

ORIGINAL ARTICLE

Adaptation and Modification of The Malay Language Version of Voice Handicap Index-10 (VHI-10) for Spasmodic Dysphonia

RATHAKRISHNAN VENKATASAMY^{1,2*}, MAWADDAH AZMAN^{1,2}, MARINA MAT BAKI^{1,2}, NOOR AZIMAH MUHAMMAD^{3,4}

¹Department of Otorhinolaryngology-Head & Neck Surgery, Faculty of Medicine, Universiti Kebangsaan Malaysia, 56000 Cheras, Kuala Lumpur, Malaysia

²Department of Otorhinolaryngology-Head and Neck Surgery, Hospital Canselor Tuanku Muhriz, 56000 Cheras, Kuala Lumpur, Malaysia

³Department of Family Medicine, Faculty of Medicine, Universiti Kebangsaan Malaysia, 56000 Cheras, Kuala Lumpur, Malaysia

⁴Department of Family Medicine, Hospital Canselor Tuanku Muhriz, 56000 Cheras, Kuala Lumpur, Malaysia

*Correspondence: rakrish05@gmail.com, p116275@siswa.ukm.edu.my; Tel: +60175506443

Received: 16 August 2025 / Accepted: 19 January 2026

ABSTRAK

Disfonia spasmodik (SD) ialah kekejangan pita suara yang berpunca daripada gangguan sistem saraf. Soal selidik sedia ada belum dirangka secara khusus untuk mencerminkan ketidakupayaan suara dalam kalangan pesakit SD. Kajian kualitatif ini mengumpulkan pandangan pakar dan pesakit SD melalui proses tiga peringkat, merangkumi: adaptasi dan pengubahan konteks Indeks Ketidakupayaan Suara versi Bahasa Melayu-10 (mVHI-10), pengesahan kandungan oleh pakar serta pengesahan rupa oleh pesakit bagi mVHI-10 yang telah dikontekstualkan. Lima item baharu telah dibangunkan bagi mewakili tema utama yang dikenal pasti dalam temu bual pesakit. Purata indeks kesahan kandungan pada tahap skala (S-CVI/Ave) ialah 0.95 bagi item awal dan 0.98 bagi item akhir. Soal selidik akhir yang dirangka khusus untuk SD, iaitu Indeks Ketidakupayaan Suara SD-10 (SD-VHI-10) mengandungi 10 item; enam dikekalkan daripada mVHI-10 dan empat ditambah berdasarkan dapatan kajian. Kesahihan SD-VHI-10 menunjukkan representasi yang kukuh terhadap pengalaman pesakit SD di Malaysia.

Kata kunci: *Disfonia spasmodik; indeks ketidakupayaan suara; masalah suara*

ABSTRACT

Spasmodic dysphonia (SD), a neurogenic dysphonia, is characterised by involuntary spasms of the vocal cords. Existing questionnaires do not specifically capture the impact of impairment in SD. This qualitative study gathered insights from experts and SD patients through a three-stage process: adaptation and contextualisation of the Malay Voice Handicap Index-10 (mVHI-10), content validation by experts and face validation of the contextualised mVHI-10. Five new items were developed to represent key themes identified in patient interviews. The scale-level content validity index average (S-CVI/Ave) was 0.95 for the preliminary items and 0.98 for the final items. The final SD-specific Voice Handicap Index questionnaire (SD-VHI-10) consists of 10 items; six retained from the original mVHI-10 and four adapted. Designed to reflect the experiences of SD patients in Malaysia, the SD-VHI-10 demonstrates strong content and face validity.

Keywords: Spasmodic dysphonia; voice disorder; voice handicap index

INTRODUCTION

Spasmodic dysphonia (SD) is a voice disorder characterised by involuntary spasms in the vocal cords. These spasms result from a central neurogenic disorder (Sataloff 2016). However, swallowing and singing typically remain unaffected (Creighton et al. 2015). SD is classified as a non-structural, neurogenic dysphonia. According to the Malaysian Voice Pathology Database, patients with SD account for 7% of the dysphonia cases in a laryngology clinic's archive (Za'im et al. 2023). Symptoms of SD may first appear between the ages of 20 and 50 and are reported to be more prevalent in women.

