

## VoiSS A patient-derived Voice Symptom Scale

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### Abstract

**Objective:** Many voice-rating tools are either physician-derived, disease-specific measures or they merely combine general quality-of-life domains with vocal symptoms. The aim of this series of studies was to devise and validate a patient-derived inventory of voice symptoms for use as a sensitive assessment tool of (i) baseline pathology and (ii) response to change in adult dysphonia clinics. **Method:** Three stages in the development of the instrument are described. First, an initial exploratory, open-ended questionnaire study was used to compile a prototype list of voice complaints [Clin Otolaryngol 22 (1997) 37]. Second, the prototype list was administered to 168 subjects with dysphonia and underwent principal components analysis. Qualitatively, it was also assessed at this stage for its ability to

capture voice-related impairment, disability and handicap. Third, a modified 44-item scale was administered to 180 new subjects.

**Results:** The symptoms were highly endorsed. Principal components analysis with oblique rotation yielded a Voice Symptom Scale (VoiSS); 43 of the items comprise a ‘general voice pathology’ scale. More specifically, five oblique components provided assessments of: ‘communication problems,’ ‘throat infections,’ ‘psychosocial distress,’ ‘voice sound and variability’ and ‘phlegm.’ **Conclusion:** The VoiSS is simple for patients to complete and easy to score. It is sensitive enough to reflect the wide range of communication, physical symptoms and emotional responses implicit in adult dysphonia. © 2003 Elsevier Science Inc. All rights reserved.

*Keywords:* Dysphonia; Voice; Questionnaire; Factor analysis; Psychometrics

### Introduction

Modern health care delivery demands outcome measures that are robust, yet sensitive to change, comprehensive, yet disease-specific and which must reflect the illness-related concerns of the patients themselves. Over the past 5 years, there has been an increasing awareness among speech pathologists and phonosurgeons that treatment can only be optimised once such methods are developed [2]. Further, resource allocation to what are frequently termed functional disorders will be enhanced by collation of good evidence of the efficacy of interventions.

Until recently, voice outcome studies have largely relied upon perceptual judgements of voice quality and acoustic measurement of aperiodicity in the speech signal [3]. Any attempt to quantify patients’ assessments of the individual impact of the voice disorder used either a generic, health-related quality of life instrument (for example, the SF36) or a simple single score on a linear scale [3]. However, it is now widely recognised that the severity of the voice disorder may not reflect the impact that the dysphonia has in the patient’s life [4]. As a consequence, dysphonia-related, self-report questionnaires were developed and they offer valuable outcome measures in addition to the traditional methods.

The *Patient Questionnaire of Vocal Performance* (VPQ) was designed for an evaluation study of voice therapy in nonorganic dysphonia [5]. It consists of 12 items on the physical attributes of the voice problem and the social and

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emotional impact the voice disorder is having on the patient and their family. The reliability of the instrument was assessed on a group of ten respondents (test–retest) and an aspect of validity was ascertained by discussion of potential redundant items in a pilot study [6]. The *Vocal Handicap Index* (VHI) was developed to be a psychometrically robust voice disability/handicap inventory for voice-disordered patients. The reliability of the questionnaire was evaluated based on a test–retest sample of 63 patients. One aspect of construct validity was evaluated by correlating the VHI with domains of the SF36 in 260 patients [2]. Sensitivity to change in voice severity was evaluated on a sample of 37 subjects with multiple voice pathologies [7]. The *Voice-Related Quality of Life* (V-RQOL) questionnaire distinguishes between the concepts of handicap and quality of life [8]. It is not clear how the items of the V-RQOL questionnaire were selected (from ‘clinical experience’ and ‘informal interviews’) or refined (piloted on 20 patients and subsequently ‘revised’). The reliability, some aspects of validity and sensitivity of the V-RQOL instrument were assessed on 109 patients and 22 controls [8]. Test–retest reproducibility was calculated on a sample of 68 patients and content-related validity determined on ‘approximately 20’ patients [8]. The VR-QOL has further been criticised as there are no data on its correlation with objective voice parameters and as applications have not been established [9].

These three measures represent considerable recent developments in patient-report questionnaires for voice disorders. However, determination of the final content of the instruments is unclear in VPQ and V-RQOL, and this may ultimately challenge their validity and usefulness. Content validity, reliability and sensitivity (to change) have been examined in small sample sizes for all three questionnaires. The aim of the present report is more fully to document the phases in the development of our Voice Symptom Scale (VoiSS).

