



Brazilian Consensus on Sleep-Focused Speech-Language-Hearing Sciences - 2023

Brazilian Sleep Association

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Sleep Sci

Abstract

Keywords

- ▶ sleep
- ▶ speech
- ▶ language and hearing sciences
- ▶ sleep wake disorders
- ▶ obstructive sleep apnea
- ▶ consensus
- ▶ delphi

Introduction This consensus aimed to develop a structured document presenting the role of sleep-focused Speech-Language-Hearing (SPH) Sciences (SPHS). The recommendations were based on the expertise of specialists and on evidence in the literature, aiming to guide the coverage of this area and the consequent improvement in the quality of the professionals' approach.

Methods A Delphi method was conducted with 49 SLH pathologists (SLHP), four sleep physicians, one dentist, one physical therapist, and one methodologist. Four Delphi panel rounds were conducted in Google Forms. The items were analyzed based on the panelists' percentage of agreement; consensus was reached when $\geq 2/3$ (66.6%) of valid responses were on a same answer (either "agree" or "disagree").

Results Participants voted on 102 items. The mean consensus rate was $89.9\% \pm 10.9\%$. The essential topics were the importance of professional training, the SLH diagnosis, and the SLH treatment of sleep disorders. It was verified that all fields of the SLHS are related to the area of sleep; that sleep-focused SLH pathologists (SLHP) are the responsible for assessing, indicating, and conducting specific orofacial

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myofunctional therapy for sleep-disordered breathing alone or in combination with other treatments; that SLHP are included in interdisciplinary teams in the area of sleep in public and private services.

Discussion The Brazilian consensus on sleep-focused SLHS is a landmark in this area. This consensus described the scope of action of sleep-focused SLHP and systematized recommendations being useful as a reference for the professional practice in the area of sleep.

Introduction

Speech-Language-Hearing Sciences (SLHS) encompass various areas related to human communication other functions of the orofacial and cervical myofunctional systems, in all their aspects and life cycles. Since it aims at promoting health and improving the quality of life, SLHS prevent, assess, diagnose, guide, habilitate, rehabilitate, and improve SLHS aspects related to peripheral and central hearing functions, oral language, written language, learning to read and write, fluency, voice, speech articulation, orofacial and cervical structures and functions involved in breathing, sucking, masticating, and swallowing, vestibular function (balance), and supplementary, augmentative, and alternative communication systems.¹⁻³

Given these responsibilities, the concern with these disorders has always been part of the scope of the SLHS. Clinical questions about the characteristics of sleep are included in medical history survey protocols in all SLHS areas. The characteristics of sleep have always been addressed as possible etiological, contributing, and/or aggravating factors of SLHS issues.⁴ It is relevant to seek information on the sleep of babies, children, adolescents, adults, and older adults. Such information is decisive to occupational voice users and those who want to improve SLH aspects or solve congenital, developmental, or acquired problems with neurological impairments or other important comorbidities – in which even the SLH therapy's effectiveness depends on the patient's being awake, attentive, and alert.

Efficient restful sleep is a multidimensional biological need, responsible for regulating various systems that play a critical role in well-being, similar to breathing, eating, drinking, and speaking. However, sleep can be affected by countless factors, greatly impacting human physical and mental health.⁵⁻⁷ Sleep deprivation and disorders can negatively interfere with metabolic functioning in organs and systems, contributing to the onset or aggravation of various diseases, including cardiovascular problems.^{6,8} The consequences are not limited to when the person is asleep, as they importantly affect the time awake, impairing physical and mental development, cognitive aspects, attention, memory, learning, mood, and disposition, compromising the quality of life and longevity.^{6,8}

The interface of sleep disorders with SLHS first appeared in international literature in the 1960s when certain aspects of communication performance were identified as sensitive

to sleep deprivation, and Morris et al. described its effects on communication and speech. The most striking conditions verified in sleep deprivation include unclear communication and changes in the speech rhythm and tone of voice.⁹ Particularly, performance in tasks that require sustained attention decreases sharply as sleep deprivation increases. Moreover, other frequent changes are associated with sleep deprivation, such as apathy, irritability, increased restlessness, incapacity to concentrate, and visual illusions. Later studies^{10,11} point out that speech fluency and spontaneous word generation based on given letters or categories are likewise significantly impaired by sleep deprivation, even after a single night without sleeping.¹¹ More recently, SLHS have specifically focused on sleep and sleep disorders, in an area referred to as sleep-focused SLHS.

Given the broad field of SLHS practice, its first specialties were defined in Brazil in 1996: Audiology, Language, orofacial myofunctional field (OMF), and Voice.¹² By 2021, it encompassed 14 specialty areas¹³: Audiology, Dysphagia, Fluency, Occupational SLH Pathology, Educational SLH pathology, Hospital SLH Pathology, Neurofunctional SLH Pathology, Gerontology, Language, OMF, Neuropsychology, Forensic SLH Analysis, Public Health, and Voice.

Given the objectives of SLHS in each specialty, it was necessary to broaden SLH skills, including more in-depth diagnoses of sleep problems and their consequences in all age ranges. SLHS interfaces not only with various pathologies but also with other health professionals. Hence, they seek associative factors regarding the issues that make patients look for professional SLH treatment – which may include consequences of sleep problems to their health, involving practically all SLHS specialties.¹⁴

SLHP are currently included in sleep-focused interdisciplinary teams in various public and private services. The involvement of SLHS with sleep was disseminated at first mainly through the approach of OMF to sleep-disordered breathing (SDB), particularly obstructive sleep apnea (OSA) and snoring.

Brazil has unquestionably pioneered in this field of practice. The first study was published in the late 1990s, showing the main characteristics of oropharyngeal soft tissues in patients with OSA.¹⁵ After 10 years, another study from the same author, published in the international literature, addressed the effectiveness of an SLH therapy program to treat OSA,¹⁶ using oropharyngeal myofunctional exercises and approaching mastication, swallowing, and breathing.

The abovementioned study was used in patients with moderate OSA and had positive results in decreasing OSA signs and symptoms, including improved polysomnographic parameters. Further studies were conducted based on this research, demonstrating the effectiveness of orofacial myofunctional therapy (OMT) in reducing the frequency and intensity of snoring,¹⁷ improving the adherence to the use of continuous positive airway pressure (CPAP) devices in combined treatments,¹⁸ and possibly modifying tongue structure and functioning in these patients' treatments.¹⁹ These studies address various therapy programs, according to the initial approach; however, they generally focus on the oropharyngeal muscles and the importance of orofacial functions to rebalance the upper airway (UA).

In 2014, the SLHS were officially included in the Brazilian Sleep Association (*Associação Brasileira do Sono* – ABS, in Portuguese), which grants accreditation in sleep-focused SLHS since 2016, via specific examination, supported by the Brazilian SLH Society (*Sociedade Brasileira de Fonoaudiologia* – SBFa) and the Brazilian Orofacial Myofunctional Association (*Associação Brasileira de Motricidade Orofacial* – ABRAMO). Thus, SLH pathologists (SLHP) who are granted this accreditation have their work recognized in multidisciplinary teams focused on studying, researching, preventing, assessing, diagnosing, guiding, habilitating, and treating sleep disorders related to areas encompassed by SLHS. These scientific institutions – SBFa,²⁰ ABRAMO,²¹ and ABS²²–developed and publicized official reports on sleep-focused SLHS, complying with ethical and professional norms. In the same year, the Federal SLH Council (*Conselho Federal de Fonoaudiologia* – CFFa) passed a resolution that regulates and officializes the work of SLHP in the area of sleep.²³

The pioneering initiative in Brazilian SLHS is renowned worldwide in the fields of SDB due to randomized clinical trials cited in systematic literature reviews and meta-analyses by national and international authors; publications on sleep from various SLHS specialties available in indexed journals; the evaluation of scientific institutions and trade associations on the scope of sleep-focused SLHS; the inclusion of SLHP in conferences and interdisciplinary discussions on sleep. However, the reach of their work is not widely known yet in terms of their involvement with sleep and its disorders, interface possibilities with areas of SLH expertise, and practices that go beyond diagnostic-therapeutic procedures.

