Original articles

Voice therapy in a teaching outpatient clinic belonging to the Brazilian Public Health System

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ABSTRACT

Purpose: to compare the clinical findings before and after voice therapy regarding vocal quality and laryngeal diagnosis of patients with dysphonia treated at the service.

Methods: a retrospective cohort study with a convenience sample. Evaluation and treatment took place at a teaching voice therapy outpatient clinic assisting the Brazilian Public Health System. Data collected through medical records and clinical protocols applied to 65 patients between 20 and 77 years old were analyzed. Vocal methods and techniques based on the traditional voice therapy program, with an average of twelve 30-minute sessions, were used. Statistical analysis was performed using the SPSS program. Student's t-test for paired data and McNemar test compared the pre- and post-speech therapy evaluations, considering a 5% significance level.

Results: there was a predominance of secondary functional dysphonia. In the pre-speech therapy evaluation, the users had a maximum phonation time below that expected for their age group and sex, high respiratory type, and abnormal body posture. After intervention, the scores related to the degree of dysphonia changed, with a predominance of individuals with mild deviation, improvement in the self-perception of voice handicap, and changes in body and respiratory pattern.

Conclusion: positive clinical outcomes were observed regarding vocal, body, and respiratory parameters, in addition to a decrease in the voice handicap perceived by the users.

Keywords: Voice; Dysphonia; Speech Therapy; Laryngeal Disease; Rehabilitation

INTRODUCTION

Voice disorders and their manifestations are multi-dimensional. Therefore, early diagnosis and treatment enable a better prognosis and reduce the impact of dysphonia on the subject's social, professional, and emotional life[1]. Identifying the epidemiological and clinical profile of voice therapy users serves as a basis for developing innovative strategies and public policies to improve the treatment of dysphonia, considering the reality of speech therapy in the Public Health System (SUS)[2].

Speech therapy in SUS aims to promote health and prevent, diagnose, and treat various voice and speech changes that cause communication disorders[3]. Updating and developing scientific healthcare research are fundamental to evidence-based practice[4]. More publications linking results in the area of voice related to public health are still needed and essential to instrumentalizing services and promoting the population's health[3,5].

Thus, standardizing assessment and therapeutic strategies and publishing results bring benefits and clinical safety to voice therapy in dysphonic users treated at a teaching outpatient clinic in SUS. This study encompasses contributions to teaching, research, and care. It aimed to compare the clinical findings before and after voice therapy related to vocal quality and laryngeal diagnosis of patients with dysphonia treated at the service.

METHODS

This study was approved by the Research Ethics Committees of the Universidade Federal de Ciências da Saúde de Porto Alegre (UFCSPA) and the Complexo Hospitalar da Santa Casa de Misericórdia de Porto Alegre, RS, Brazil, under evaluation reports 6126779 and 4424945. CAAE CEP UFCSPA: 71489917.7.0000.5345. All study participants signed an informed consent form, allowing the use of data for subsequent analysis.

This retrospective cohort study analyzed characterization data and clinical outcomes through medical records of dysphonic users diagnosed with laryngeal changes, referred for and treated in voice therapy. Evaluation and treatment took place at a voice therapy outpatient clinic belonging to the otorhinolaryngology service of a referral hospital in Southern Brazil, which assists the population through the SUS at the secondary care level. In other words, the referral for this treatment

modality occurs via primary care, which integrates and refers dysphonic users to specialized services[6]. The users included in the study were evaluated by the otorhinolaryngology team, which performed videolaryngoscopy to diagnose laryngeal changes and then referred patients to the voice therapy program.

The study used a convenience sample, inviting users treated at this outpatient clinic to participate in its average 12 therapy sessions. Thus, 65 individuals aged 20 to 77 years were included, with data collected between 2018 and 2023. The number of participants decreased in the reassessments throughout the study period due to low adherence to treatment, evasion, multimorbidities, and referrals to other health specialties.

