for patients with dysphonia or swallowing disorders. The approach was not new, because the first speech therapy tele-consultation was developed in 1964 in the Norfolk State Hospital [4]. At this time, this approach allowed the management of

patients who were far from the hospital or the speech–language–pathologist (CCC–SLP) office. Telerehabilitation is particularly important for voice rehabilitation, because the rehabilitation does not primarily require manipulation or contact with the patient. With the onset of the pandemic, the members of the French Society of Phoniatrics and Laryngology has been facing a problem in the follow-up of patients requiring speech therapy and decided to develop consensus guidelines for telerehabilitation for voice disorders.

Thus, the aim of the present study was to propose telerehabilitation consensus statements for the management of patients with voice disorders.

Methods

This study was conducted following three steps according to the Delphi recommendations [5].

1. The composition of the expert group respecting balance between CCC–SLP (M.G., A.B., D.M., P.R., N.S.L., J.A., A.J.L., G.V.dP., L.B., N.G.), phoniatricians and laryngologists (R.B., S.H., M.C., L.C.B., C.F., A.R., E.dM., S.C., A.G., J.R.L.).
2. The carry out of a systematic review about the current telerehabilitation consensus guidelines, practitioner perception about telerehabilitation or practical considerations for the telerehabilitation implementation.
3. The establishment of statements for voting.

Panel selection

The study was implemented by a coordinating group composed of two young CCC–SLPs (M.G. and A.B.) and two senior practitioners (i.e., with more than 10 years of experience or over 40 years) (J.R.L. and N.D.). They selected 20 French native speaker experts from France and Belgium. The experts needed to have significantly contributed to many studies in the field of speech-language rehabilitation, especially in voice rehabilitation and telerehabilitation. There were no selection criteria based on age, gender or geographic location.

Review of the literature

The review of the literature was conducted by four authors (M.G., A.B., J.R.L., N.G.) through Medline, Embase, and the Cochrane Library database. The following keywords were combined: 'voice'; 'telerehabilitation'; 'rehabilitation'; 'dysphonia'; 'consensus'. The papers were analyzed by the coordinating group and their content was considered for the

writing of the initial statements. These papers were made available to experts before the start of the voting rounds.

Survey and voting

A modified Delphi technique [5, 6] was used, asking experts to rate a list of 24 statements (round 1). The statements were available on a survey using the Survey Monkey® system (San Mateo, California, USA), allowing each participant to complete the survey round only once each. The survey itself was developed in iterative fashion, with drafts revised by the coordinating group. Potential free comments by experts were collected for each statement at each round of evaluation.

The statements were rated with a 10-point visual analog scale ranging from 1 (totally disagree) to 10 (totally agree). The statements were accepted if more than 80% of the experts rated the item with a score of $\geq 8/10$. The statements with $\geq 8/10$ score by 60–80% of experts were improved and resubmitted to voting until they were validated or rejected. Statement with < 60% of experts providing $\geq 8/10$ score were definitively rejected. Four rounds were planned with a discussion meeting of experts after two rounds to improve the remaining statements. Thus, the revised statements were submitted to new voting round until all non-validated statements (60–80% of agreement) were accepted or rejected. The whole process was carried out in a longitudinal way. The analysis of statement validation was performed anonymously. Only the members of the coordinating group had access to the comments and votes of the experts of the Consensus Group.

The coordinating group was invited to assess the level of importance of each statement at the end of the process with the GRADE working group system [7] with the following grades: *high*: further research is unlikely to change our confidence in the estimate of effect; *moderate*: further research is likely to have an important impact on our confidence in the estimate of effect and may change the estimate; *low*: further research is likely to have an important impact on our confidence in the estimate of effect and is very likely to change the estimate; *very low*: any estimate of effect is uncertain. No ethics committee was required for the present study and all experts consented to participate.

Results

Twenty experts agreed to participate, accounting for 14 CCC–SLP (12 women/2 men), and 6 phoniatricians–laryngologists (4 women/2 men). The experts came from 7 hospitals and 6 offices (private practice). The mean years of

practice of the panel was 17.2 ± 9.4 (range 5–35 years). The study was conducted from September 2021 to April 2022.