SD is primarily classified into two types: adductor spasmodic dysphonia (ADSD), the more prevalent form, and abductor spasmodic dysphonia (ABSD), which comprises fewer than 20% of cases (Sataloff 2016). In ADSD, the vocal cords intermittently and uncontrollably adduct, producing a strained voice, particularly during vowel sounds. In contrast, individuals with ABSD present with intermittent breathy voices due to uncontrolled abduction of the vocal cords during and after voiceless consonants (Ludlow et al. 2018; Pearson et al. 2003).

Being a rare disorder, SD is often diagnosed late, with an average delay of 53 months from the patient's initial visit for voice concerns (Creighton et al. 2015). The injection of botulinum toxin (BT) is considered the preferred treatment for SD, with serial injections necessary to sustain voice improvement (Hyodo et al. 2021a). Post-BT treatment outcome measures include perceptual parameters, acoustic assessments and self-evaluation metrics (Dejonckere et al. 2012). However, the first two measures do not account for patients' perceptions or satisfaction with the treatment received. Two widely studied and utilised patient-reported assessment tools are the Voice Handicap Index (VHI) (Jacobson et al. 1997) and the Communicative Participation Item Bank (CPIB) (Yiu et al. 2021). Developed in 1997, the VHI was designed to assess the impact of voice impairment. It consists of 30 items, evenly distributed across functional, physical and emotional domains. During its development,

patients with a broad range of voice disorders were included. Among the 65 patients who participated in the VHI testing, 26% were diagnosed with neurological disorders, including vocal cord paralysis and SD (Johnson et al. 1997). However, the specific proportion of SD cases within this group was not reported.

Subsequently, a concise version of the original VHI, the Voice Handicap Index-10 (VHI-10), was developed and validated in 2004 (Rosen et al. 2004). In the study, 23 out of 819 patients (2.8%) had SD (Rosen et al. 2004). The VHI-10 utilises a 5-point Likert scale, where 0 indicates "never," 1 is "almost never," 2 is "sometimes," 3 is "almost always" and 4 is "always." A higher summative score across the 10 items reflects a greater perception of voice handicap. Many clinical studies have used the VHI-10 to measure treatment response, particularly in unilateral vocal fold paralysis (UVFP) (Mattei et al. 2018), benign vocal fold lesions (Singh et al. 2022) and laryngeal cancer (Oridate et al. 2009).

The VHI-10 was translated into Malay language (mVHI-10) and later validated locally (Ong et al. 2019). However, these studies did not include patients with SD. In addition, the number of SD patients involved in the validation of both the VHI and VHI-10 questionnaires was small, potentially limiting their ability to fully capture the impact of voice handicap experienced by individuals with SD. Therefore, this study aims to adapt the mVHI-10 specifically for SD patients.

MATERIALS AND METHODS

This was a qualitative type of research in which views from the experts and SD patients were collated. It had three stages: adaptation and contextualisation of the mVHI-10, content validation by the experts, and face validation of the contextualised mVHI-10.

Adaptation and Contextualisation of the mVHI-10

With permission from the principal authors of the VHI-10 and the mVHI-10, mVHI-10 was adapted

to address the context of SD. This process involved interviewing patients with SD to identify any additional concerns not covered by the original 10 items of the VHI-10. To recruit participants, the medical record system was accessed to identify patients who met the following criteria: (i) diagnosed with SD; (ii) registered at Hospital Canselor Tuanku Muhriz (HCTM) between 2019 and 2024; and (iii) no active medical or mental illness.

Eligible patients were invited to participate in the study. All participants gave informed consent prior to engaging in individual in-depth interviews, which were conducted either online or in person. Each interview lasted 30 to 40 minutes and was audio-recorded before being transcribed into text. The transcribed data were then imported into ATLAS.ti version 9 software (Scientific Software Development GmbH, Berlin, Germany), where axial coding was used to generate themes. Based on these themes, new items were developed and incorporated into the existing mVHI-10, resulting in a preliminary SD-specific questionnaire (p-SD-VHI-10). Two laryngologists evaluated the themes and contributed feedback on the newly generated items.

Content Validation of the Questionnaire

The content validity of the preliminary p-SD-VHI-10 questionnaire, which included both the mVHI-10 and newly developed items, was assessed by experts with at least three years of experience in treating patients with SD. All experts were informed about the study's objective and their role in evaluating the relevance and clarity of the questionnaire items, specifically for patients with SD. The p-SD-VHI-10 questionnaire and validation form were emailed to the experts, with a request to complete them within one week. Experts rated each item using a 4-point Likert scale: (i) 0-No relevance or clarity; (ii) 1-Low relevance or clarity; (iii) 2-Moderate relevance or clarity; (iv) 3-High relevance or clarity.