Data collected through medical records and applied clinical protocols were analyzed. The evaluation protocols used were vocal medical history; breathing assessment; body assessment; auditory-perceptual evaluation of vocal quality (using the GRBASI scale[7]) and self-perception of vocal deviation (using the Voice Handicap Index – VHI-10[8]). All protocols and the vocal therapy program were performed by interns in the final year of the Speech-Language-Hearing Program, allocated to the Mandatory Internship in Voice, with all cases supervised by a professor in the area. Voices were recorded for the auditory-perceptual evaluation of vocal quality in a silent environment with a digital recorder, model Sony LCD-PX440. The voice recordings were analyzed by the pathologist in charge together with the teaching supervisor and a postgraduate student (both voice specialists). The auditory-perceptual evaluation is the main vocal assessment procedure speech-language-hearing pathologists use in clinical practice. The voice samples were separated according to the type of task, and the supervisor and the voice specialist analyzed the grade of hoarseness separately. Disagreements in defining the grade of hoarseness were resolved by consensus among the evaluators at the time of analysis. The voice recording included a sample of the vowel /a/ sustained with control so that the emission was at the usual frequency and intensity; counting from 1 to 10; spontaneous speech of how the participant feels about their voice problem, in a silent environment and with the recorder microphone positioned 5 centimeters from the patient's mouth.

The study followed the Traditional Voice Therapy model[9], with an average of 12 weekly 30-minute sessions. Users were instructed to perform the techniques at home once or twice a day and maintain

contact with the pathologist to answer any questions during the week. They also received printed materials or videos as guidance for performing the vocal techniques. Table 1 describes the methods and techniques used, in order of frequency, applied according to the individual therapeutic plan[1,9]. All subjects received therapeutic approaches that included general guidelines, resources for knowledge of anatomy and physiology to improve body and voice awareness, multisensory cues, and auditory and visual monitoring techniques.

Furthermore, since this was a clinical study conducted in an academic environment, clinical cases were supervised weekly, before and after each therapeutic session. Hence, the technique was applied or included in the therapy plan according to the diagnosis and supervision of each case before and after therapeutic tests, based on the positive effect (vocal quality improvement either self-reported or perceived by the pathologist or reduction in self-reported vocal effort).

Table 1. Vocal techniques used in the voice therapy program

Method	Frequency of the technique performed by the sample n (%)	Vocal techniques
Respiratory/body	48 (73.8%)	• MPT exercises with fricatives /s, z/ • shoulder rotation with and without voicing • cervical movements with and without voicing • massage of the shoulder girdle • digital manipulation of the larynx • body movements with and without voicing
Facilitating Sounds	47 (72.3%)	• voiceless fricatives /s/ and voiced /z/ isolated and associated with vowels • vibrating sounds of lips and tongue isolated and associated with vowels • nasal sounds isolated and associated with vowels • basal sound • super-high pitch
Speech Articulation Organs	43 (66.2%)	• tongue rotation in the oral cavity • yawning/sigh • masticatory technique • tongue displacement technique
SOVTE with equipment	44 (67.7%)	• phonation into a high-resistance straw • phonation into a flexible tube in water
Phonatory Competence	33 (50.8%)	• *finger kazoo* • prolonged "b" technique • glottal firmness technique • blowing and high-pitched sound • musical scale techniques
Speech Method	15 (23.1%)	• overarticulation technique with and without cork • chanted voice with automatic sequences

Material prepared based on references Behlau, 2001[1], and Behlau et al., 2022[26].
Captions: SOVTE = Semi-occluded Vocal Tract Exercises; MPT = Maximum Phonation Time.

Statistical analysis was performed using SPSS version 18.0 (SPSS Inc., Chicago, IL, USA). Descriptive statistics were presented using absolute and relative frequencies. Variables with nonparametric distribution were presented as median, interquartile range, minimum, and maximum values. Student's t-test for paired data and McNemar's test compared pre- and post-speech therapy assessments. All analyses used a 5% significance level.

Users were referred to care services accordingly for psychology, physiotherapy, and, in some cases, therapy groups such as the Smoking Support Group when they needed additional intervention. In all referrals, an attempt was made to integrate and communicate with the care network.

RESULTS

The study included 65 users with an otorhinolaryngological diagnosis of laryngeal changes and a speech-language-hearing diagnosis of dysphonia.

The sample characterization data at the beginning of the speech therapy found a distribution of users in different age groups, with a mean age of 54 years and a standard deviation of 14.9. A greater number of female users was also observed (n: 40, 61.5%). Users lived predominantly in the capital (n: 42, 64.7%), 14 (21.5%) lived in other cities in inland Rio Grande do Sul, and nine (13.8%) lived in the metropolitan region. Also, 50 (76.9%) individuals were not occupational voice users.

The study performed a descriptive analysis of laryngeal changes and dysphonia at the initial stage of speech therapy. Several diagnoses were observed, with a predominance of secondary functional dysphonia, as shown in Table 2. All laryngeal changes, such as vocal nodules, cysts, and polyps, had associated glottal gaps. Thus, the classification of "glottal gaps" in the table refers to cases of isolated gaps, not associated with any other laryngeal lesion or diagnosis. Cases without a conclusive medical diagnosis were included under "others".