Hence, it was found necessary to reach a consensus on sleep-focused SLHS based on Brazilian specialists' expertise and the extant literature. These recommendations are intended for SLHP and other professionals involved in the area of sleep, such as physicians, dentists, physical therapists, psychologists, nutritionists, physical educators, primary healthcare personnel, among others.

The process was based on the Delphi method, which is widely used to reach consensus and is deemed effective in guiding decision-making based on the opinions of specialists on the topic, leading to reliable results regarding complex and encompassing topics. This study aimed to develop a consensus on sleep-focused SLHS, based on specialists' expertise and recommendations previously pointed out in

the literature, to indicate the scope of the area and thus improve the quality of the professional approach.

Methods

This consensus was based on a modified Delphi method, following the guidelines from CREDES (Guidance on Conducting and REporting DELphi Studies)²⁴ and EQUATOR (Enhancing the QUALity and Transparency Of health Research).²⁵

Delphi studies were initially developed by the RAND Corporation^a to reach consensus on military strategy issues,²⁶ being successfully adapted to health research as a reputable method to reach consensus on a given topic.^{26,27} It is currently one of the most recognized methodologies to reach consensus on biomedical topics, based on specialists' opinions and contributions from specialists,^{24,26,28} especially when evidence is limited, controversial, or not applicable.^{27,29,30}

The Delphi method varies considerably between studies,^{28,30–32} but it is usually based on iterative rounds with a group of specialists who participate anonymously, giving their opinions and voting on predefined topics, with the possibility of reconsidering their votes based on controlled feedback, until they reach a consensus. The sections below detail how the Delphi method was structured to reach the current consensus.

Selection of participants

The participants of this Delphi study were divided into four organization levels: steering committee, core committee, specialist panel, and advisory board. Their names are listed per level in **►Supplementary Table S1** (online only). Their responsibilities and attributions are listed below.

- Steering committee (comprising LMSP, EMGB, and GNP): Responsible for managing all works, which included nominating the other participants, defining the questions on which they would vote, managing voting rounds, analyzing the results of each Delphi round, and giving feedback to all participants.
- Core committee: Comprising all members of the ABS SLHS Committee ($n = 4$) and one invited member, who participated in previous SLH committees. They were responsible for helping the steering committee define the method for this study, assisting in the results of each Delphi round when necessary, and organizing work groups to develop and revise the final report.
- Panel of specialists: The following were invited to participate in the specialist panel: Brazilian SLHP accredited by ABS in sleep-focused SLHS and Brazilian SLHS researchers who authored publications on sleep in the past 10 years, identified through a search in the CAPES and SCOPUS databases. The panel had 47 SLHP – 32 of them were accredited by ABS in sleep-focused SLHS, and the other 15 were SLHS researchers, hereinafter referred to as “panelists.” They were responsible for suggesting new items besides the ones initially listed by the steering committee and voting in the subsequent rounds. Only SLHP could

participate in the specialist panel, which means that non-SLHP who participated in the other authorship levels did not vote in any Delphi round. Steering committee members were not part of the specialist panel (hence, they could not vote) to avoid possible biases, whereas core committee members were also included in the specialist panel. Panelists who did not participate at any other level are recognized in the authorship group named “Consensus Group on Sleep-focused SLHS.”

- Advisory board: Comprising non-SLHP (sleep physicians, dentists, physical therapists), whose responsibilities were limited to advisory and consulting roles on specific topics.

All panelists signed an authorship form agreeing with the participation terms regarding the order of authorship, their inclusion as members of the Consensus Group on sleep-focused Speech-Language-Hearing Sciences, and obligation to participate in all voting rounds. Moreover, all participants confirmed they are aware that this consensus is a systematized collective position in the area; hence, the final document may have statements and recommendations that do not reflect the personal and professional opinions of each individual author.

Delphi panel

This Delphi panel had four rounds, as described below. In general, panelists could vote in these rounds to reach consensus on specific points related to professional sleep-focused SLH practices or propose items to be voted on. All rounds were developed in Google Forms, with no synchronous meetings between panelists. All participations were exclusively online and asynchronous, and panelists had ~2 weeks to fill in each round. Also, each panelist did not know who the other ones were, had no access to their participation, and could not share their responses with anyone to ensure secrecy in the process.

During the voting stage, all practical items were written and presented in a standard form, always as affirmative statements (avoiding negative ones) related to the definition, constitution, and professional practice of the sleep-focused SLH Sciences. In each item, panelists could vote as one of three options: “agree,” “disagree,” or “I don’t know.” In each author’s form, panelists could also give open feedback on voted items.

All items were analyzed based on the panelists’ percentage of agreement. Each item was considered as a consensus when $\frac{2}{3}$ (66.6%) of the valid responses were on a same answer (either “agree” or “disagree”). Items that reached a consensus were not voted on again, whereas those that did not reach a consensus in the first round were submitted to voting again in the following round. If no consensus was reached in the second round, it was considered as “no consensus.” From one round to the next, each panelist received their own answers and the general descriptive results of the previous panel (but with no access to the other panelists’ individual responses) for them to reassess and reconsider their votes from one round to the other. Each round’s procedures and activities are presented below.

- Round #1: Once all Delphi panel members confirmed their participation and agreed with the authorship crite-

ria, they participated in round #1, which consisted of questions about sociodemographic data and general directions about the consensus. Sociodemographic questions aimed to map and describe the participants, including questions on age, time of professional experience, SLH specialty, work setting (public or private clinic, hospital, or university), and geographical region. Then, an open question was presented to obtain their opinion on the constitution of sleep-focused SLH practices, and what activities should be included in the professional practice in this field. These questions were intentionally open to generally guide the steering committee and define items to be voted on in the second round.

- Round #2: Based on the panelists’ contributions in round #1, the steering committee listed practical items for voting. Some special instructions were organized for panelists to be attentive to some particularities, especially regarding two important topics. The first one referred to the nature of the questions, as some addressed SLHS in general, while others were specifically about sleep-focused SLHS. The second one referred to the type of sleep disorder – some questions addressed sleep disorders in general, while other ones were specifically related to SDB. At the end of the voting round, participants could suggest new items to be voted on in round #3.
- Round #3: Comprising voting on three types of items: those for which consensus was not reached in the previous round, new items proposed by the panelists, and items for which the writing was considered unclear on the previous round. This round included only voting and suggestions of new items were not allowed.
- Round #4: It consisted of a voting round only for the items suggested by the panelists in round #2 and that did not reach consensus on round #3.

Development of practical items for voting rounds

The steering committee was responsible for defining and developing items for voting, based on the panelists’ contributions and with the assistance of the core committee. All practical items were prepared as soon as round #1 had finished. Altogether, 91 items were developed to be voted on in round #2, distributed into four categories: professional qualification, diagnosis, treatment, and other topics (► Tables 1 to 5).

The steering committee reserved the right to remove or exclude items at any moment, as long as its members reached an absolute consensus on it. The possible reasons for it include logical inconsistencies (e.g., more restrictive items reaching a consensus when broader ones had not), unclear phrasing, or political inconsistencies (e.g., items inconsistent with laws, SLH prerogatives, or other professions’ prerogatives).

Results

Description of the specialist panel

The specialist panel had 47 panelists, all of them SLHP. The description of the specialist panel is based on round #1 when 42 valid responses were given (hence, a 10.6% non-response rate). Subsequent rounds had a 100% response rate.