Systematic review

The literature search identified 40 papers dedicated to voice or speech disorder telerehabilitation. Among them, 11 publications met our inclusion criteria (Fig. 1) [8–18]. The included papers were dedicated to recommendations [8–10], conference consensus [10], principles [12], review [13–15], survey of practitioner perception [10, 16, 17] or COVID-19 consensus [18]. There were no guidelines of scientific societies in the literature, which was recently deplored by the Canadian Agency for Drugs and Technologies in Health [19]. Overall, there is a paucity of literature specific to the establishment of recommendations in the assessment and treatment of voice or speech disorders [13].
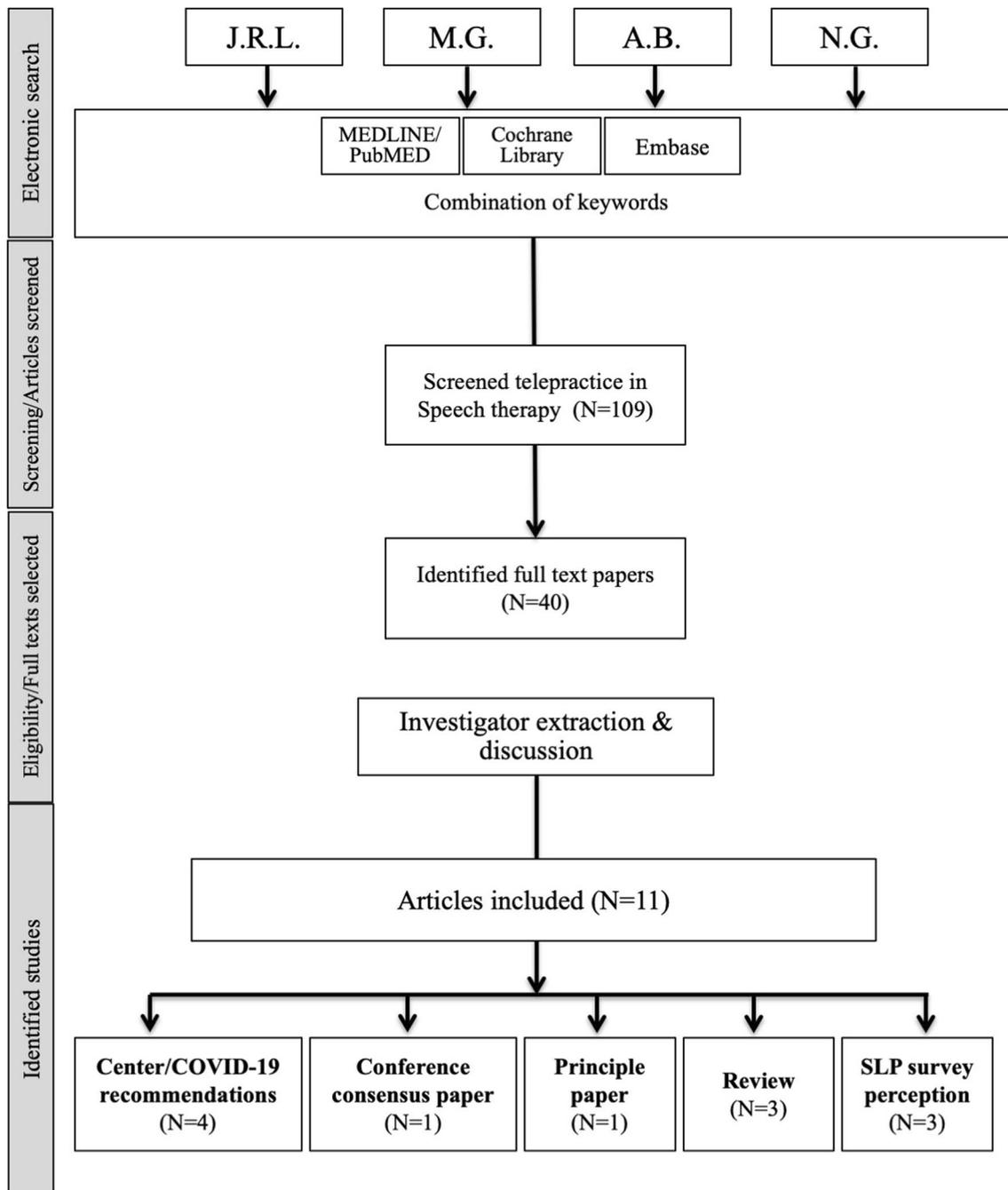

Fig. 1 Chart flow of systematic review. *SLP* speech–language pathologist

Statement validation

The first voting round resulted in ten validated statements, eight needing revision, and six rejected, respectively. Based on the expert comments and discussion in the coordinating group, eight statements were modified, while one statement was divided into two statements. The second voting round led to six statement validation, and two needed improvements. After consideration of expert comments, discussion and related modifications, the two remaining statements were validated throughout the third voting round. At the end of the Delphi process, 18 statements were validated on a consensual basis (Fig. 2). The validated statements included recommendations for setting ($N=4$), medical/speech history ($N=2$), subjective voice evaluations ($N=3$), objective voice quality measurements ($N=3$), and voice rehabilitation ($N=5$; Table 1). The validated statements are summarized in Table 1.