Additionally, they were encouraged to provide comments and suggestions to further refine the

questionnaire.

Once the experts provided their responses for each item, the Content Validity Index (CVI) was used to quantify the relevance of the questionnaire items within our context. To calculate the CVI, relevance scores were recoded as follows: (i) 1-Items rated 2 or 3 on the relevance scale and (ii) 0-Items rated 0 or 1 on the relevance scale.

Based on the content validity process, questionnaire items were either retained, or replaced with more SD-specific items. Some of the newly added items were modified based on expert recommendations to enhance clarity. This process resulted in the final SD-VHI-10 questionnaire.

Face Validation of the Questionnaire

The SD-VHI-10 was distributed to the SD patients for face validity assessment. These patients had not participated in the initial in-depth interviews. They were asked to independently review each item, assess its comprehensibility, and provide feedback on cultural sensitivity and appropriateness. Additionally, the time required to complete the questionnaire was recorded.

RESULTS

Adaptation and Contextualisation of the mVHI-10

A total of ten patients with SD participated in the in-depth interviews. Each patient was diagnosed with adductor-type SD and had a documented history of receiving botulinum toxin injection on at least one occasion. The socio-demographic profiles of the ten patients are presented in Table 1.

The transcribed data was imported into ATLAS.ti, version 9 software and analysed systematically, from codes, sub-codes and themes. Focusing on the impacts of SD on the patients, five main themes were generated, namely: (i) poor quality of voice; (ii) negative social perceptions; (iii) psychological factor; (iv) limited social interactions; and (v) academic and

TABLE 1: Socio-demographic profiles of patients with spasmodic dysphonia (SD) and involved in interviews

Patient	Age	Gender	Age of diagnosis	Level of education	Employment status	Profession
SD1	36	Female	35	Tertiary	Unemployed	Digital marketing manager
SD2	31	Male	21	Tertiary	Employed	Medical doctor
SD3	35	Male	33	Tertiary	Employed	Admin officer
SD4	28	Female	26	Tertiary	Employed	Banker
SD5	49	Female	47	Tertiary	Employed	Operation manager
SD6	54	Female	51	Tertiary	Employed	Teacher
SD7	65	Female	61	Secondary	Unemployed	Housewife
SD8	32	Female	28	Tertiary	Employed	Sales executive
SD9	62	Female	51	Tertiary	Unemployed	Pensioner
SD10	53	Female	50	Tertiary	Employed	Manager

employment impact.

(i) Poor quality of voice

Patients with SD had difficulty expressing themselves, their voice would be shaky, breaking and sometimes inaudible. They struggled with the issue throughout the conversation, exerting effort to initiate speech and experiencing a shaky voice towards the end. This was mentioned by patient SD3, *"When I need to speak, I feel my voice box is being stretched and it is so difficult to produce a voice."* This was supported by patients SD2, and SD9. Patient SD5 pointed out, *"It is difficult to voice when I need to talk, and the voice breaks when I am finishing the conversation."*

(ii) Negative social perceptions

Due to their voice, they also frequently received unfavourable comments from others. As patient SD2 mentioned, *"people always think that I am nervous to talk."* This was faced by patients SD4, SD5 and SD8 too. They were perceived as incapable and in distress. Patients received such feedback either during their academic years from their lecturers or during their working lives from their superiors and colleagues.

(iii) Psychological factor

Emotional distress would also make their voice worse. As mentioned by patient SD1, *"my voice is worse when I am stressed,"* and patient SD5, *"my voice is bad when I need to speak in front of the public or when I am nervous".* These further worsened their emotional well-being. They were sad, shy and stressed with their voice. This was highlighted by patient SD2, *"I am sad because whenever I want to talk, people would comment that I am nervous"* and patient SD6, *"It stressed me up when people commented that my voice was shaky".* They had low self-esteem and limited their communications. Patient SD2 mentioned, *"People always ask about my voice, and that makes me shy to talk and spend time with my friends".*

(iv) Limited social interactions

People with SD faced difficulty not only when communicating face-to-face, but also through phone calls. Patient SD4 expressed, *"I don't like to answer phone calls as my voice will be shaky and vibrating".* Due to the quality of their voice, they were frequently asked to repeat which drained them and hindered their social interactions. Patient SD4 said, *"Working and daily communication require me to use my voice, but*

my voice vibrates when I talk, and that stops me." Thus, they preferred to keep quiet and limited their communication.