Table 1 Consensus on items related to professional training.

| Item | Consensus index | Voting rounds until reaching a consensus |
|--|-----------------|--|
| Sleep-focused SLH Sciences can only be practiced by professionals who have a bachelor's degree in SLH Sciences. | 97.9% | 1 |
| Sleep-focused SLH pathologists must be trained or accredited by competent trade associations or professional societies*. | 91.5% | 1 |
| Sleep-focused SLH pathologists must be specifically trained in the areas of sleep. | 97.9% | 1 |
| Sleep-focused SLH pathologists must be experienced in the area of sleep, verified with clinical activities. | 93.6% | 1 |
| Sleep-focused SLH Sciences training must encompass the following topics: | | |
| Sleep physiology | 100.0% | 1 |
| Physiopathology of sleep disorders | 100.0% | 1 |
| Diagnostic criteria for sleep disorders | 97.8% | 1 |
| Diagnostic and assessment methods in sleep medicine | 97.8% | 1 |
| Therapeutic modalities in sleep medicine | 100.0% | 1 |
| Sleep-focused SLH Sciences is related to the following SLH specialties: | | |
| Audiology | 78.7% | 1 |
| Dysphagia | 97.9% | 1 |
| Fluency | 76.6% | 1 |
| Occupational SLH pathology | 74.5% | 1 |
| Educational SLH pathology | 83.0% | 1 |
| Hospital SLH pathology | 83.0% | 1 |
| Neurofunctional SLH pathology | 76.6% | 1 |
| Gerontology | 97.9% | 1 |
| Language | 93.6% | 1 |
| Orofacial Myofunctional Field | 100.0% | 1 |
| Neuropsychology | 74.5% | 1 |
| Public Health | 85.1% | 1 |
| Voice | 87.2% | 1 |
| Sleep-focused SLH pathologists can work in the following settings: | | |
| Clinics | 100.0% | 1 |
| Outpatient centers | 100.0% | 1 |
| Hospitals | 95.7% | 1 |
| Schools | 72.3% | 1 |
| Supervising scientific research in the area of sleep does not grant the status of a Sleep-focused SLH pathologist**. | 89.4% | 2 |
| Conducting scientific research in the area of sleep does not grant the status of a Sleep-focused SLH pathologist**. | 83.0% | 2 |

*The only association that grants accreditation in Sleep-focused SLH Sciences in Brazil to date is the Brazilian Sleep Association (Associação Brasileira do Sono - ABS).

**All items were voted as positive statements, but items whose consensus was obtained as "disagree" were rewritten to make clear the direction of the recommendation.

Most of the 47 SLHP were women ($n = 45$, 95.7%), aged 41 to 50 years ($n = 21$, 44.7%), with 20 or more years of professional experience ($n = 30$, 63.8%). The most reported specialty was OMF ($n = 34$; 72.3%), whereas each of the other specialties was reported by no more than six participants (► **Fig. 1**). Most panelists worked in clinics ($n = 33$, 70.2%), followed by academic settings ($n = 19$,

40.4%) and hospitals ($n = 2$, 4.2%). Private work settings were reported by 31 panelists (65.9%), while public health was reported by 12 of them (25.5%). Most panelists were from Southeastern Brazil ($n = 30$, 63.8%), followed by the Northeast ($n = 5$, 10.6%), South ($n = 4$, 8.5%), and Central-West ($n = 3$, 6.4%). None of the panelists was from the North Region.

Table 2 Consensus on items related to diagnosis.

| Item | Consensus index | Voting rounds until reaching a consensus |
|--|-----------------|--|
| Sleep problems interfere with memory, learning, behavior, emotional regulation, and communication skills. Hence, the assessment of sleep disorder symptoms and complaints is included in the SLH pathologists' responsibilities. | 95.7% | 1 |
| Sleep-focused SLH pathologists perform orofacial myofunctional assessments and diagnoses of sleep-disordered breathing. | 97.9% | 1 |
| Orofacial myofunctional assessments and diagnoses of sleep-disordered breathing are the exclusive responsibility of sleep-focused SLH pathologists. | 72.3% | 2 |
| Sleep-focused SLH pathologists can request multidisciplinary clinical assessments of sleep-disordered breathing. | 100.0% | 1 |
| SLH pathologists are responsible for referring patients for thorough sleep assessment with multidisciplinary and/or interdisciplinary teams. | 91.5% | 1 |
| The work of sleep-focused SLH pathologists encompasses referrals for specialized multidisciplinary diagnoses. | 97.9% | 1 |
| Sleep-focused SLH pathologists can request the following examinations: | | |
| Type-I (complete laboratory) and type-II (complete home) polysomnography | 74.5% | 2 |
| Types III and IV polysomnography (cardiorespiratory polygraphy) | 72.3% | 2 |
| Sleep-focused SLH pathologists can accompany complementary instrumental examinations of sleep disorders (e.g., sleep endoscopy and nasal endoscopy). | 95.7% | 1 |
| SLH pathologists CANNOT emit polysomnography reports*. | 78.7% | 1 |
| Sleep-focused SLH pathologists can apply questionnaires and other subjective tools to assess sleep disorders and symptoms (e.g., sleep diaries, Epworth Scale, Pittsburgh Sleep Quality Index (PSQI), Child Obstructive Apnea Syndrome Questionnaire-18 (OSA-18), etc.). | 100.0% | 1 |
| Sleep-focused SLH pathologists can take anthropometric measures (body mass index and cervical and abdominal circumference). | 95.7% | 1 |
| Sleep-focused SLH pathologists assess and treat patients at any age with SLH demands related to sleep disorders. | 95.7% | 1 |
| Sleep-focused SLH pathologists are responsible for sleep-related assessments and clinical guidance associated with coexisting issues, such as: | | |
| Changes in oral and/or written language | 95.7% | 1 |
| Psycholinguistic skills | 83.0% | 1 |
| Cognitive skills | 89.4% | 1 |
| Central auditory processing | 87.2% | 1 |
| Balance | 80.9% | 1 |
| Hearing | 89.4% | 1 |
| Speech fluency | 91.5% | 1 |
| Voice | 97.9% | 1 |
| Orofacial Myofunctional Field | 100.0% | 1 |
| Dysphagia | 100.0% | 1 |
| Gerontology | 100.0% | 1 |
| Public health | 91.5% | 1 |
| Other fields of SLHS competence | 85.1% | 1 |

*All items were voted as positive statements, but items whose consensus was obtained as "disagree" were rewritten to make clear the direction of the recommendation.

Delphi results

Round #2 (first voting round) had 91 items. A consensus was reached on 73 of them (86.8%) – 72 with "agree" (79.1%) and one with "disagree" (1.1%). No consensus was reached for nine items (9.9%), and another nine (9.9%) were considered

invalid due to unclear phrasing, according to the panelists' feedback (► **Supplementary Table S2** (online only)).

Round #3 had 29 items – nine were submitted to a second voting round because they had not reached a consensus in the previous one (31.0%), 19 were new items based on

Table 3 Consensus on items related to treatment.