The rejected statements concerned (1) the systematic organization of preliminary rehabilitation session at the patient home to ensure a good understanding of the rehabilitation program; (2) the use of a headset for the speech therapist; (3) the use of two screens for the therapist to improve the patient contact and note taking; (4) the use of the VoiceEvalU8® (NuCitrus Technologies®, Quakertown, PA, USA) application for smartphone; (5) The consideration of telerehabilitation as effective as in-person rehabilitation for the following disorders: nodules, polyps, muscular tension dysphonia, vocal fold edema, vocal fold paralysis, hyperfunction can be as effective in face-to-face therapy as in telepractice; (6) the consideration of exercises that may require a control of the supra- and subglottic pressures in telerehabilitation.

Discussion

The importance of telepractice and telerehabilitation was strengthened by the pandemic and the related quarantine politics. Indeed, telemedicine practices may reduce the number of emergency room visits, preserve health care resources, and was associated with a reduction of the spread of COVID-19 by decreasing in-person visits during and following the pandemic [16, 20]. Telepractice is additionally an interesting issue for rural patients who have no access to practitioners [15].

In the present study, we established the first tele-speech therapy guidelines of the French Society of Phoniatrics and Laryngology, which includes the French-speaking laryngologists and phoniatrics of Europe. Experts judged that the setting (connection, material), the structured medical history, the reliable collection of subjective and objective voice quality evaluations and the conduction of rehabilitation in

reproducible conditions were the key points of our guidelines. As found in the literature review, there is, to date, no official scientific society consensus guidelines for the tele-speech therapy and rehabilitation, which limits the comparison of our findings with the current literature. However, some clinical studies were conducted in the development of statements or the implementation of telerehabilitation, reporting important perspectives.

The importance of setting, structured examination, treatment initiation information, and recognition of when a tele-visit is insufficient for patient care needs were defined as the most important key points in the University of California San Francisco protocol for preparing and conducting telemedicine visits in laryngology [11]. In this study, Strohl et al. supported the need of combined in-person and telerehabilitation approaches to improve patient care. However, the authors advised a previsit check-in, which was not supported by the experts of the present study. The previsit check-in of Strohl et al. includes the verification that patient received and completed patient-reported outcome questionnaire, the review of medical history findings, the connection quality verification and the answer to any questions related to the protocol of telerehabilitation [11]. In our protocol, these findings were included in the first telerehabilitation session, adhering to the recommendations of the American Telemedicine Association [12]. Several authors supported the need to perform at least subjective and objective voice quality assessments at baseline and throughout the telerehabilitation protocol (e.g., the use of validated patient-reported outcome questionnaires, maximum phonation time, acoustic and voice range measurements), which corroborates the point of view of our experts [11, 18, 20].