(v) Academic and employment impact

Voice disorders had also led to indirect negative consequences in patients' professional and academic journeys. Academic demands, particularly presentations and group activities, posed challenges for students. Patient SD2, for example, failed to secure an academic scholarship due to difficulties answering interview questions fluently. He shared, *"During an interview for a scholarship to support my studies, I could not speak fluently and failed the interview."*

Similarly, the impact of voice disorders extended to the workplace. Patient SD4 mentioned, *"At work, I prefer to be an observer because of my voice issues."* Without regular BT injections, employment became difficult, and some patients either stagnated in their careers or quit their jobs entirely. Patient SD10 reflected, *"Over the last 20 years in this job, I have had many opportunities to progress, but due to my weak voice, I prefer to stay where I am."* However, some professionals with lower vocal demands did not experience significant financial setbacks.

Thus, five new items were created to represent each theme that emerged from the interviews,

as shown in Table 2. These items were then incorporated into the existing 10 items of the mVHI-10, resulting in a preliminary 15-item questionnaire, p-SD-VHI-10.

Content Validity of the Preliminary Questionnaire (p-SD-VHI-10)

The content validity was performed by four experts (two laryngologists and two speech therapists). Based on the score of relevancy, and clarity and descriptive feedback, four original items were replaced with new ones, while one new item was dropped from the p-SD-VHI-10. The scoring of the items and actions taken following content validity were summarised in Table 3.

Item 1, *"Keadaan suara saya membuatkan orang susah untuk mendengar percakapan saya (My voice makes it difficult for people to hear me)"*, with a score of 2.75 out of 3, it was removed based on the lower relevance and clarity scores. Item 2, *"Orang lain susah untuk memahami percakapan saya di dalam bilik yang bising (People have difficulty understanding me in a noisy room)"*, item 3, *"Masalah suara saya menghadkan kehidupan peribadi dan sosial saya (My voice difficulties restrict my personal and social life)"*, item 4, *"Keadaan suara saya menyebabkan saya berasa ketinggalan dalam perbualan (I feel left out of conversation because"*

TABLE 2: New items added to p-SD-VHI-10

Themes	New items based on the in-depth interviews
1. Poor quality of voice	I feel my voice is breaking <i>Saya berasa suara saya terputus-putus.</i>
2. Negative social perceptions	People ask, "Why do you sound anxious?" <i>Ada orang bertanya, "Kenapa suara awak seperti cemas?"</i>
3. Psychological factor	My voice problem is worse in tense situations. <i>Masalah suara saya lebih teruk dalam situasi yang tegang</i>
4. Limited social interactions	I limit conversations with other people. <i>Saya menghadkan percakapan dengan orang lain.</i>
5. Academic and employment impact	My voice problem limits my career or academic progress. <i>Masalah suara saya menghadkan kemajuan dalam kerjaya atau akademik.</i>

TABLE 3: Relevance and clarity score of each original and proposed item.

NO	ITEM	AVERAGE RELEVANCE SCORE (SD)	AVERAGE CLARITY SCORE (SD)	ACTION
Original m-VHI-10 items				
1	My voice makes it difficult for people to hear me <i>Keadaan suara saya membuat orang susah untuk mendengar percakapan saya.</i>	2.75 (0.43)	2.75 (0.43)	Removed
2	People have difficulty understanding me in a noisy room <i>Orang lain susah untuk memahami percakapan saya di dalam bilik yang bising.</i>	3.00 (0.00)	3.00 (0.00)	Retained
3	My voice difficulties restrict my personal and social life. <i>Masalah suara saya menghadkan kehidupan peribadi dan sosial saya.</i>	3.00 (0.00)	3.00 (0.00)	Retained
4	I feel left out of conversation because of my voice <i>Keadaan suara saya menyebabkan saya berasa ketinggalan dalam perbualan.</i>	3.00 (0.00)	3.00 (0.00)	Retained
5	My voice problem causes me to lose income <i>Masalah suara saya menyebabkan saya hilang pendapatan.</i>	2.50 (0.50)	3.00 (0.00)	Removed, and replaced with item 13
6	I feel as though I have to strain to produce voice <i>Saya berasa seperti saya perlu meneran untuk menghasilkan suara.</i>	3.00 (0.00)	3.00 (0.00)	Retained
7	The clarity of my voice is unpredictable <i>Kejelasan suara agak sukar dijangka.</i>	3.00 (0.00)	3.00 (0.00)	Retained
8	My voice problem upsets me. <i>Saya kecewa dengan masalah suara saya.</i>	2.50 (0.87)	3.00 (0.00)	Retained
9	My voice makes me feel handicapped <i>Keadaan suara saya menyebabkan saya berasa tidak sempurna.</i>	2.25 (0.83)	3.00 (0.00)	Removed
10	People ask, "What's wrong with your voice?" <i>Ada orang bertanya, "Kenapa dengan suara awak?"</i>	2.75 (0.43)	3.00 (0.00)	Removed
New items added to p-SD-VHI-10				
11	My voice problem is worse in tense situations. <i>Masalah suara saya lebih teruk dalam situasi yang tegang.</i> Rephrased: My voice problem is worse in stressful situations. <i>Masalah suara saya lebih teruk ketika stres.</i>	3.00 (0.0)	2.75 (0.43)	Rephrased, added