Table 2. Characterization of laryngeal changes and dysphonia

	Total	
	n	**%**
Laryngeal change		
Reinke's edema	10	15.4
Glottal gap	8	12.3
Cists	6	9.2
Groove	6	9.2
Vocal nodules	5	7.7
Gastroesophageal reflux	4	6.1
Presbylarynx	4	6.1
Papilloma	4	6.1
Polyp	3	4.6
Paralysis	3	4.6
Laryngeal trauma	3	4.6
Granuloma	1	1.5
Cancer	1	1.5
Others	7	10.8
Type of dysphonia*		
Functional	32	49.2
Organofunctional	17	26.1
Organic	13	20
Unidentified	3	4.6

Classification of dysphonia: Behlau, 2001[1].

Table 3 presents the variables related to the users' respiratory and body aspects in the initial and final evaluation. The average s/z ratio was 1.2 seconds; 20 (30.8%) users had vocal tract hypofunction, high respiratory type, and abnormal body posture. A difference was found in respiratory pattern, s/z ratio, and body posture after speech therapy.

Table 3. Respiratory and body data before and after speech therapy

| | | Period of speech therapy | | | | p-value |
| | | Before | | After | | |
		n	%	n	%	
Respiratory pattern	High	18	58.10	5	16.10	**0.001**
	Medium	9	29.00	24	77.40	**0**
	Low	4	12.90	2	6.50	0.687
Functioning of the vocal tract	Normal	16	53.30	22	73.30	0.07
	Hypofunction	12	40.00	7	23.30	0.125
	Hyperfunction	2	6.70	1	3.30	1
Body posture	Normal	7	25.00	15	53.60	**0.008**
	Abnormal	21	75.00	13	46.40	

McNemar test (p<0,05*)

A statistically significant improvement was observed in the grade of hoarseness assessed by the GRBASI scale in the post-voice therapy comparison, increasing the number of individuals with a mild degree, and decreasing the number of users with intense dysphonia, as demonstrated in Table 4.

Table 4. Comparison of vocal quality in the assessment and reassessment by the grade of hoarseness (according to the GRBASI scale)

| | | Period of speech therapy | | | | p-value |
| | | Before | | After | | |
		n	%	n	%	
GRBASI	No deviation	0	0.00	4	12.10	0.125
	Mild	6	18.20	17	51.50	**0.007**
	Moderate	20	60.60	11	33.30	0.078
	Intense	7	21.20	1	3.00	**0.031**

McNemar test (p < 0.05*)
Caption: GRBASI = Perceptual-auditory evaluation scale of vocal quality.

The results of the VHI-10 voice self-assessment protocol showed a mean score of 20.41 points in the initial assessment, with a standard deviation of 9.35. In the post-speech therapy data, the mean score decreased to 11.94, with a standard deviation of 11.68, obtaining a statistically significant reduction of 8.5 points on average.
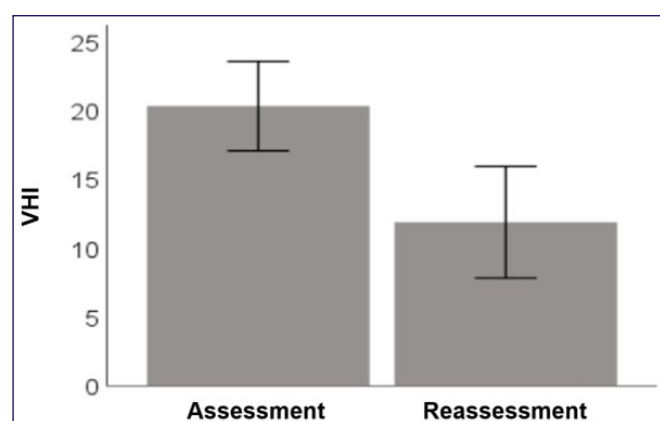
Student's t-test (p < 0.05*)
Caption: VHI = Voice Handicap Index

Figure 1. Comparison of voice self-assessment protocol scores between assessment and reassessment

DISCUSSION

The study data made it possible to identify the users' profile and analyze the outcomes of voice therapy in a SUS outpatient clinic. Changes were observed in several clinical speech-language-hearing aspects, such as improvements in users' vocal quality, self-perception of the voice handicap, respiratory pattern, and body posture. Various clinical speech-language-hearing parameters improved significantly throughout the therapeutic follow-up.