Most studies focused on recommendations for the initial tele-speech check-up but did not provide information for the therapy. The present consensus protocol provides recommendations for the implementation of telerehabilitation of voice disorders. In a recent study, Castillo-Allendes et al. surveyed CCC–SLP experts about recommendations for in-person assessment, direct treatment, and teamwork for patients with voice disorders [18]. In this study, authors devoted some statements for telepractice, especially about the voice quality measurements. From a subjective standpoint, authors recognized the possibility to use patient-reported outcome questionnaires throughout the treatment period. Moreover, Castillo-Allendes et al. supported that the recording of voice sample may be performed by cell phone of patient, which was particularly important to assess the patient progress during treatment, while the clinicians must always control background noise [18]. Similar to our experts, they supported (1) the need to check the quality of material before the starting of the session, (2) the importance to keep the phone microphone 15 cm from the mouth during the voice sample recording and in the same quiet room,
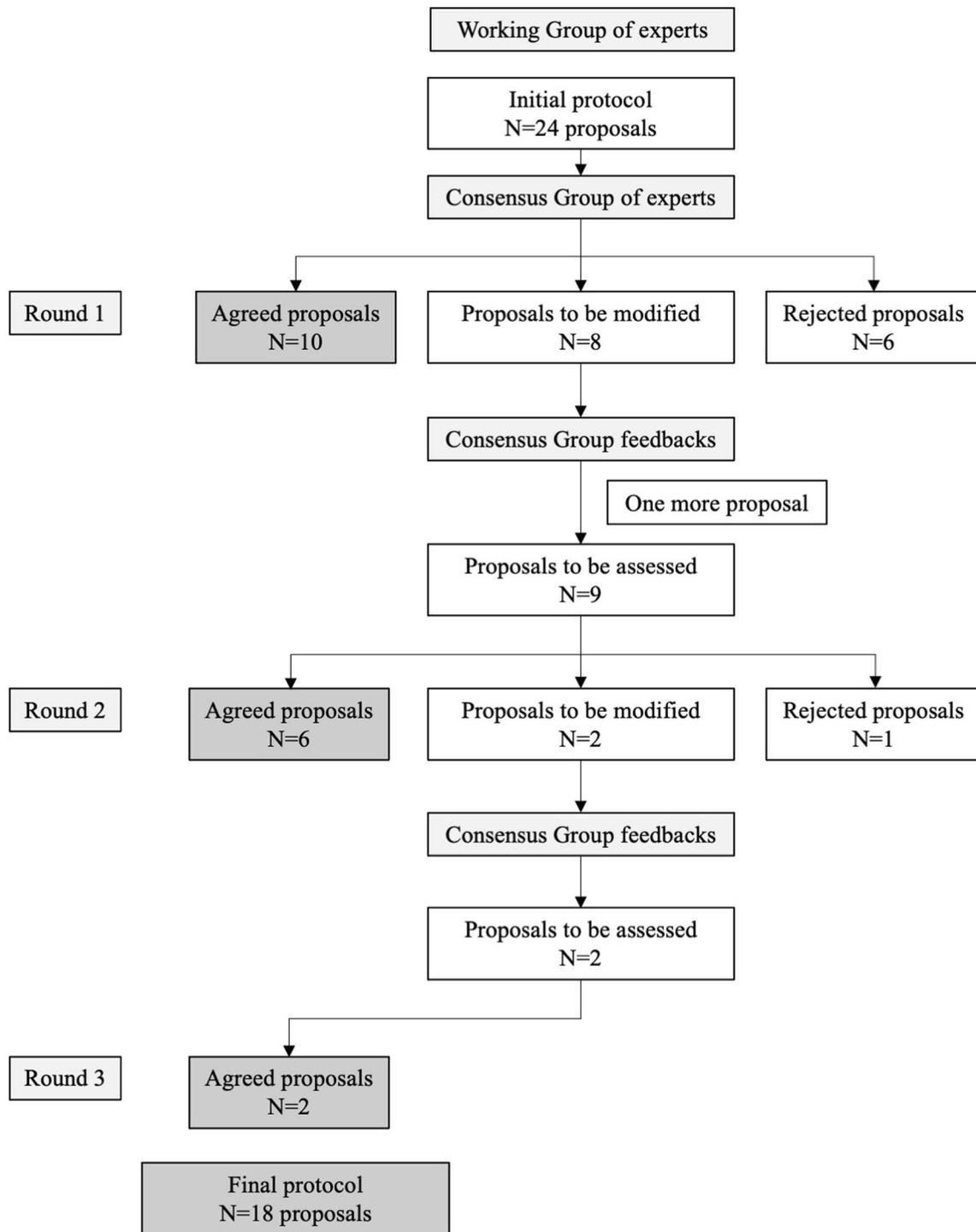
Fig. 2 Delphi study chart flow. Each expert anonymously and blindly expressed disagreement (0–7) or agreement (8–10) with each protocol proposal. A proposal was validated ($\geq 80\%$ of the experts agreeing), rejected ($< 60\%$ of experts agreeing). Proposals that were nei-ther rejected nor agreed were reviewed by the Working Group and submitted to the Consensus Group in several rounds of voting until all proposals were agreed or rejected

and (3) the check of the internet connection quality [18]. Interestingly, authors provided additional recommendation to ours, consisting of the use of short sentences with easy to understand information, the maintain of proper posture in front of the computer, and the use of chat to reinforce information when the internet connection is not stable [18].