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...continuing

NO	ITEM	AVERAGE RELEVANCE SCORE (SD)	AVERAGE CLARITY SCORE (SD)	ACTION
12	I limit conversations with other people. <i>Saya menghadkan percakapan dengan orang lain.</i> Rephrased: I speak less with others. Saya kurang bercakap dengan orang lain.	3.00 (0.00)	2.00 (0.00)	Rephrased, Added.
13	My voice problem limits my career or academic progress. <i>Masalah suara saya menghadkan kemajuan dalam kerjaya atau akademik</i>	2.75 (0.43)	3.00 (0.00)	Replaced item 5
14	I feel my voice is breaking <i>Saya berasa suara saya terputus-putus.</i>	3.00 (0.00)	3.00 (0.00)	Added
15	People ask, "Why does my voice sound anxious?" <i>Ada orang bertanya, "Kenapa suara awak seperti cemas?"</i>	2.00 (0.71)	3.00 (0.00)	Dropped
SD: Standard deviation				

of my voice)", item 6, "*Saya berasa seperti saya perlu meneran untuk menghasilkan suara (I feel as though I have to strain to produce voice)*", and item 7, "*Kejelasan suara agak sukar dijangka (The clarity of my voice is unpredictable)*" of the m-VHI-10 were retained without amendments because the items were viewed as highly relevant for patients with SD evidenced by perfect scores of 3 in both relevancy, and clarity.

For item 5, "*Masalah suara saya menyebabkan saya hilang pendapatan (My voice problem causes me to lose income)*" was substituted to include career or academic progress instead of income loss, "*Masalah suara saya menghadkan kemajuan dalam kerjaya atau akademik (My voice problem limits my career or academic progress)*". Although clarity of these two items was perfect, average relevance score of the new item was 2.75 compared to the score of 2.5 of the item 5.

The next two items were from emotional domain. Item 8, "*Saya kecewa dengan masalah suara saya (My voice problem upsets me)*" had an average relevance score of 2.5 and item 9, "*Keadaan suara saya menyebabkan saya berasa tidak sempurna (My voice makes me feel handicapped)*" had 2.25. Both these items had a lower score compared to the other items

which were retained, but to include an item from emotional domain, item 8 with a relatively higher score was retained. The final item of the m-VHI-10, "*Ada orang bertanya, kenapa dengan suara awak? (People ask, what's wrong with your voice?)*", had a relevancy score of 2.75 and was deemed not specific for SD.

Additionally, "*Masalah suara saya lebih teruk dalam situasi yang tegang (My voice problem is worse in tense situations)*" was added based on a perfect score of 3 for relevance. However, the clarity of this item was 2.75. As specified by the experts, to improve the clarity this was later revised to, "*Masalah suara saya lebih teruk ketika stres, (My voice problem is worse in stressful situations)*" Next item was, "*I limit conversations with other people*" with a perfect relevancy score. However, clarity of the item obtained poor score and was simplified to, "*Saya kurang bercakap dengan orang lain (I speak less with others)*" based on the recommendation of the expert panel. The revised item was believed to be straightforward and directly reflected the social impact of their voice condition by the experts. Furthermore, "*Saya berasa suara saya terputus-putus (I feel my voice is breaking)*" which had perfect relevancy and clarity scores was included.

One of the items in the p-SD-VHI-10, developed under the theme of negative social perceptions, "*Ada orang bertanya, kenapa suara awak seperti cemas? (People ask, why do you sound anxious?)*" was removed. Although this newly added item was more specific to SD and initially considered a potential substitute for item 10, it received a low relevance score from the expert panel.