| Item | Consensus index | Voting rounds until reaching a consensus |
|---|-----------------|--|
| Sleep-focused SLH pathologists' scope of action encompasses the identification of risks for sleep disorders. | 100.0% | 1 |
| Sleep-focused SLH pathologists can help diagnose sleep disorders. | 97.9% | 1 |
| SLH pathologists must suspect of and assess sleep disorders whenever signs and symptoms are present, even if it is not the patient's original complaint. | 91.5% | 1 |
| Sleep-focused SLH pathologists' procedures to treat sleep-disordered breathing include Orofacial Myofunctional Field competencies. | 97.9% | 1 |
| Sleep-focused SLH pathologists indicate specific orofacial myofunctional therapy for sleep-disordered breathing alone. | 76.6% | 2 |
| Sleep-focused SLH pathologists indicate specific orofacial myofunctional therapy for sleep-disordered breathing in combination with other types of treatments. | 95.7% | 1 |
| Sleep-focused SLH pathologists indicate specific orofacial myofunctional therapy for sleep-disordered breathing as complementary to first-choice treatments, such as surgery. | 95.7% | 1 |
| In Brazil, SLH pathologists are the professionals trained to conduct orofacial myofunctional therapy for sleep-disordered breathing alone, in combination, or as a complement. | 93.6% | 1 |
| In Brazil, SLH pathologists have the exclusive right to conduct orofacial myofunctional therapy for sleep-disordered breathing. | 83.0% | 1 |
| Sleep-focused SLH pathologists can help fit different types of continuous positive airway pressure masks in the multidisciplinary treatment of sleep-disordered breathing. | 72.3% | 1 |
| Sleep-focused SLH pathologists can help choose and fit intraoral appliance models in the multidisciplinary treatment of sleep-disordered breathing. | 83.0% | 2 |
| Sleep-focused SLH pathologists assess and treat orofacial functions in patients with diagnosed or suspected sleep-disordered breathing. | 100.0% | 1 |
| SLH pathologists have the exclusive right to assess and treat orofacial functions in patients with diagnosed or suspected sleep-disordered breathing. | 87.2% | 1 |
| Sleep-focused SLH pathologists can use complementary resources such as laser therapy, incentive spirometers, therapeutic ultrasound, surface electromyography, electromyographic biofeedback, and so forth to treat patients with sleep-disordered breathing. | 97.9% | 1 |
| Sleep-focused SLH pathologists can provide clinical reports on the follow-up of cases of sleep disorders. | 93.6% | 1 |
| Sleep-focused SLH pathologists can request clinical reports on the follow-up of cases of sleep disorders. | 97.9% | 1 |
| Sleep-focused SLH pathologists CANNOT prescribe cognitive-behavioral therapy*. | 66.0% | 1 |
| Sleep-focused SLH pathologists CANNOT conduct cognitive-behavioral therapy*. | 95.7% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments on the feasibility of treatment with cognitive-behavioral therapy, to be conducted by another professional when the signs and symptoms indicate the need for this therapy. | 93.6% | 1 |
| Sleep-focused SLH pathologists can prescribe positional therapy to treat sleep-disordered breathing. | 90.9% | 1 |
| Sleep-focused SLH pathologists can conduct positional therapy to treat sleep-disordered breathing. | 70.2% | 1 |
| Sleep-focused SLH pathologists CANNOT prescribe physical exercises to treat sleep-disordered breathing*. | 78.7% | 1 |
| Sleep-focused SLH pathologists CANNOT conduct physical exercises to treat sleep-disordered breathing*. | 100.0% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments of the feasibility of treatment with physical exercises in cases of sleep-disordered breathing, to be | 100.0% | 1 |

(Continued)

Table 3 (Continued)

| Item | Consensus index | Voting rounds until reaching a consensus |
|---|-----------------|--|
| conducted by another professional, when the signs and symptoms indicate the need for this therapy. | | |
| Sleep-focused SLH pathologists CANNOT prescribe weight loss therapy to treat sleep-disordered breathing*. | 72.3% | 1 |
| Sleep-focused SLH pathologists CANNOT conduct weight loss therapy to treat sleep-disordered breathing*. | 97.9% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments on the feasibility of treatment with weight loss therapy in cases of sleep-disordered breathing, to be conducted by another professional, when the signs and symptoms indicate the need for this therapy. | 97.9% | 1 |
| Sleep-focused SLH pathologists CANNOT prescribe intraoral appliances to treat sleep-disordered breathing*. | 93.6% | 1 |
| Sleep-focused SLH pathologists CANNOT conduct therapy with intraoral appliances to treat sleep-disordered breathing*. | 95.7% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments on the feasibility of treatment with intraoral appliances in cases of sleep-disordered breathing, to be conducted by another professional, when the signs and symptoms indicate the need for this therapy. | 95.7% | 1 |
| Sleep-focused SLH pathologists CANNOT prescribe therapy with continuous positive airway pressure devices to treat sleep-disordered breathing*. | 87.2% | 1 |
| Sleep-focused SLH pathologists CANNOT conduct therapy with continuous positive airway pressure devices to treat sleep-disordered breathing*. | 80.9% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments on the feasibility of treatment with continuous positive airway pressure devices to treat sleep-disordered breathing, to be conducted by another professional when the signs and symptoms indicate the need for this therapy. | 93.6% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments on the feasibility of treatment with skeletal surgeries in cases of sleep-disordered breathing, to be conducted by another professional, when the signs and symptoms indicate the need for this therapy. | 95.7% | 1 |
| Sleep-focused SLH pathologists can suggest specific assessments on the feasibility of treatment with oropharyngeal soft tissue surgery in cases of sleep-disordered breathing, to be conducted by another professional, when the signs and symptoms indicate the need for this therapy. | 95.7% | 1 |

*All items were voted as positive statements, but items whose consensus was obtained as “disagree” were rewritten to make clear the direction of the recommendation.

Table 4 Consensus on items related to other topics.

| Item | Consensus index | Number of voting rounds until reaching a consensus |
|--|-----------------|--|
| Sleep-focused SLH pathologists can work in multidisciplinary teams in the area of sleep. | 100.0% | 1 |
| Sleep-focused SLH pathologists can coordinate multidisciplinary teams in the area of sleep. | 89.4% | 1 |
| Sleep-focused SLH pathologists can teach and coordinate courses in the area of sleep. | 97.9% | 1 |
| Sleep-focused SLH pathologists can coordinate initiatives and campaigns in the area of sleep. | 97.9% | 1 |
| Sleep-focused SLH pathologists can hold administrative positions in the area of sleep. | 97.9% | 1 |
| Sleep-focused SLH pathologists can be the technical professionals responsible for devices and appliances related to sleep. | 68.1% | 1 |

Table 4 (Continued)

| Item | Consensus index | Number of voting rounds until reaching a consensus |
|---|-----------------|--|
| Sleep-focused SLH pathologists' scope of action in multidisciplinary teams can involve the management and conduction of scientific studies and research. | 97.9% | 1 |
| Sleep-focused SLH pathologists can work in preventing sleep disorders through guidance and participation in initiatives and campaigns to instruct the population. | 100.0% | 1 |
| Sleep-focused SLH pathologists can address sleep disorders through guidance on sleep hygiene. | 97.9% | 1 |
| Sleep-focused SLH pathologists' scope of action encompasses guidance and adjustment of orofacial myofunctional aspects that predispose to sleep-disordered breathing. | 100.0% | 1 |

*All items were voted as positive statements, but items whose consensus was obtained as "disagree" were rewritten to make clear the direction of the recommendation.

Table 5 Items on which no consensus was reached.

| Category | Item | Consensus index |
|-----------------------|--|-----------------|
| Professional training | Sleep-focused SLH Sciences is related to the following SLH specialties: [Forensic SLHS Analysis] | 51.1% |
| Diagnosis | Sleep-focused SLH pathologists can request the following examinations: [Actigraphy] | 63.8% |
| Others | Is it the sleep-focused SLH pathologists' role to sell positive airway pressure devices? | 57.4% |

All these items were submitted to two voting rounds, but they did not reach 66.6% of equal responses on either occasion.

^aRAND Corporation is a nonprofit, non-partisan research organization that develops solutions for public policy challenges, aiming to make worldwide communities safer, healthier, and more prosperous.

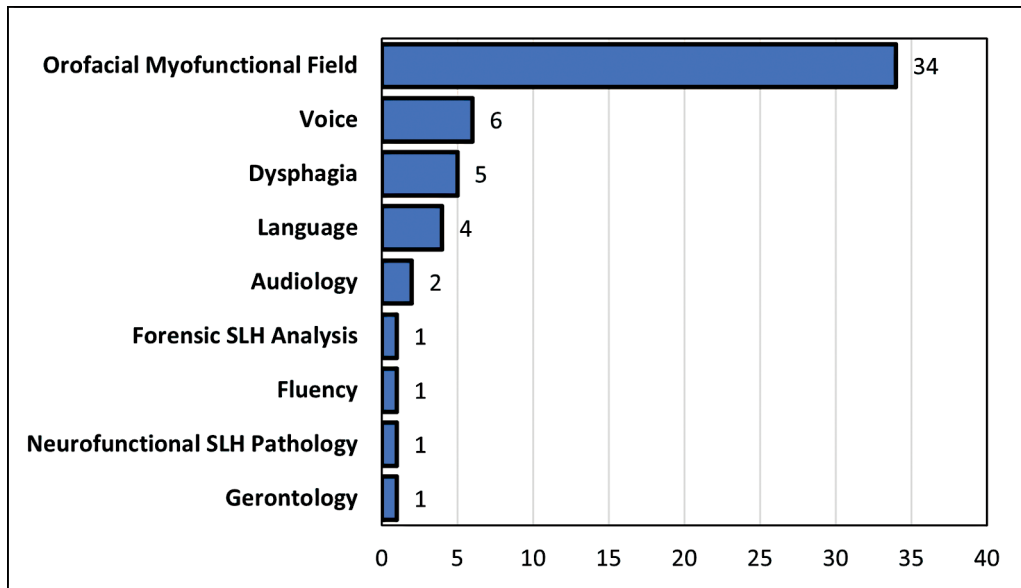


Fig. 1 Professional specialties reported by the panelists. Each panelist could report as many specialties as they had; hence, the total number of reported specialties exceeded the number of panelists.

previous ones that were considered unclear (65.6%), and one new based suggestion by the panelists (3.4%). A consensus was reached on 26 items (69.7%) – 14 with “agree” (43.8%) and 12 with “disagree” (41.4%). Round #4 had a single item, which had been first included in round #3, and had not reached a consensus.