Table 1 Consensus statements

Statements	Rate	Grade
Setting		
1 The internet connection must report good quality (bandwidth speed of at least 384 Kbit/s to ensure transmission)	95%	N.A
The use of private wi-fi or cable connection is recommended	R1	
2 Patient and therapist have to be alone in the consultation room with closed doors and windows to reduce the risk of noise/distractions	95%	High
	R1	
3 The therapist may be attentive to patient motivation and participation through regular feedback and positive reinforcement throughout the telepractice session	80%	High
	R1	
4 Telepractice sessions can be conducted on a third-party telecommunication platform, i.e., Zoom or logopede.online (Belgium)	85%	N.A
	R2	
Medical and speech history		
5 In case of use of secure platform based on the electronic medical record system, the medical history information may be collected from the medical record available in the platform. If not, the information have to be collected with a personalized tele-interview	85%	Low
	R2	
6 The medical/speech history has to be carried out through a phone call, a video conference call or a face-to-face meeting rather than by collecting data through solely patient-reported outcome questionnaires	85%	Low
	R2	
Subjective voice or speech quality assessment		
7 Subjective voice evaluation with validated instruments may be easily fulfilled through videoconference. These important tools improved the medical history and the patient understanding about the disorder and the impact on quality-of-life	85%	Mod
	R1	
8 The face-to-face fulfil of subjective voice self-evaluation questionnaires is better to ensure optimal understanding of patient. However, these questionnaires may be also electronically sent and completed by the patient via a call (video/phone) with the therapist for guidance	85%	Low
	R3	
9 It remains better to rate the GRBASI scale in-person than through phone/video for getting better quality of collected/recorded voice samples by the microphone of a smartphone/computer	95%	Low
	R2	
Objective voice or speech quality assessment		
10 Acoustic parameters and maximum phonation time are better assessed in-person than through call/video. In case of telepractice, these outcomes may be recorded by the patient smartphone using the same microphone at each recording to ensure comparison of the samples	85%	Low
	R3	
The voice samples that are recorded with the same equipment may be considered as reliable for the longitudinal comparison		
11 In case of patient voice sample self-recording, patient needs to be in the same place for all recordings, consisting of a quiet area without noise, and the recording must be performed with a distance of 15 cm from the smartphone microphone	80%	Mod
	R1	
12 If possible, a hybrid method may be favored consisting of medical history and initial voice quality assessment in-person, and telepractice rehabilitation. In-person appointments may be envisaged according to the disease and the patient wishes	80%	Very low
	R2	
Rehabilitation		
13 Telerehabilitation satisfaction of patients may be assessed throughout the rehabilitation session with validated patient-reported outcome questionnaire	85%	High
	R1	
14 LSVT approach may be applied through telepractice for Parkinson patients. Face-to-face appointments may be scheduled, depending on the patient wishes, improving the development of patient/therapist relationship, the measurement of vocal acoustic outcomes and pressure, and the evaluation of the LSVT tasks. The other sessions are offered by telepractice	80%	High
	R2	
15 Some voice therapy outcomes (e.g., vocal hygiene and education, anatomical explanation of the vocal apparatus function, physiology of the vocal disorder) may be explained by videoconference	80%	N.A
	R1	
16 Practitioner may send to patient videos of speech treatment objectives and rehabilitation exercises through asynchronous methods (photos, videos, recordings that the patient can process offline) to improve understanding of the patient. The patient may access to these outcomes whenever he wants and as many times as he wants	90%	N.A
	R1	
17 The patient may record himself/herself via asynchronous methods (photos, videos) to give to the speech therapist useful information about the functional and daily environment of the patient	80%	N.A
	R1	

Table 1 (continued)

	Statements	Rate	Grade
18	The lack of kinesthetic feedback may negatively influence speech rehabilitation. Therefore, face-to-face sessions should be regularly scheduled to give to patient benefit of the manual therapy exercises. Telerehabilitation session remains complementary to face-to-face sessions and the proportion of telerehabilitation depends on the patient whish and the features of disease	95% R1	Low

LSVT Lee Silverman Voice Therapy, *N.A.* not applicable, *Mod.* moderate

The use of telerehabilitation during pandemic period was supported by the American Speech–Language–Hearing Association [22] and the consensus study of Freeman-Sanderson et al. who considered important the implementation of additional resources for the acquisition of telehealth capabilities [23]. An additional important resource for tele-speech therapy is the use of asynchronous (store-and-forward) data for patients to improve the understanding of exercises or information, which was recommended by our expert panel and Richmond et al. in their principle publication of the American Telemedicine Association [12].