## Methods

### *VoiSS Phase 1: formation of items from open-ended responses from patients*

Recognising the lack of a finally validated, patient-reported outcomes instrument for disorders of voice, we have undertaken a structured series of studies aimed at providing one. It was considered important to involve patients with dysphonia to inform the content of the scale. Phase 1, therefore, of our developing the instrument was to ask a large number of patients, with a variety of voice disorders, to list all of their voice-related problems. We previously reported [1] this first phase of the development of the VoiSS tool, based on an open-ended problems sheet [10]. In that exercise, 133 consecutive patients prospectively reported a total of 467 difficulties and problems due to their voice disorder.

The aims and results of the next two phases in the development of the VoiSS are reported here. The aims of these phases were to refine the open-ended items into a usable questionnaire, to analyse its principal components and to begin to establish its validity.

### *VoiSS Phase 2: a pilot questionnaire study*

Phase 2 in the development of the VoiSS outcomes tool was the construction of a novel questionnaire that was based on actual problems raised by patients [1]. Because questionnaires are never optimal or rarely even satisfactory after a single study, we assumed that this first questionnaire study would be a pilot and that at least another study would be needed to refine the questionnaire. Therefore, this pilot questionnaire study is reported only briefly here; it has not been published elsewhere.

In the Phase 2 pilot study, the 467 voice-related problems identified in the open-ended problems sheet [1] were classified by the WHO criteria [11] into 24 impairments, 15 disabilities and 15 handicaps. All but one of these 54 items (dizziness, reported by only one of the original cohort of 133 subjects) were included in the pilot voice questionnaire. The 53-item stems were each accompanied by a pair of response scales. One of these was a five-point frequency index (*all the time, most of the time, some of the time, occasionally, never*). The other was a severity index (*unbearable, severe, moderate, slight, not at all*). That is, for every 1 of the 53 items, respondents were required to state how often they experienced the symptom and how severe it was. This pilot questionnaire was administered to 168 subjects (118 women, 43 men, and 7 did not indicate sex on the questionnaire). They had a variety of types of dysphonia, similar in distribution to the subjects studied in Phase 3, below. That is, they excluded major malignant and surgical causes of the disorder, but were otherwise a typical population of people presenting at an ENT clinic. Common causes were chronic laryngitis, nodules, polyps, Reinke’s oedema and functional dysphonia (normal larynx). The mean (S.D.) age was 48.4 (13.9) years for women and 49.8 (16.0) years for men. Since this was a pilot for the main study, the results are merely outlined.

The use of both severity and frequency response scales for each item stem was not helpful. The effective doubling of the length of the questionnaire produced problems with incompletely filled questionnaires. Patients were found consistently to complete the frequency scale, but not the severity scale of each item. The analysis of the structure of the questionnaire by data reduction was therefore performed on only the frequency responses for each of the 53 items. The assumption was that the 53 items were not independent items. Rather, it was assumed that items were indicators of broader groups of voice problems. The method used to discover these latent groups of items was principal components analysis. The method used to decide the number of components to extract from the correlation matrix of items

was inspection of the scree slope, which suggested either a three or a five-factor solution. The five-factor model included, however, two factors with only moderate loadings from just a few items each. The contents of the three more substantial components concerned: communication difficulties, pharyngeal symptoms and psychosocial distress. This pilot questionnaire and the details of the principal components analysis are available from the authors. Phase 3 of this series of studies concerns the refining of this questionnaire and is the main study reported herein.

### *VoiSS Phase 3: a refined VoiSS questionnaire*

#### *Method*

**Subjects.** This study includes 180 new subjects (63 men, 117 women) with dysphonia. Each completed a VoiSS questionnaire that was refined using the information from the pilot study described above. The mean (S.D.) age was 53.4 (16.0) years for women and 55.4 (14.0) years for men. Their voice problems represented a range of types of dysphonia. Each patient was seen by an otolaryngologist and a diagnosis of their voice problem was made. The range and number of diagnoses are shown in Table 1.

**VoiSS questionnaire.** From the pilot questionnaire that was constructed and analysed in Phase 2, 31 items were identified that had the following desirable psychometric characteristics. They had high loadings on their principal factor, low loadings on other factors and together represented the symptom domains of the three strongest principal components. That is, they formed symptom groups related to communication difficulties, pharyngeal symptoms and psychosocial distress.