Altogether, considering the three voting rounds, panelists voted on 102 items, not counting the unclear ones in round #2. A consensus was reached on 99 items (97.1%) – 86 with “agree” (84.3%) and 13 with “disagree” (12.7%). No consensus was reached on three items (2.9%). Most of the consensuses were reached in the first voting round ($n = 94, 92.2%$), while

only eight required two voting rounds (7.8%). The mean consensus rate was $89.9\% \pm 10.9\%$.

Discussion

Sleep-focused SLHS is a promising area, which has played an essential role in sleep disorders management interdisciplinary teams. The interest in the area increased by the late 1990s when the first studies and clinical approaches aimed to identify orofacial myofunctional issues in patients with OSA and snoring¹⁵ and understand the impact of sleep disorders on contexts related to SLHS specialties, such as language, voice, speech fluency, and hearing.³³

This consensus aimed to address the SLHP's training, their work in the area of sleep, details on specific SDB therapy, and other multidisciplinary relationships. The SLHP who participated in this study reached a consensus that sleep-focused SLHS should be practiced exclusively by professionals with a degree in SLHS (97.9%) with specific training in the area of sleep (97.9%).

SLHS in Brazil currently encompasses 14 specialties thanks to its scope in practices regarding communication and eating processes and disorders. SLHS undergraduate programs address specific topics such as sleep disorders, but they are only approached in-depth in postgraduate improvement or specialization programs. In undergraduate studies, topics on sleep disorders are usually addressed in OMF courses, as this area has a greater interface with SDB treatment with OMT. These results reinforce the need to review the pedagogical frameworks of undergraduate SLHS programs, as the participants also reached a consensus that the sleep-focused SLHS are related to various other specialties, such as Audiology, Dysphagia, Fluency, Occupational SLH Pathology, Educational SLH Pathology, Hospital SLH Pathology, Neurofunctional SLH Pathology, Gerontology, Language, Neuropsychology, Public Health, and Voice (→ **Table 1**).

The CFFa aimed to officialize the scope and criteria of SLHS practice in 2009, including the responsibility for SLH assessment and therapy of SDB in the official document – the 3rd edition of the Brazilian Classification of SLH Procedures (CBPFa).³⁴ Even though orofacial myofunctional treatment of SDB is included in OMF, countless other SLHS productions point to the importance of various SLHS specialties in the procedure and management of different sleep disorders.³³

Sleep changes can interfere with voice quality³⁵ or impair communicative competence, as it interferes with speech-motor functions.^{11,36} Sleep deprivation can also lead to language changes when this function is being developed.³⁷ Impacts on the sleep of children and adolescents with stuttering have also been observed – they were found to be four times as likely to have insomnia or sleep difficulties as individuals who did not have this disorder.³⁸

Sleep also interferes directly with cognitive processes, which in turn interact with communication and eating – skills encompassed in the domain of SLHP. Sleep architecture and other parameters such as sleep latency, efficiency, and total time are associated with cognitive functions.³⁹ Evi-

dence indicates that naps impact preschoolers' vocabulary performance⁴⁰ and that sleep has an essential role in consolidating adults' declarative memory.⁴¹

Sleep-related problems may interface simultaneously with various SLHS fields. The assessment of children of different ages clearly shows that obstructive SDB impacts oral language, oral reading, and hearing skills.⁴² Indicated treatment, usually adenotonsillectomy, and longitudinal follow-up improved these skills, although they do not always level with the control population,⁴³ with the continuity of habitual mouth breathing and residual apnea and/or hypopnea. Hence, SLHP have an important role in assessing communication skills as early as possible and identifying possible sleep changes to proceed with the appropriate treatment and minimize cognitive impacts.

There was no consensus only in the area of Forensic SLHS Analysis, which led to presenting the question again in the subsequent research round. However, agreement was still low (52.2%). The divergence may be due to the recent recognition of this specialty as an area of the SLHS.⁴⁴ This field of practice is related to legal and administrative processes, which can be related to the area of sleep as sleep disorders poses greater risks of accidents in traffic⁴⁵ and at work.⁴⁶ This topic may also be involved in homicide processes.^{47,48}

The first internationally relevant randomized clinical trial approaching the effects of OMT on reducing moderate OSA signs and symptoms was published in 2009. Its results, based on the physiological parameters analyzed, showed significant differences in anthropometric measures related to reduced cervical circumference with no decrease in the body mass index (BMI). Physiological data obtained with polysomnography verified an ~40% decrease in the apnea-hypopnea index (AHI). Parameters on the symptomatology analyzed also showed a decrease in snoring intensity and frequency and daytime sleepiness and improved quality of sleep after applying for the OMT program. This pioneer publication was an important landmark in the national and international recognition of SLH practice regarding sleep disorders.¹⁶ This study motivated further randomized clinical research that helped consolidate this therapeutic approach.

Clinical studies conducted so far have presented encouraging results regarding the effects of OMT on mild and moderate OSA treatment. In a specific study that verified the effects of OMT on snoring,¹⁷ this therapeutic approach reduced the index, total power, frequency, and intensity of snoring¹⁷ and AHI and improved breathing patterns and the quality of sleep in affected individuals.^{18,19,49}

OMF sustains the possibility of SLHS practice in the alternative treatment of oral and nasopharyngeal obstructions during sleep, with the probability of potentializing pharyngeal permeability with oropharyngeal exercises and adjustments in orofacial functions. A systematic review of eight studies demonstrated that this treatment is an option for obstructive disorders, although further investigations are needed to direct the eligibility for this treatment⁵⁰ and longitudinal results follow-up.

OMF specialists are knowledgeable of the anatomy and physiology of the stomatognathic system, which encompasses UA oropharyngeal muscles and the other structures related to breathing, mastication, swallowing, and speech. Hence, they are apt to manage orofacial myofunctional disorders associated with SDB. Dysphagia and Voice specialists also master these issues, focused on the health, safety, and rehabilitation of swallowing and voice, respectively. However, these competencies may not be enough for the professional practice encompassing sleep disorders. Participants reached a consensus that sleep-focused SLHP must also master the following topics: physiopathology of sleep (100%), physiopathology of sleep disorders (100%), diagnostic criteria for sleep disorders (97.8%), sleep assessment and diagnostic methods (97.8%), and therapeutic modalities to treat sleep disorders (100%). Hence, minimum training programs for sleep-focused SLHP must have these items in their course content.

Scientific societies' evaluation reports reinforce the SLHS practice to address sleep disorders and point out the need for specific training in the area, interdisciplinary teamwork skills, and OMF training to perform OMT aimed at cases of snoring and OSA. The documents reinforce the work of SLHP regarding sleep disorders and highlight the scientific associations' recognition of this field of practice.²¹⁻²³

Continuing education is essential for professionals to update on scientific and technological advancements. SLHP must be attentive to updates in the area of sleep and participate in courses, workshops, conferences, and study groups in this field to improve and develop specific theoretical-practical skills for such practice. A consensus was reached that sleep-focused SLHP must be experienced in the area of sleep, verified with clinical activities (93%). However, supervising (98.4%) or conducting (83%) scientific studies in the area of sleep does not grant the status of a sleep-focused SLHP.