Another question that has to be discussed in all countries is the security process about medical data. This point may be a limitation to spread the tele-speech therapy in some countries and should be a true ethical concern surveyed as much as possible.

Finally, the use of similar tools for reproducible evaluation of voice parameters remains an essential point in telemedicine. This element has not been studied here in the Delphi process. A therapeutic evaluation is only of interest if reproducible in time and comparable between several individuals and practitioners.

The main strength of the present study was the establishment of the first consensus guidelines to guide practitioners of our society or others in the management of patients with voice disorders in future pandemics. The reliability and validity of these guidelines need to be demonstrated through a clinical controlled study comparing the effectiveness of tele-speech therapy and rehabilitation with conventional in-person approach. The determination of consensus guideline remains an important issue according to the proportion of CCC–SLPs who wish such guidelines. Indeed, in a recent Australian survey, 82.5% of CCC–SLPs believed that telerehabilitation is an important issue in patients with voice disorders related to Parkinson disease [24]. Satisfaction and awareness of CCC–SLPs and patients toward tele-speech therapy and telerehabilitation were high in many studies [25, 26].

Conclusions

This Delphi study established the first telerehabilitation protocol of the French Society of Phoniatrics and Laryngology for patients with voice disorders. Future controlled studies are needed to assess its feasibility, reliability, and the patient perception about telerehabilitation versus in-office rehabilitation.

Declarations

References

1. WHO Coronavirus (COVID-19) Dashboard. https://covid19.who.int. Accessed 31 Jul 2022
2. Panneer S, Kantamaneni K, Palaniswamy U, Bhat L, Pushparaj RRB, Nayar KR, Soundari Manuel H, Flower FXLL, Rice L (2022) Health, Economic and Social Development Challenges of the COVID-19Pandemic: Strategies for Multiple and Interconnected Issues. Healthcare (Basel) 10(5):770. https://doi.org/10.3390/healthcare10050770
3. Palomares-Aguilera M, Inostroza-Allende F, Solar LR (2021) Speech pathology telepractice intervention during the COVID-19 pandemic for Spanish-speaking children with cleft palate: a systematic review. Int J Pediatr Otorhinolaryngol 144:110700. https://doi.org/10.1016/j.ijporl.2021.110700
4. Telemedicine I of M (US) C on ECA of, Field MJ (1996) Evolution and current applications of telemedicine. National Academies Press, London
5. Linstone H, Turoff M (1975) The Delphi method: techniques and applications
6. Fackrell K, Smith H, Colley V et al (2017) Core outcome domains for early phase clinical trials of sound-, psychology-, and pharmacology-based interventions to manage chronic subjective tinnitus in adults: the COMIT'ID study protocol for using a Delphi process and face-to-face meetings to establish consensus. Trials 18(1):388. https://doi.org/10.1186/s13063-017-2123-0
7. Group BMJP (2004) Grading quality of evidence and strength of recommendations. BMJ 328:1490. https://doi.org/10.1136/bmj.328.7454.1490
8. Knickerbocker K, Bryan C, Ziegler A (2021) Phonogenic Voice Problems among Speech-Language Pathologists in Synchronous Telepractice: an overview and recommendations. Semin Speech Lang 42(1):73–84. https://doi.org/10.1055/s-0040-1722754
9. Almubark BM, Majrashi N, Alghusun N, Alhammad M, Alhthifi F, Alyahya RSW (2022) Telehealth Clinical Practice Guide for Occupational Therapy, Physical Therapy, and Speech and

Language Pathology: a Saudi and Middle Eastern Guide. Telemed J E Health 28(5):636–642. https://doi.org/10.1089/tmj.2021.0021

10. Bayati B, Ayatollahi H (2021) Speech therapists' perspectives about using tele-speech therapy: a qualitative study. Disabil Rehabil Assist Technol. https://doi.org/10.1080/17483107.2021.1900933

11. Strohl MP, Dwyer CD, Ma Y, Rosen CA, Schneider SL, Young VN (2022) Implementation of telemedicine in a laryngology practice during the COVID-19 pandemic: lessons learned, experiences shared. J Voice 36(3):396–402. https://doi.org/10.1016/j.jvoice.2020.06.017