In summary, 8 out of the 15 items that received a perfect relevance score were included in the final version. One additional item, with the next highest score of 2.75, was also retained. At this stage, the selection comprised 5 items from the functional domain and 4 from the physical domain. To ensure representation across all three domains of the VHI-10, one item from the emotional domain was included despite receiving a lower relevance score of 2.5.

All items in the preliminary questionnaire, except for items 8, 9 and 15, achieved a perfect I-CVI score of 1. The scale-level CVI average (S-CVI/Ave) was 0.950 for the preliminary items and 0.975 for the final items. The relevance ratings and corresponding CVI were detailed

in Table 4. The concise final SD-specific VHI questionnaire (SD-VHI-10) comprised 10 items, 6 from the original m-VHI-10 and 4 adapted.

Face Validity

Groups of six natives and four non-native Malay-speaking patients with SD reviewed the final SD-specific VHI questionnaire (SD-VHI-10). They were able to comprehend the instructions and the ten items, and the comprehensibility score for each item was 100%. The items were labelled as neither ambiguous nor sensitive. The respondents took less than 3 minutes to answer all the items. Similar to the original questionnaire, m-VHI-10, the adapted SD version of VHI-10 (SD-VHI-10) had 10 items and uses a 5-point Likert scale of responses from 0 = never to 4 = always. It is a self-reported questionnaire that assesses the impacts of voice impairment, specifically SD. The higher the summative score of the 10 items indicates the greater the voice handicap perception of the individuals with SD. The final items of SD-VHI-10 is as shown in Table 5.

TABLE 4: The relevance ratings on the item by experts and content validity index

ITEM	Expert1	Expert2	Expert3	Expert4	Experts in agreement	I-CVI	UA
1	1	1	1	1	4	1	1
2	1	1	1	1	4	1	1
3	1	1	1	1	4	1	1
4	1	1	1	1	4	1	1
5	1	1	1	1	4	1	1
6	1	1	1	1	4	1	1
7	1	1	1	1	4	1	1
8	0	1	1	1	3	0.75	0
9	0	1	1	1	3	0.75	0
10	1	1	1	1	4	1	1
11	1	1	1	1	4	1	1
12	1	1	1	1	4	1	1
13	1	1	1	1	4	1	1
14	1	1	1	1	4	1	1
15	0	1	1	1	3	0.75	0
S-CVI/Ave						0.95	
I-CVI: Item-level Content Validity Index; UA: Universal agreement; S-CVI/Ave: Scale-level content validity index average							

TABLE 5: Items in spasmodic dysphonia version of VHI-10 (SD-VHI-10)

Number	Items
1	My voice problem is worse in stressful situations. Masalah suara saya lebih teruk ketika stress.
2	People have difficulty understanding me in a noisy room. Orang lain susah untuk memahami percakapan saya di dalam bilik yang bising.
3	My voice difficulties restrict my personal and social life. Masalah suara saya menghadkan kehidupan peribadi dan sosial saya.
4	I feel left out of conversation because of my voice. Keadaan suara saya menyebabkan saya berasa ketinggalan dalam perbualan.
5	My voice problem limits my career or academic progress. Masalah suara saya menghadkan kemajuan dalam kerjaya atau akademik.
6	I feel as though I have to strain to produce voice. Saya berasa seperti saya perlu meneran untuk menghasilkan suara.
7	The clarity of my voice is unpredictable. Kejelasan suara agak sukar dijangka.
8	My voice problem upsets me. Saya kecewa dengan masalah suara saya.
9	I feel my voice is breaking. Saya berasa suara saya terputus-putus.
10	I speak less with others. Saya kurang bercakap dengan orang lain.

DISCUSSION

Adaptation and Contextualisation of the mVHI-10

The intent of this study is to identify the impact of SD on our patients. A search of the PubMed database reveals no published studies on SD in Malaysia. Our study highlights the experiences of patients with SD, as well as the perspectives of experts actively managing them in the local setting. Great emphasis has been placed on ensuring that this study gathers personalised and contextualised input from the participating patients.

To transform individualised experiences into a structured model, developing a questionnaire was deemed appropriate. This introduces a novel approach to objectively measuring how SD patients perceive the impact of their voice impairment through a questionnaire designed in the local language. However, creating a new questionnaire is time-consuming and requires

extensive resources. Alternatively, cross-cultural adaptation and contextualisation of a validated tool can yield a reliable and robust instrument with comparable validity. This approach was adopted by Rosen et al. in 2004, when his team developed an abbreviated voice handicap assessment tool derived from the original VHI. This newer tool demonstrates a strong correlation (>0.9) and is time-efficient. Evidence-based medicine and patient-centred medicine are two sides of the same coin. To evaluate the impact of a voice disorder and its treatment, a patient-reported tool such as the VHI or VHI-10 is ideal.