Table 1  
Working diagnoses in 180 subjects with complete data on the voice symptoms questionnaire

Diagnosis	Female	Male	Total
Functional dysphonia	36	15	51
Vocal cord palsy	11	14	25
Laryngitis	15	6	21
'Acid' laryngitis	7	2	9
Reinke's oedema	8	1	9
Asthma	5	1	6
Malignancy	3	3	6
Papillomata	0	6	6
Globus/phlegm	5	0	5
Nodules	5	0	5
Leukoplakia	3	1	4
Vocal cord polyp	1	2	3
Granuloma	1	2	3
Exophytic lesion	2	0	2
Cricoarytenoid arthritis	1	1	2
Puberphonia	0	2	2
Miscellaneous	3	3	6
Near normal/resolving	11	4	15
Total	117	63	180

The 22 items omitted from the 53 items used in the pilot study of Phase 2 are as follows. We note in parentheses the numbers of subjects in the original 133 open-ended problems sheet study [1] who complained of these problems. Impairment items: dry throat (24), difficulty swallowing (9), out of breath when talking (8), sore neck (7), throat feels tight (4), sore ears (4), choking sensation (2), pitch rises (2), change in speech patterns (1), feeling dizzy (1), hearing affected (1), stammering (1). Disability items: being understood in company (14), voice sounds different (8), effect on self-confidence (7), voice not recognised by others (3), consonants unclear (1), saying too many words at once (1). Handicap items: made fun of (5), worry about cause of problem (2), feeling lifeless and weak (2), worried that may not be able to call for help (1). The dry throat item, proffered by 24 respondents, was omitted as it overlapped with the added item on voice dry and creaky (see below). The disability item on being understood in company was omitted as it ranked lower than the very similar item on being hard to hear in company.

Having identified the 31 strongest items which survived Phases 1 and 2, we then scrutinised the questionnaire for areas that might be strengthened. This is a normal part of the process of ensuring content validity. As a part of this process, we considered whether there were items in the VHI that might usefully be added to the questionnaire. With regard to broad themes in the questionnaire, it was decided to balance the WHO domains by adding disability and handicap items to the key 31 items identified by the principal components analysis in the pilot study. Thirteen items were drawn from the VHI [2] (each is indicated by an asterisk in Table 2). The resulting 44-item VoiSS questionnaire was laid out in a concise two-sheet format. It was completed by the 180 subjects in this main, Phase 3 study. Each item stem had an accompanying five-point, frequency-based response scale: *never, occasionally, some of the time, most of the time, all of the time*. These responses obtain scores of 1, 2, 3, 4 and 5, respectively. The VoiSS is freely available from the authors who encourage clinicians and researchers to copy and distribute it.

#### *Statistical analysis*

Response frequencies to the 44 VoiSS items were examined to ensure that responses were not unacceptably concentrated on single response categories. At this stage, item 6, related to work, was omitted because a large minority of people were not in work. Principal components analysis was performed on the responses of the 180 subjects to the 43 remaining voice-related items. The scree slope criterion was used to decide the number of components and these were then rotated obliquely with the Oblimin method. The internal consistency of scales suggested by the principal components analysis was assessed using Cronbach's  $\alpha$  statistic.

Table 2  
Principal components analysis and internal consistency coefficients (Cronbach's  $\alpha$ ) of the Voice Symptom Scale (VoiSS)