12. Richmond T, Peterson C, Cason J, Billings M, Terrell EA, Lee ACW, Towey M, Parmanto B, Saptono A, Cohn ER, Brennan D (2017) American Telemedicine Association's principles for delivering telerehabilitation services. Int J Telerehabil 9(2):63–68. https://doi.org/10.5195/ijt.2017.6232

13. Doll EJ, Braden MN, Thibeault SL (2021) COVID-19 and speech-language pathology clinical practice of voice and upper airway disorders. Am J Speech Lang Pathol 30(1):63–74. https://doi.org/10.1044/2020_AJSLP-20-00228

14. Theodoros DG (2008) Telerehabilitation for service delivery in speech-language pathology. J Telemed Telecare 14(5):221–224. https://doi.org/10.1258/jtt.2007.007044

15. Molini-Avejonas DR, Rondon-Melo S, Amato CA, Samelli AG (2015) REVIEW: a systematic review of the use of telehealth in speech, language and hearing sciences. J Telemed Telecare 21(7):367–376. https://doi.org/10.1177/1357633X15583215

16. Fong R, Tsai CF, Yiu OY (2021) The implementation of telepractice in speech language pathology in Hong Kong during the COVID-19 pandemic. Telemed J E Health 27(1):30–38. https://doi.org/10.1089/tmj.2020.0223

17. Swales M, Theodoros D, Hill AJ, Russell T (2020) Speech-language pathologists' perceptions of the use of telepractice in the delivery of services to people with Parkinson's disease: a national pilot survey. Int J Speech Lang Pathol 22(4):387–398. https://doi.org/10.1080/17549507.2019.1650110

18. Castillo-Allendes F, Contreras-Ruston F, Cantor-Cutiva L, Codino J, Guzman M, Malebran C, Manzano C, Pavez A, Vaiano T, Wilder F, Behlau M (2020) Voice therapy in the context of the COVID-19 pandemic: guidelines for clinical practice. J Voice. https://doi.org/10.1016/j.jvoice.2020.08.001

19. No authors listed. Telehealth for Speech and Language Pathology: A Review of Clinical Effectiveness, Cost-Effectiveness, and Guidelines [Internet]. Ottawa (ON): Canadian Agency for Drugs and Technologies in Health; 2015.

20. Bokolo A (2020) Exploring the adoption of telemedicine and virtual software for care of outpatients during and after COVID-19 pandemic. Irish J Med Sci. https://doi.org/10.1007/s11845-020-02299-z

21. Zughni LA, Gillespie AI, Hatcher JL, Rubin AD, Giliberto JP (2020) Telemedicine and the interdiscplinary clinic model: during the COVID-19 pandemic and beyond. Otolaryngol Head Neck Surg 163(4):673–675. https://doi.org/10.1177/0194599820932167

22. American Speech-Language-Hearing Association (ASHA). Service delivery considerations in health care during coronavirus/COVID-19. 2020. https://www.asha.org/SLP/healthcare/SLP-Service-Delivery-Considerations-in-Health-Care-During-Coronavirus/#endoscopic. Accessed 20 Jun 2020

23. Freeman-Sanderson A, Ward EC, Miles A, de Pedro NI, Duncan S, Inamoto Y, McRae J, Pillay N, Skoretz SA, Walshe M, Brodsky MB, COVID-19 SLP Global Group (2021) A Consensus statement for the management and rehabilitation of communication and swallowing function in the ICU: a global response to COVID-19. Arch Phys Med Rehabil. 102(5):835–842. https://doi.org/10.1016/j.apmr.2020.10.113

24. Swales M, Theodoros D, Hill AJ, Russell T (2020) Speech-language pathologists' perceptions of the use of telepractice in the delivery of services to people with Parkinson's disease: a national pilot survey. Int J Speech Lang Pathol 22:387–398. https://doi.org/10.1080/17549507.2019.1650110

25. Gray R, Michael D, Hoffmeister J, Lunos S, Zach S, Butcher L, Weinstein D, Misono S (2022) Patient satisfaction with virtual vs in-person voice therapy. J Voice. https://doi.org/10.1016/j.jvoice.2022.03.011

26. Freckmann A, Hines M, Lincoln M (2017) Clinicians' perspectives of therapeutic alliance in face-to-face and telepractice speech-language pathology sessions. Int J Speech Lang Pathol 19(3):287–296. https://doi.org/10.1080/17549507.2017.1292547

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