Sleep-focused SLHP must be trained or accredited by a competent trade association or professional society, according to the SLHP participating in the consensus (91.5%). So far, ABS is the only association that accredits sleep-focused SLHP in Brazil. ABS is a worldwide recognized interdisciplinary institution, which includes various Brazilian professionals that study sleep – e.g., basic experimental areas, biologists, polysomnography technicians, physical therapists, SLHP, psychologists, dentists, physical educators, nutritionists, and physicians. ABS has accredited sleep-focused SLHP yearly since 2016 by analyzing their curricula vitae and applying theoretical and practical tests.

The main goals of the process of accrediting in sleep-focused SLHS are to assess the pathologist's theoretical-practical mastery of the implications, diagnosis, and treatment of sleep disorders and prove their professional competence in the area of sleep. A minimum training in the area of sleep is a *sine qua non* condition to apply to the accreditation test. Applicants must have more than 3 years of professional experience as an SLHP, according to their CFFa registry, and prove they are apt to work as a sleep-focused SLHP, according to their training in the previous 10 years, as indicated in the announcement of the

proposing institution. Lastly, the candidate is submitted to a theoretical and a practical test to be recognized as an accredited sleep-focused SLHP.

There was a consensus that SLHP can work in clinical, outpatient, hospital, and school settings, which reinforces the range of possibilities and the interaction of sleep-related problems with different interfaces in SLHS, regardless of the field of practice, from sleep disorders prevention to specific SDB rehabilitation.

Concerning the consequences of sleep disorders, participating SLHP reached a consensus (95.7%) that sleep problems interfere with memory, learning, behavior, emotional regulation, and communication skills – hence, the assessments of symptoms, complaints, and sleep disorders are part of the SLHP's responsibilities.⁵¹⁻⁵⁵

Participants also reached a consensus that sleep-focused SLHP assess and diagnose orofacial myofunctional disorders regarding SDB (97.9%) and that this competence is exclusive to sleep-focused SLHP (72.3%). Considering that SLHP are the professionals officially trained to assess and diagnose orofacial myofunctional conditions,³⁴ a consensus was reached that, in the case of SDB, this responsibility is exclusive to sleep-focused SLHP – hence, other health professionals should not conduct this assessment. Thus, analyzing the diagnostic assessment process as a guide to decision-making and therapy planning, in addition to specific assessments by the other professionals who follow up on the case, it is essential to have specific knowledge of the area of sleep.

The complexity of sleep-related pathologies requires medical guidance and multidisciplinary observation, which often determines the need for referrals and complementary assessments. The results of this consensus (100%) indicate that sleep-focused SLHP can request multidisciplinary clinical SDB assessments. It is the SLHP's responsibility to refer patients for thorough sleep assessment by multidisciplinary teams (91.5%), as well as specialized multidisciplinary diagnosis (97.9%).

SLHP can request previous examinations from the physician responsible for the case, as long as they have the competence to analyze the examinations and it is decisive to reach an SLH diagnosis and define SLH therapy strategies. As for sleep disorders examinations, they should also be competent and trained in the area of sleep and have specific knowledge of the examination equipment, procedures, and parameters obtained and analyzed. SLHP are not responsible for nosologic diagnoses, but they must be apt to understand and interpret the parameters assessed in the examinations, as the results may pose criteria for SLH indications or the ineligibility of SLH therapy. Hence, the interdisciplinary team approach favors case discussion and a more accurate definition of procedures, as complementary examinations requested by the physician responsible for the case may provide important data to sleep-focused SLHP.

The consensus on complementary examinations is considered as a prerogative that these and other complementary assessments be requested from the sleep physicians responsible for the case. This study reached a consensus that sleep-focused SLHP can request to physicians and patients (if they already have

them) type-I (complete laboratory), type II (complete home) (74.5%), and types-III and IV polysomnography (cardiorespiratory polygraphy) (72.3%) necessary to the SLH practice, case discussion in interdisciplinary teams, SLH diagnosis, and progress of the SLH treatment. When the SLHP is the first professional visited by the patient, referring them to a sleep physician is decisive in reaching a diagnosis and requesting complementary examinations when necessary to enable sleep-focused SLHP to discuss the case and define their procedures.

Following the same interdisciplinary parameter, it was a consensus that SLHP can accompany complementary instrumental sleep disorders examinations (e.g., sleep endoscopy and nasal endoscopy) (95.7%), certainly as long as they are authorized by the physician performing the examination. As expected, it was a consensus that sleep-focused SLHP are not responsible for emitting polysomnography reports.

No consensus was reached on the request for actigraphy by sleep-focused SLHP. This result may be related to SLHP's little knowledge of this procedure.

Conducting SLH assessments in cases of sleep disorders will depend on the SLHS interface to which sleep disorders is related. It was a consensus that it is the role of sleep-focused SLHP to assess and direct clinical procedures regarding sleep associated with coexisting issues, such as changes in oral and/or written language (91.7%), psycholinguistic skills (83.0%), cognitive skills (89.4%), central auditory processing (87.2%), balance (80.9%), hearing (84.4%), speech fluency (91.5%), Voice (97.9%), OMF (100%), Dysphagia (100%), Gerontology (100%), Public Health (91.5%), and the other fields of SLHS competence (85.1%). These results are due to the evidence in the cited areas.^{38,56-67}

In cases of SDB, the goal of SLH assessment is to determine muscle and functional imbalances that may affect UA permeability during sleep.¹⁹ The eligibility for SLH therapy intervention alone is related to these patients' lack of impeditive factors, such as mechanical airway obstruction, craniofacial changes, neuromuscular diseases, and orofacial myofunctional disorders.⁶⁸ In this context, the association of SLH demands with sleep pathologies will determine such procedures.

It was a consensus that sleep-focused SLHP can take anthropometric measures (BMI and cervical and abdominal circumference) (95.7%). The use of specific standardized protocols to assess orofacial structures and functions,⁶⁹⁻⁷¹ the assessment of anthropometric measures, and the observation of proportions between oral and pharyngeal structures – such as the modified Mallampati index and palatine tonsil classification regarding the percentage of pharyngeal light obstruction^{71,72} – are part of the SLH process of assessing SDB. A study points out that SLHP experienced in the area of sleep are apt to assess and classify the oropharyngeal region and identify predictive factors for OSA and snoring.⁷³ It is highlighted that physicians are responsible for diagnosing pharyngeal obstructions and/or pathologies.

SLH assessment includes questionnaires and other subjective tools to assess sleep disorders and symptoms, such as sleep diaries, the Epworth Scale, Pittsburgh Sleep Quality Index (PSQI), Berlin Questionnaire, Child Obstructive Apnea Syndrome Questionnaire-18 (OSA-18), and so forth, accord-

ing to all participants in this consensus study. Most of them are easy to apply and, though not intended for diagnosis, can support the indication to other professionals and help monitor therapy intervention results.

It was a consensus that the practice of sleep-focused SLHP includes the identification of risks that may lead to sleep disorders (100%) and help diagnose sleep disorders (97.9%). Hence, the abovementioned questionnaires can be used to screen and identify sleep disorders signs and symptoms.

SLHP must suspect and assess sleep disorders whenever signs and symptoms are present, even if it is not the patient's and/or the group's original complaint, according to consensus results (91.5%) (►Table 3). SLHP assessed Brazilian adolescents' quality of sleep during the COVID-19 pandemic with no specific demand, considering that social distancing could impair young students' sleep during this moment in history and have cognitive-behavioral impacts on learning. The investigation of the quality of sleep identified, among other aspects, that their quality of sleep worsened, impacting their motivation to study.³

Sleep-focused SLHP assess and treat patients at any age with sleep disorders-related SLH demands, according to the professionals who participated in this study (95.7%). This is justified by the scope of SLH practice, which encompasses all life cycles. In general, SLH intervention aims to attenuate symptoms and improve the patients' quality of sleep and life. On the other hand, in specific terms, sleep-focused SLH therapy must be based on the patients' phenotypes – hence, age is one of the decisive factors to customize assessment criteria and establish therapeutic goals⁷⁴ (►Table 2).