We analysed the literature to identify a voice-related, patient-reported questionnaire suitable for adaptation to the context of SD in a local setting. Our aim was to ensure that the questionnaire is disease-specific. Although numerous self-reported questionnaires evaluate the impact of voice disorders, disease-specific questionnaires remain scarce. For instance, the VHI-10 and its predecessor, the VHI are widely used in clinical practice to assess patients with

various types of voice disorders, with study populations encompassing a broad range of diagnoses. The cut-off point for the mVHI-10 is 7.5 (Idris et al. 2023). However, this study compared patients with dysphonia to a normal population. To date, no study has compared scores across different dysphonia subgroups.

Disease-specific tools for voice disorders include the Voice Outcome Survey (VOS) 5-item version, a questionnaire developed specifically for unilateral vocal cord paralysis (UVCP) (Gliklich et al. 1999). It consists of five items that are highly relevant and specific to patients with unilateral vocal cord paralysis. In addition to VOS, the Score for Allergic Rhinitis (SFAR) questionnaire is a disease-specific tool that has been modified and translated into Malay for local application (Cheah et al. 2023). Another example of a disease-specific, patient-reported tool is the Self-Evaluation of Communication Experiences after Laryngectomy (SECEL) questionnaire, which specifically assesses communication dysfunction in patients after laryngectomy. This tool has been translated into Malay and validated for Malaysian patients (Mohd Shakri et al. 2023). The specificity of these instruments enhances their reliability and ensures that each questionnaire remains brief and easy to administer. Based on the literature review, the ideal questionnaire for adaptation and contextualisation to fulfil our goal is the m-VHI-10, which is universally accepted and validated for various voice disorders. Furthermore, it has already been translated and validated in our local population.

Analysis of patient interviews identified five themes. The first theme, 'poor quality of voice', describes voice quality from the patient's perspective. Complaints about the nature of the voice, particularly voice breaks, align with existing literature (Imamura et al. 2006; Ludlow et al. 2018). While voice breaking is a characteristic feature of SD, it is not exclusive to the condition. Other voice disorders, such as muscle tension dysphonia and laryngeal tremor, may also present with voice breaking. This detailed description of voice impairment was not specifically addressed in the VHI, as the VHI is designed to be broadly

applicable to various voice disorders rather than focusing on conditions characterised by voice breaks.

The second theme is 'negative social perceptions'. In the past, there was a misconception that SD was a psychogenic disorder (Hu et al. 2018). However, advancements in diagnostic tools and clinical research have corrected this misbelief. Although this has addressed the misdiagnosis of SD, literature still highlights the prevalence of anxiety and depression among SD patients. The reported prevalence of anxiety is 13.4%, while that of depression is 2.8% (Hu et al. 2018). Younger individuals, females, those with lower general self-esteem and those with greater perceived vocal handicap are more likely to experience anxiety. The prevalence of anxiety is lower in more recent studies and is influenced by factors such as age, gender, and individual personality (Liu et al. 1998; Hu et al., 2018). This challenges the applicability of the "anxious-sounding voice" characterisation across the general SD population. This may explain why the panel of experts assigned a low relevancy score to this item.

The third theme identified is 'psychological factors', specifically the impact of stress on voice quality. Many patients reported that their voice problems worsened in tense situations, suggesting a strong link between emotional stress and vocal function. During interviews, patients shared experiences of heightened vocal strain when facing psychological pressure, reinforcing the idea that stress plays a significant role in exacerbating voice difficulties. This phenomenon has been documented in the literature, with studies highlighting that voice quality often deteriorates during stressful events (Sulica 2004). The physiological mechanisms underlying this effect may involve increased muscle tension and heightened sympathetic and vagal responses, both of which contribute to vocal dysfunction (Van Lierde et al. 2009).

The next theme is 'limited social interactions'. Many patients report intentionally restricting conversations with others due to communication

challenges. Communication is a two-way process, and environmental factors influence its effectiveness. Based on patient experiences, difficulties in expressing themselves at work and over the telephone are commonly reported.