Previous studies have already shown the importance and relevance of speech therapy activities in SUS for the population, as they improve quality of life and adherence to health treatments[10,11]. Successful health treatment can result in improved quality of life in general since health professionals' guidance can be generalized to self-care[12,13]. Positive speech therapy outcomes are important to disseminate and support speech therapy in the SUS[3,11].

The study sample characterization identified the predominance of women (61.5%), corroborating another study carried out in 2020 with adults from Porto Alegre, and justifying the greater demand for health services by women[14]. Another point to highlight is that 23.1% of the study population comprised service users who are also occupational voice users, evidencing the negative impact of dysphonia on their lives. A 2020 integrative literature review addressed the prevalence of occupational voice disorders and the importance of specific actions for this population[15]. Given that this is a varied sample of dysphonic patients, identifying several laryngeal changes, diagnoses, and dysphonia types, it

is essential to delve deeper and take a different look at each situation treated.

The laryngological diagnosis of Reinke's edema affected 15.4% of the study population, followed by glottal gaps (12.3%) and other lesions that configure minimal structural changes[16]. Previous studies address Reinke's edema as a public health problem since it includes smoking, alcoholism, and vocal abuse as causes[17]. Even though in some cases there is an indication for surgery, the edema is commonly recurrent if there is no behavioral change or adherence to vocal hygiene habits[18]. It can also be stated that glottal gaps are identified by the image of the space between the vocal folds, during phonation in the laryngeal evaluation, and are observed differently between men and women due to their anatomical and physiological characteristics[19,20]. Moreover, secondary functional dysphonia predominated, which reinforces the possible positive impact of the speech therapy since these cases require behavioral changes regarding voice misuse and lifestyle habits that interfere with vocal health[16]. However, secondary functional dysphonia does not always result from vocal misuse and abuse. Minimal structural changes, for instance, are common to the larynx or its formation and harm vocal production when the individual begins to use their voice with greater demand. Therefore, an individualized therapeutic plan is the recommended scenario for assertive treatment.

Vocal quality, breathing pattern, and body posture associated with voice use improved statistically significantly after speech therapy. It is known that changes in the user's vocal and communicative pattern can have clinical consequences, even without a statistically significant difference[21].

Results were within the normal range expected for young and older individuals of both sexes after speech therapy follow-up[19]. Vocal deviation on the GRBASI scale improved after speech therapy since all users reassessed evolved from severe to mild-to-moderate deviation in the grade of hoarseness. In other words, no user remained with severe deviation, showing improved vocal quality[22].

Another important point to highlight is the change in VHI scores, showing an increase in self-perception and a lower index of voice handicap. The decrease in voice handicap after voice therapy demonstrates that the applicability of the protocols measures vocal self-perception in dysphonia evolution analysis, as well as the effects of voice therapy. It also helps guide the therapy and understand the relationship between

dysphonia and quality of life[23,24]. These data demonstrate benefits of quality public care focused on each user's needs.

A list presents the most common techniques in the therapeutic approaches used in speech therapy programs, considering that each user had their therapeutic planning designed individually[1,24]. The respiratory and body methods were performed in combination with other vocal techniques, aiming at the user's self-perception of vocal and respiratory production, as well as knowledge of anatomy and physiology to improve body and voice awareness[1,25,26]. Multisensory cues, auditory monitoring techniques with the aid of auditory and visual feedback instruments, the recording of the user's voice, and general guidelines on vocal health were used to achieve these objectives. The scientific evidence of traditional vocal techniques and guidelines on vocal health is proven with high evidence and recognized worldwide[25,27].

The results reveal the importance of a speech therapy approach that considers body methods to improve posture in relation to vocal production in dysphonic users[1,25]. As an example of muscle tension dysphonia, the abnormal contraction of muscles during speech production associated with changes in body posture influences vocal behavior and is therefore modifiable in voice therapy[28].

The study showed a loss in the number of users reassessed due to several associated factors such as low adherence to treatment, evasion, referrals to other health specialties, and multimorbidity. This fact is common and can be attributed to the profile of SUS users[11,12,29].

Speech therapy practice is centered on each patient's individuality and subjectivity, and emotional and functional aspects of communication. Hence, public speech therapy assistance is essential to provide comprehensive and universal access to health. Therefore, this service is in line with the United Nations' sustainable development since it preserves the population's health and well-being.

CONCLUSION

This study demonstrated positive clinical outcomes after voice therapy in relation to vocal quality and body and respiratory aspects associated with voice use. It also found a reduction in voice handicaps perceived by users treated at the service.