Participants reached a consensus (97.9%) that the procedures of sleep-focused SLHP to treat SDB encompass OMF competence and specific OMT indication for SDB alone (76.6%), in combination with other types of treatment (95.7%), and as a first-choice complementary therapy to the first-choice treatment, as in surgical cases (95.7%). The recognition of this competence certainly originates in the first published Brazilian studies^{15,16} that point out the pioneering initiative of Brazilian SLHP in the orofacial myofunctional treatment of SDB. It was a consensus that, in Brazil, SLHP are exclusively apt and responsible for OMT for SDB alone, in combination, or complementarily (83%).

As mentioned above, some groups of patients have reserved OMT prognoses. Brazilian randomized studies^{16,17,49} excluded patients whose BMI was higher than 40 kg/m² and who had craniofacial malformations and severe obstructive nasal diseases. Thus, there is no evidence of the effect of OMT in these cases. These criteria must be carefully assessed, as referrals by competent professionals to assess and correct changes are often needed.

Age is another important factor for OMT indication. The same Brazilian randomized studies^{16,17,49} included adult patients up to 65 years old but did not indicate the efficiency of this therapy in older patients. On the other hand, some clinical cases⁷⁵ and new randomized studies⁷⁶ demonstrate that OMT effectively reduced AHI and improved orofacial myofunctional aspects in older patients with moderate to severe OSA.

Craniofacial malformations, for instance, interfere with the positioning and functioning of orofacial muscles, causing functional adaptations,⁷⁷ and obstructive nasal diseases cause changes such as low tongue, absent lip sealing, flaccid orofacial muscles, and breathing, mastication, and swallowing changes. Obesity, which is the main risk factor for OSA – due to UA narrowing caused by the increase in soft tissues and decrease in pulmonary volume, diminishing tracheal traction, and pharyngeal wall tension⁷⁸ – also have orofacial myofunctional aspects that must be observed.⁷⁹

A randomized clinical study showed that OMT had no significant effect on reducing obese patients' snoring.⁸⁰ OMT, in these cases, can be combined with treatments to reduce and control weight, as these factors compromise the success of OMT when applied alone.⁸¹ On the other hand, research¹⁷ compared two groups of patients whose BMI was 28.2 ± 3.1 kg/m² and whose AHI was 15.3 ± 9.3 events/h and verified no significant change in the control group and a significant decrease in the snoring index in patients submitted to SLH therapy. In this randomized study, the control group comprised patients who used nasal dilators and did breathing exercises, and the therapy group did daily oropharyngeal exercises.

OMT aims to improve muscle function and control. Thus, among the many possible causes or phenotype and endotype characteristics of the pathogenesis of OSA, this therapy addresses non-anatomical causes, acting on the activity of the pharyngeal dilator muscle during sleep. Identifying these characteristics through detailed assessments and developing personalized therapies aiming selectively at one or more treatable characteristics have the potential to optimize therapeutic results.⁸² However, some studies demonstrate the possible anatomical effects of OMT on OSA patients, such as the decrease in tongue volume and fat,⁷¹ reaffirming the SLHS possibilities with judicious indication.

As seen in ►Table 3, participants in this consensus study unanimously agreed that sleep-focused SLHP can assess and treat orofacial functions in patients with diagnosed or suspected SDB. SLHP's possibility of providing care to these patients has already been generally legitimated internally by the SLHS^{20–22} and Sleep Medicine.^{8,23}

The degree of OSA based on AHI was until recently the main parameter to indicate OMT to these patients – those with mild and moderate apnea were the main candidates for this treatment modality. AHI is still an indicative parameter, but other aspects must be considered, such as the oxyhemoglobin desaturation index, duration of breathing pauses, sleep phase when apnea mostly occurs, microwakes index, and so on.

Besides the polysomnography parameters mentioned above, clinical warnings or impediments to OMT must be considered as well. Patients with impaired nasal permeability, neuromuscular diseases, craniofacial skeletal discrepancies, and cognitive limitations, for example, may not benefit from SLH procedures alone. In this regard, a recent literature review⁸³ reconstructed the history of AHI creation and evolution, followed by a critical assessment of its importance in research and medical clinical practice.

OMT is characterized by a set of procedures based on myofunctional exercises in the orofacial and cervical regions, focused on the sensitivity, proprioception, mobility, coordination, and strength of the structures involved to adjust breathing, mastication, swallowing, and speech.⁷⁰ It is based on myofunctional exercises with isotonic and isometric contractions that change orofacial and oropharyngeal patterns.^{16–19} The process uses periodic muscle training to improve muscle coordination, tonicity, and resistance, ease muscle fatigue, balance the contraction of pharyngeal muscles,^{70,84,85} reduce the volume and fat of the structures involved, and attenuate UA collapses during sleep.^{19,86}

Despite the efforts to deconstruct the idea that OMT is based exclusively on exercises, they are unquestionably one of its resources. However, considering the great variability of exercises used in OMT approaches portrayed in scientific studies and referenced in systematic literature reviews and meta-analyses,^{70,87} clinical indication and individual adequacy must be the SLHP's main concern. The intensity, number of repetitions, frequency of exercises, and duration of therapy are often discussed in OMF clinical practice, being extended to sleep-focused SLH therapy regarding SDB. Training programs and protocols must be changed or adapted to meet specific populations and maximize the results. The exercise dose is an essential component in any exercise-based therapy – hence, understanding the relationship between the dose and the effectiveness of the treatment is essential to maximize the benefit to the patient.⁸⁸

Participants reached a consensus (97.9%) that complementary resources such as laser therapy, incentive spirometers, therapeutic ultrasound, surface electromyography, electromyographic biofeedback, and so forth are used by sleep-focused SLHP to treat patients with SDB. OMF is increasingly using photobiomodulation. Despite the lack of direct evidence of its effects in OMT in patients with SDB, laser therapy aims to decrease edema and improve local sensitivity and muscle function. The indication is to use it before the activity requested by the SLHP as a potentializing resource to support OMT. It can be widely applied, encompassing the oropharyngeal region, tongue, suprahyoid muscles, lips, and cheeks.⁸⁹

Incentive spirometers are portable devices that train breathing muscles by strengthening inspiratory and expiratory muscles and activating suprahyoid muscles and hyoid bone movement. They were widely used in SLH therapy in cases of dysphagia and voice disorders.^{90,91} Regarding SDB, Respirom was used in inhaling and exhaling in a recent study, opening the space between lateral pharyngeal walls, as verified in fiberoptic nasolaryngoscopy and semi-occluded vocal tract exercises with LaxVox tube.^{92,93} This voiced breathing technique in a silicone tube for 20 minutes per day for 10 weeks improved the quality of sleep and decreased snoring in a case study.⁹⁴ Threshold IMT (Respiromics, USA) is another incentive spirometer addressed in a study that compared the effectiveness of oropharyngeal exercises with inspiratory muscle training using this device. The results indicate no significant differences in AHI between the groups, as both the oropharyngeal exercises and the

device increased the expiratory muscle strength, decreased excessive daytime sleepiness, and improved the severity and frequency of snoring, fatigue, and quality of sleep.⁹⁵

Customizing SLH care for patients with SDB goes beyond specific OMF issues and polysomnography data. The detailed analysis of overall health, including the investigation of systemic diseases and comorbidities, metabolic and cardiovascular diseases, arterial hypertension, gastroesophageal reflux, depression, other diagnosed or reported sleep disorders, allergies, respiratory obstructions, and other health issues must be recorded along with the treatments that have been used for each one of them.⁶⁸ Moreover, it is important to listen attentively to the reported details of sleep routines and habits. Even though OMT is based on specific premises, as mentioned above, the treatment goal is the individual with sleep disorders and all issues related to the sleep problem, not only the dysfunctional pharynx.

According to this consensus, sleep-focused SLHP can prescribe (90.9%) and conduct (70.2%) positional therapy (PT) to treat SDB. It is known that the supine position may be associated with increased obstructive events,⁹⁶ and the work of sleep-focused SLHP requires fundamental theoretical knowledge of the physiology of sleep, the physiopathology of sleep, and types of multidisciplinary approaches to sleep.⁸⁶ Hence, it is appropriate that SLHP conduct such guidance in interdisciplinary approaches associated with OMT management, as long as they are updated on the effectiveness of various PT devices available. The practice of sleep-focused SLHP also encompasses guidance and adjustment of orofacial myofunctional aspects that predispose to SDB, according to the results of this consensus study (100%), and addresses sleep disorders through sleep hygiene instructions (97.9%).