Item no.	Verbatim item	FUPC <sup>a</sup>	Obliquely rotated factors					Endorse (%) <sup>b</sup>	Mean	S.D.
			Factor 1	Factor 2	Factor 3	Factor 4	Factor 5			
1	Do you have difficulty attracting attention?	<b>.61</b>	<b>.72</b>	-.12	.03	.12	-.04	47.2	1.82	1.02
2	Do you get frustrated by your voice problem?	<b>.74</b>	<b>.48</b>	.03	-.16	.23	.16	85.0	2.98	1.27
3	Do you have problems singing?	<b>.59</b>	.39	-.22	-.02	.34	.20	80.6	3.41	1.56
4	Do people ignore you?	<b>.61</b>	<b>.68</b>	.04	-.11	-.08	-.03	45.0	1.67	0.87
5	Is your throat sore?	<b>.38</b>	.09	<b>.54</b>	-.01	.06	.35	68.9	2.23	1.11
7	Is your voice hoarse?	<b>.56</b>	.12	-.06	-.15	<b>.48</b>	.17	93.9	3.22	1.19
8	When talking in company do people fail to hear you?	<b>.74</b>	<b>.69</b>	-.01	-.16	.04	.05	68.3	2.30	1.11
9	Do you lose your voice?	<b>.59</b>	<b>.62</b>	.39	.06	.10	-.07	66.7	2.27	1.18
10	Does your voice problem reduce your social life?	<b>.70</b>	<b>.57</b>	-.14	-.35	-.20	.22	49.4	2.01	1.27
11	Are you able to read aloud?	-. <b>40</b>	-. <b>62</b>	-.18	-.02	.10	.20	73.9 <sup>c</sup>	3.39	1.39
12	How often do you worry about catching a throat infection?	<b>.37</b>	-.02	<b>.58</b>	-.24	.05	.07	58.9	2.21	1.31
13	Do you cough or clear your throat?	<b>.41</b>	.02	.11	.01	.13	<b>.69</b>	98.9	3.39	1.09
14	Do you have pains in the chest?	<b>.41</b>	.29	<b>.54</b>	.03	-.09	.31	47.8	1.73	0.94
15	Do you have a weak voice?	<b>.63</b>	<b>.52</b>	-.22	-.05	.35	-.02	73.9	2.65	1.34
16	Do you have problems talking on the telephone?	<b>.75</b>	<b>.63</b>	.08	-.10	.18	.03	70.0	2.47	1.28
17	Do you feel miserable or depressed because of your voice problem?	<b>.75</b>	.25	.02	-. <b>50</b>	-.09	.35	69.4	2.33	1.22
18	Does it feel as if there is something stuck in your throat?	.27	-.04	.16	.05	.17	<b>.47</b>	72.8	2.66	1.35
19	Do you have swollen glands?	.21	-.03	<b>.61</b>	-.07	-.07	.10	36.7	1.51	0.78
20	Do you talk less than you normally would?	<b>.72</b>	<b>.66</b>	-.09	-.10	.02	.20	65.6	2.37	1.25
21	Are you embarrassed by your voice problem?	<b>.75</b>	.28	-.05	-. <b>53</b>	-.05	.29	61.7	2.27	1.30
22	Do you find the effort of speaking tiring?	<b>.81</b>	<b>.68</b>	-.09	-.08	.23	.14	66.7	2.49	1.38
23	Does your voice problem make you feel stressed and nervous?	<b>.70</b>	.31	.10	-.32	.11	.23	64.4	2.18	1.15
24	Do you have difficulty competing against background noise?	<b>.74</b>	<b>.60</b>	-.14	-.14	.24	.04	73.9	2.79	1.46
25	Are you unable to shout or raise your voice?	<b>.62</b>	<b>.59</b>	-.28	-.02	.21	.12	81.7	3.01	1.41
26	Are you able to ask for things in shops?	-. <b>33</b>	-. <b>45</b>	-.13	.11	.20	.11	52.8 <sup>c</sup>	4.01	1.23
27	Does your voice problem put a strain on your family and friends?	<b>.62</b>	.32	-.02	-. <b>42</b>	-.21	.32	46.7	1.89	1.16
28	Do you have a lot of phlegm in your throat?	.28	.00	.09	.12	.03	<b>.76</b>	77.8	2.64	1.31
29	Do you run out of air when you talk? <sup>d</sup>	<b>.61</b>	.20	.08	-.13	.38	.21	60.6	2.37	1.39
30	Does the sound of your voice vary throughout the day? <sup>d</sup>	<b>.46</b>	-.04	.02	.03	<b>.77</b>	.15	87.2	2.98	1.21
31	Do people seem irritated by your voice? <sup>d</sup>	<b>.58</b>	.07	.02	-. <b>52</b>	.05	.14	41.7	1.67	0.99
32	Do you have a blocked nose?	.19	-.16	.08	-.11	-.03	<b>.56</b>	52.2	1.88	1.09
33	Do people ask what is wrong with your voice? <sup>d</sup>	<b>.64</b>	.29	.13	-.21	<b>.40</b>	-.09	77.8	2.68	1.33
34	Does your voice sound creaky and dry? <sup>d</sup>	<b>.60</b>	-.03	-.10	-.27	<b>.58</b>	.21	86.1	2.82	1.16
35	Do you feel you have to strain to produce voice? <sup>d</sup>	<b>.79</b>	<b>.48</b>	-.00	-.17	.40	.02	71.7	2.73	1.41
36	Do you find other people do not understand your voice problem? <sup>d</sup>	<b>.69</b>	.06	.17	-. <b>64</b>	.18	-.05	50.6	1.97	1.21
37	Do you try to change your voice to sound different? <sup>d</sup>	<b>.56</b>	-.02	.21	-. <b>59</b>	.31	-.31	35.6	1.66	1.04
38	How often do you get throat infections?	.15	-.10	<b>.72</b>	.03	.12	.03	67.8	1.99	0.94
39	Is your voice worse in the evening? <sup>d</sup>	<b>.43</b>	-.09	.18	-.03	<b>.66</b>	-.05	75.0	2.54	1.23
40	Does your voice 'give out' in the middle of speaking? <sup>d</sup>	<b>.67</b>	.34	.14	-.11	<b>.52</b>	-.10	70.6	2.44	1.22
41	Do you feel annoyed when people ask you to repeat? <sup>d</sup>	<b>.71</b>	.23	.03	-. <b>54</b>	.07	.08	52.8	2.08	1.33
42	Does your voice make you feel incompetent? <sup>d</sup>	<b>.68</b>	-.00	-.06	-. <b>84</b>	.04	-.01	42.8	1.81	1.16
43	Are you ashamed of your voice problem? <sup>d</sup>	<b>.61</b>	-.11	.10	-. <b>90</b>	.04	-.15	30.0	1.63	1.16
44	Do you feel lonely because of your voice problem?	<b>.60</b>	-.01	-.07	-. <b>84</b>	-.08	-.02	19.4	1.40	0.95
	Cronbach $\alpha$ (internal consistency coefficient)	.94	.87	.74	.91	.81	.66			
	Correlations among factors									
	Factor 2		.08							
	Factor 3		-.52	-.18						
	Factor 4		.30	.08	-.32					
	Factor 5		.18	.14	-.22	.25				