REFERENCES

1. Behlau M, Azevedo R, Pontes P. Conceito de voz normal e classificação das disfonias. In: Behlau M, Padovani M, Knopp D, editors. Voz: o livro do especialista: volume I. Rio de Janeiro (RJ): Revinter; 2001. p.348-65.

2. Contribuição da Fonoaudiologia para o avanço do SUS 27 anos do SUS: a Fonoaudiologia na conquista pela integralidade da atenção à saúde Sistema de Conselhos de Fonoaudiologia [Webpage on the internet]. [Accessed on 2023 May 23]. Available at: https://fonoaudiologia.org.br/wp-content/uploads/2019/09/Contribuicao-Fonoaudiologia-Avancao-do-Sus.pdf

3. Pereira CC, Veloso AL. Os desafios da Fonoaudiologia no Sistema Único de Saúde. In: editora científica digital. Ciências da saúde: desafios e potencialidades em pesquisa - Volume 2 [Book on the internet]. 2022 [Accessed on 2023 Nov 27]; 353-60. https://doi.org/10.37885/221010591

4. El Dib RP. How to practice evidence-based medicine. J vasc bras. 2007;6(1):1-4. https://doi.org/10.1590/S1677-54492007000100001

5. Relly CD, Tomiasi A, Cassol K, Romero G, Topanotti J. Atuação fonoaudiológica no sistema público de Saúde - Revisão de literatura. FJH. 2019;1(1):212-31. https://doi.org/10.35984/fjh.v1i1.12

6. Secretaria da Saúde do Rio Grande do Sul [Webpage on the internet]. Consultas e Exames Especializados. 2017 [Accessed on 2023 Nov 27]. Available at: https://saude.rs.gov.br/consultas

7. Hirano M. Psycho-acoustic evaluation of voice. In: Arnold GE, Winckel F, Wyke BD, editors. Clinical examination of voice. New York: Springer-Verlag Wien; 1981. p. 81-4.

8. Costa T, Oliveira G, Behlau M. Validation of the Voice Handicap Index: 10 (VHI-10) to the Brazilian Portuguese. Codas. 2013;25(5):482-5. https://doi:org/10.1590/S2317-17822013000500013 PMID: 24408554.

9. Behlau M, Almeida AA, Amorim G, Balata P, Bastos S, Cassol M et al. Reducing the GAP between science and clinic: Lessons from academia and professional practice - part A: Perceptual-auditory judgment of vocal quality, acoustic vocal signal analysis and voice self-assessment. CoDAS. 2022;34(5):e20210240. https://doi.org/10.1590/2317-1782/20212021240en PMID: 35920467.

10. Escola Paulista de Medicina. Departamento de Fonoaudiologia [Webpage on the internet]. Ambulatórios de Fonoaudiologia [Accessed on 2023 Nov 27]. Available at: https://sp.unifesp.br/epm/fonoaudiologia/institucional/ambulatorios-fonoaudiologia

11. Menezes LN de, Behlau M, Gama ACC, Teixeira LC. Voice disorder clinic in the speech therapy outpatient unit at "Hospital das Clínicas da Universidade Federal de Minas Gerais". Cien Saude Colet. 2011;16(7):3119-29. https://doi.org/10.1590/s1413-81232011000800012 PMID: 21808900.

12. Silva KZ da, Bello JZ, Cassol M. Motivational stage analysis of patients with behavioral dysphonia. Folia Phoniatr Logop. 2019;72(4):267-72. https://doi.org/10.1159/000500403 PMID: 31189167.

13. Silva MT, Silva EN da, Pereira MG, Silva MT, Silva EN da, Pereira MG. Outcomes in health economic evaluation studies. Epidemiol. Serv. Saúde. 2016;25(3):663-6. https://doi.org/10.5123/S1679-49742016000300023

14. Rech RS, Bulgarelli PT, Condessa AM, Santos CM dos, Hilgert JB, Goulart BNG de. Access and use of speech-language therapy services in Porto Alegre, Brazil: A population-based study. Cien Saude Colet. 2020;25(3):817-25. https://doi.org/10.1590/1413-81232020253.17212018 PMID: 32159652.

15. Jesus MTA de, Ferrite S, Araújo TM de, Masson MLV. Work-related voice disorder: An integrative review. RBSO. 2020;45:e26. https://doi.org/10.1590/2317-6369000040218

16. Behlau M, Azevedo R, Pontes P, Brasil O do. Disfonias funcionais. In: Behlau M, Padovani M, Knopp D, editor. Voz: o livro do especialista: volume I. Rio de Janeiro (RJ): Revinter; 2001. p.250-348.