Unquestionably, sleep disorders require a multidisciplinary approach.^{97,98} However, the professionals reached a consensus in this study that prescribing and performing physical exercises, prescribing and performing weight loss therapy, prescribing and performing therapy with intraoral appliances (IOA), prescribing and performing therapy with CPAP, and prescribing and performing cognitive-behavioral therapy are not among the procedures to be performed by sleep-focused SLHP. On the other hand, these pathologists can suggest specific feasibility assessments of treatment with cognitive-behavioral therapy (93.6%), physical exercises (100%), weight loss therapy (97.9%), IOA (95.7%), CPAP (93.6%), skeletal surgeries (95.7%), and oropharyngeal soft tissue surgery (95.7%) in cases of SDB, to be conducted by other professionals when the signs and symptoms suggest the need for such therapy.

CPAP is the first-choice OSA treatment, just as there is evidence of using IOA to treat SDB.⁸ However, it is known that they may cause immediate side effects such as aerophagia, oral and nasal dryness, and exhaling difficulties in the case of CPAP, and excessive salivation, oral dryness, muscle and temporomandibular joint discomfort, mastication difficulties, and others related to IOA. These can impair the adaptation of such therapeutic resources, consequently undertreating the patients. Nevertheless, part of the reported difficulties may be related to orofacial structures and functions, which are within

the competence of SLHP. Moreover, people with SDB also have masticatory⁹⁹ and swallowing changes⁶⁶ and inadequate tongue and lip posture at rest, which are important factors that hinder nasal breathing during sleep as well. In this context, sleep-focused SLHP can help fit different types of CPAP masks (72.3%) and help choose and fit IOA models (83%) in multidisciplinary approaches to treating SDB, according to the results of this consensus study.

Combined treatments are commonly used in SLH procedures, as in the case of mouth-breathers,¹⁰⁰ denture wearers,¹⁰¹ and patients with temporomandibular disorder.¹⁰² In SDB, specifically, OMT is an alternative treatment used in combination with CPAP to aid adherence to the use of the gold-standard device^{18,49} and help decrease air escape through the oral cavity when using CPAP.¹⁰³ Regarding combined treatments, a randomized study¹⁸ compared four groups of patients, as follows: submitted to placebo OMT, treated with OMT, treated with CPAP, and treated with OMT in combination with CPAP. The participants' AHI was 30.9 ± 20.6 events/h. The groups submitted to treatment had a decrease in snoring and on the Epworth Sleepiness Scale, and the OMT group maintained such improvement after the washout period. AHI decreased in all treated groups, more significantly in the CPAP group. The OMT and combined groups improved tongue and soft palate muscle strength, in comparison with the placebo group. The combined OMT and CPAP group had greater adherence to CPAP than the CPAP group.

Sleep disorders has a multifactorial origin and various consequences, including genetic, endotype, phenotype, and environmental factors, thus suggesting the need for multi-professional assistance.^{88,98} SLHP have been increasingly included in multidisciplinary teams, as well as SLH professors in improvement and specialization courses in the area of sleep. All participants (100%) in this consensus study agreed that sleep-focused SLHP can work in multidisciplinary teams in the area of sleep, in activities related to the management and conduction of scientific studies and research (97.9%), coordination of multidisciplinary teams (89.4%), and teaching and coordinating courses in the area of sleep (97.9%).

SLHP's professional prerogatives include "... emitting SLHS statements, opinions, evaluations, and reports; teaching; conducting technical oversight, assistance, consultancy, coordination, administration, management, guidance, inspection, expert analysis, auditing, and other practices necessary to their full professional activity, complying with the recognized procedures and current laws..."¹⁰⁴. Sleep-focused SLHP can furnish clinical follow-up reports in cases of sleep disorders (93.6%) and request such reports (97.9%).

It was an absolute consensus that sleep-focused SLHP can work in sleep disorders prevention by providing guidance, participating in initiatives and campaigns to instruct the population (100%), coordinating initiatives and campaigns in the area of sleep (97.9%), and holding administrative positions in the area of sleep (97.9%). This has already been practiced by sleep-focused SLHP in Brazil, as they coordinate yearly national campaigns, such as Sleep Week, and participate in management, holding regional and national coordination and board positions at ABS.

SLHP have been increasingly included in the area of sleep. Sleep has been approached as a topic of SLHS research and publications, reflected and disseminated in the participation of SLHP in conferences of related areas, such as medicine, dentistry, nutrition, education, and so on. Practically all SLHS specialties deal with sleep and sleep disorders in different ways, as both diagnosis and treatment of the countless SLH disorders are interrelated and interdependent. This consensus study discussed and defined the SLH practice regarding SDB as a treatment alternative with OMT alone (to reduce snoring, OSA severity, and sleepiness) or in combination with other treatment modalities. However, not all mechanisms to obtain these results are widely known, and longitudinal follow-up studies are still scarce. Understanding such mechanisms may help inform what OSA phenotypes are more likely to respond to this form of therapy.⁸⁴

Final considerations

In the last years, ABS has taken an active role in conducting consensus studies and recommendations for the multidisciplinary approach to sleep disorders.¹⁰⁵ Thus, based on the expertise of Brazilian specialists and the recommendations in the current literature, the Brazilian consensus on sleep-focused SLHS is a landmark in the SLH practice in the area of sleep and SLHS as a whole. This study aimed to describe the scope of action of sleep-focused SLHP and systematize recommendations for SLHP and professionals involved in the area of sleep to determine what is encompassed in the area and identify its competencies and interfaces to improve the quality of professional approaches and the consequent assistance to people with sleep-related SLH problems.

The panorama of the sleep-focused SLHS in Brazil has been highlighted by its renowned pioneer initiative in the area – to the extent that the worldwide literature is essentially based on Brazilian studies, that this is the only country with sleep-focused SLHS accreditation, and that it has a representative number of specialists to participate in the process of this consensus study.

The essential topics discussed in this study were SLHS professional qualification, diagnosis, and treatment related to sleep disorders. It verified that all SLHS specialties are related to the area of sleep, as the impairments involve cognitive, developmental, communication, breathing, eating, and other aspects that are encompassed in the scope of SLH therapy.

It also identified that sleep-focused SLHP must have comprehensive training, understand specific content in each area of SLH therapy, topics such as the physiology of sleep, pathophysiology of sleep disorders, assessment criteria, and therapy modalities, and seek constant updates. Furthermore, such professionals should be accredited in sleep-focused SLHS.

Hence, sleep-focused SLHP are responsible for conducting assessments, referring to other sleep professionals and/or sleep examinations, and directing SLH clinical procedures related to sleep and associated with coexisting issues whose demands involve care in SLHS areas.

Sleep-focused SLHP are the professionals responsible for assessing, indicating, and conducting OMT specific for SDB

either alone or as a complement to other treatments. SLHP are part of interdisciplinary teams in the area of sleep in public and private services and can hold administrative and teaching positions in scientific and/or academic institutions and work in sleep disorders prevention and guidance. Lastly, sleep-focused SLHP have a wide scope of action, sleep-focused SLHS in Brazil have the opportunity to teach, train, and accredit in the area of sleep, and current scientific evidence in this field shows that OMT is a possible treatment for SDB.

Authors' contributions (Credit statements)

LMSP, GNP, and EMGB: Conceptualization, data curation, formal analysis, investigation, methodology, project administration, supervision, validation, writing-original draft, writing-review and editing. MA, TCAC, LFD, GLF, ELBVP, and EZ: validation, resources, writing-review and editing. MTB, CCC, VI, GRL, SRPS: conceptualization, investigation, writing-original draft, and review.

Conflicts of interests

GNP is a shareholder at SleepUp© and founder of P&P Metanálises©. The other authors have no conflicts of interests to disclose.

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