A study assessing the functional impact of voice disorders in individuals with SD and vocal fold paralysis found that telephone communication was the most significant limitation. This was reported by 90% of the SD population, with half rating the severity as extreme (Smith et al. 1998). The probable reasons for this include the absence of non-verbal cues in telephone conversations and the unpredictability of voice breaks. A listener who is unfamiliar with or unsympathetic to the challenges faced by an individual with SD may lack the patience to engage meaningfully and accurately interpret spoken words.

The last of the five themes identified is 'academic and employment impact'. Many patients report that their voice problems limit their career or academic progress. This is a mild variation of one of the items in the VHI-10: *"My voice problem causes me to lose income"*. SD may manifest in younger individuals during school or college, posing challenges to academic performance. Although none of the patients interviewed are current students, many experienced dysphonia for the first time while still studying. Thus, it is important to include items that address academic limitations in addition to financial implications. Patient background may also influence perceptions of vocal handicap. As vocal demands increase within their profession, individuals face higher challenges in career progression.

Content Validation

In psychometric tools such as questionnaires, validity is determined based on the interpretation of item scores. This study determined content validity by averaging expert ratings of item relevance and clarity. This was further strengthened using the CVI (Cook & Beckman 2006; Yusoff 2019). There are two distinct forms of the CVI: the item-level CVI (I-CVI) and

the scale-level CVI (S-CVI). The I-CVI reflects the proportion of experts who rate an item as relevant, calculated by dividing the number of experts in agreement by the total number of evaluators. The S-CVI/Ave, provides an aggregate measure of content validity across the instrument and is derived by averaging the I-CVI values of all items.

A threshold of 0.78 or above for the I-CVI is widely accepted as evidence of acceptable content validity, particularly when the item is evaluated by a panel of three or more experts (Polit et al. 2007). This threshold indicates strong agreement among experts regarding the relevance of an individual item. Among the items that received a score of 0.75, only item 8 was retained, based on a special consideration to preserve representation from the emotional domain.

SD is a rare disorder, and treatment decisions are typically made through discussions between the attending laryngologist and the patient, with outcomes subjectively assessed by the laryngologist. This questionnaire can serve as a valuable tool for evaluating the impact of the voice disorder on patients and may also be used to monitor treatment efficacy and guide the subsequent management of SD. With further validation, the SD-VHI-10 may function as a screening tool for diagnosing SD and assessing clinical improvement over time.

We acknowledge several limitations in this study. First, the number of respondents involved in the focus group discussion and validation is relatively small. This is primarily due to the low prevalence of SD and limited awareness among both the general population and healthcare providers. Studies conducted in Japan and the United States have reported the prevalence of SD to be between 3.5 and 7 per 100,000 individuals (Hyodo et al. 2021b). Moreover, the patients recruited for this study represent a homogenous population from a single geographic region in Malaysia. Additionally, at this stage, reliability tests-including test-retest reliability and internal consistency-have not yet been performed. In the future, we aim to recruit more patients with SD

and conduct reliability analyses.

CONCLUSION

The SD-VHI-10 is an adapted form of the VHI-10, tailored to reflect the experiences of patients with SD in Malaysia. It is a concise and intelligible questionnaire, available in both Malay and English, with the potential for future validation in a larger cohort of SD patients worldwide.

Author contributions: Conceptualisation, study design: RV, MA, MMB, NAM; data collection: RV; data analysis and interpretation: RV, MA, MMB, NAM; supervision: MA, MMB, NAM; writing-original draft: RV; writing-review and editing: MA, MMB, NAM. All authors have approved the final manuscript.

Funding: This research was supported by internal funding from the Department of Otorhinolaryngology-Head & Neck Surgery, Universiti Kebangsaan Malaysia (UKM), Malaysia. Research grant reference number: FF-2023-006.

Acknowledgement: The authors wish to express their sincere gratitude to Professor Dr. Clark A. Rosen, the principal author of the VHI-10, for granting permission to adapt the questionnaire. The authors also extend their appreciation to all the patients who participated in this study for their kind cooperation during data collection. Furthermore, the authors thank the ethics committee and the administration of Hospital Canselor Tuanku Muhriz for their support in granting permission to conduct this research.

Conflict of interest: The authors declare no conflicts of interest.

Ethics Statement: This study was conducted in accordance with the Declaration of Helsinki. Ethical approval was obtained from the UKM Research Ethics Committee (Ethics approval reference: KOD FF-2023-006). Informed consent was obtained from all participants prior to inclusion in the study.

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