17. Abreu MHL de. Edema de Reinke: aspectos gerais e tratamento [Monography]. Rio de Janeiro (RJ): CEFAC – Saúde e Educacão; 1999.

18. Medeiros N, Ferreira J, Aguiar C, Castro E, Larangeiro J, Condé A. Phonosurgical outcomes in Reinke's edema: A retrospective analysis. Acta otorrinolaringol. Galega. 2022 [Journal on the internet];14. [Accessed on 2023 Nov 27]. ISSN 2340-3438. Available at: https://www.sgorl.org/ACTA/index.php/acta/article/view/113/100

19. Behlau M, Azevedo R, Pontes P, Brasil O do. Disfonias funcionais. In: Behlau M, Padovani M, Knopp D, editors. Voz: o livro do especialista: volume I. Rio de Janeiro (RJ): Revinter; 2001. p.263-348.

20. Nascimento UN. Videolaringoscopia de alta velocidade: características laríngeas e de fechamento glótico em mulheres e homens [Dissertation]. Belo Horizonte (MG): Faculdade de Medicina da Universidade Federal de Minas Gerais; 2019.

21. Macedo TLM de. Efeito do tempo de execução do exercício com o tubo de ressonância flexível em cantores [Monography]. Natal (RN): Universidade Federal do Rio Grande do Norte; 2022.

22. Speyer R, Bogaardt HCA, Passos VL, Roodenburg NPHD, Zumach A, Heijnen MAM et al. Maximum phonation time: Variability and reliability. J Voice. 2010;24(3):281-4. https://doi.org/10.1016/j.jvoice.2008.10.004 PMID: 19111437.

23. Tierney WS, Xiao R, Milstein CF. Characterization of functional dysphonia: Pre- and post-treatment findings. Laryngoscope. 2020;131(6):E1957-E1964. https://doi.org/10.1002/lary.29358 PMID: 33369738.

24. Lemos I de O, Marchand DLP, Cassol M. Voice Handicap Index check pre and post vocal intervention in patients with dysphonia. Audiol., Commun. Res. 2015;20(4):355-60. https://doi.org/10.1590/2317-6431-2015-1580

25. Oliveira P, Lima HMO, Sousa M dos S, Almeida LN, Silva HF da, Ugulino AC et al. Comparison of the efficiency of different self-assessment instruments for dysphonia screening. CoDAS. 2023;35(2):e20210123. https://doi.org/10.1590/2317-1782/20232021123pt PMID: 37075411

26. Behlau M, Almeida AA, Amorim G, Balata P, Bastos S, Cassol M et al. Reducing the gap between science and clinic: Lessons from academia and professional practice - part B: Traditional vocal therapy techniques and modern electrostimulation and photobiomodulation techniques applied to vocal rehabilitation. CoDAS. 2022;34(5):e20210241. https://doi.org/10.1590/2317-1782/20212021241pt PMID: 36000681.

27. Lima C, Diedio P, Brasolotto AG, Antonetti-Carvalho AE, Silverio K. Effects of indirect vocal therapy via telehealth in speech-language therapy on self-assessment and vocal quality of physical education professionals. Rev. CEFAC. 2023;25(2):e9222. https://doi.org/10.1590/1982-0216/20232529222

28. Schlotthauer G, Torres ME, Jackson-Menaldi MC. A pattern recognition approach to spasmodic dysphonia and muscle tension dysphonia automatic classification. J Voice. 2010;24(3):346-53. https://doi.org/10.1016/j.jvoice.2008.10.007 PMID: 20346617.

29. Torbes TMM, Silva KZ da, Gadenz CD, Cassol M. Adherence of patients with dysphonia to voice therapy: Systematic review. J Voice. 2020;34(5):808.e15-808.e23. https://doi.org/10.1016/j.jvoice.2019.04.008 PMID: 31084942.

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LOB: Conceptualization; Data curation; Data analysis; Investigation; Methodology; Writing - Original draft.

KZS, CDG: Methodology; Writing - Review and editing.

JZB, IOL: Data analysis; Writing - Review and editing.

CCM: Conceptualization; Data analysis; Methodology; Supervision; Writing - Review and editing.

MC: Conceptualization; Data analysis; Investigation; Methodology; Project administration; Supervision; Writing - Review and editing.

Data sharing statement:

Data from this study will not be shared.