<sup>a</sup> First unrotated principal component.

<sup>b</sup> Endorsement is the percentage of people responding other than 'never,' i.e., they experience this symptom 'occasionally' or more frequently.

<sup>c</sup> These items represent normal function rather than pathology; therefore, endorsement here is the percentage responding other than 'all of the time.'

<sup>d</sup> Items from the VHI.

## Results

### *Descriptive item statistics*

The percentage of people who endorsed each of the 43 VoiSS items and the means and standard deviations of the item responses are shown in Table 2. Thirty-two of the 43 items (74.4%) achieve endorsement rates of over 50%. Thus, most of the problems may be considered common. Among the highest mean ratings of the 43 items are those directly related to communication. Other physical pharyngeal symptoms are distributed throughout the endorsement rankings. The items relating to voice-associated psychological distress are not scored so frequently, but are still common symptoms.

### *Principal components analysis*

The scree slope criterion suggested a five-factor solution for the 43 items. These five factors account for 55.2% of the total variance. This proportion of the variance is high for analyses that involve items, because responses to single items are prone to error. Before rotation, the loadings of items on the first unrotated principal component were inspected. All of the items had loadings in the expected direction, and only 5 of the 43 items failed to load higher than .3 (note throughout that items 11 and 26 are reverse-scored). This indicated that almost all of the items contribute to a 'general voice pathology' factor. Finding that almost all items load substantially on the first unrotated principal component is not a necessary outcome of this type of analysis. Rather, it indicates some shared variance even among the groups of symptoms that are identified here as separable components of dysphonia. This general factor, the sum of all 43 items, has a very high internal consistency coefficient of .94. Therefore, the VoiSS total score may be used to indicate overall voice pathology.

Because there was evidence of a general factor, the five extracted components were rotated obliquely. The pattern matrix of loadings is shown in Table 2. Loadings greater than .4 are shown in boldface type. The five-factor solution comprehensively described the 43 items: only three items (nos. 3, 23 and 29) fail to achieve a loading of .4 on any rotated factor. The solution is clear and distinct for the following reasons. It is clear because most of the principal loadings are high. It is distinct—the factors are well separated—because there is only one item (no. 35), which has a secondary loading of .4 or greater. The five factors also represent coherent domains of voice pathology. Factor 1 relates to 'communication problems,' Factor 2 to 'throat infection,' Factor 3 to 'psychosocial distress,' Factor 4 to 'voice sound and variability' and Factor 5 to 'phlegm.' The factors are no more or less than the groups of items that load highly on them; the foregoing presumptive names are arrived at subjectively by the present authors and included here merely for ease of reference.

### *Formation of VoiSS subscales and their internal consistencies*

Items loading over .4 in Table 2 were chosen to form subscales of the VoiSS that may be used to assess each domain. The only exception was item 35, which was included in Factor 1 (loading .484) but not in Factor 5 (loading .403). The numbers of items in each factor, respectively, were 15, 5, 10, 6 and 4. All components except Factor 5 (which has only four items) have high (>.7) internal consistencies. Because the factors are oblique, the correlations among them are of interest. There was an especially high (>.5) correlation between Factors 1 and 3 (Table 2), indicating that communication problems relate to psychosocial problems.

## Discussion

There is an acknowledged need for a range of outcome measures that reflect the multidimensional nature of voice problems [12]. Objectively assessed severity of the voice disorder may not reflect the impact that the disorder has on the individual [4]. The VoiSS includes a significant component derived directly from comprehensive self-reports by patients. The VoiSS structure, however, also incorporates items on well-recognised aspects of dysphonia, and we acknowledge that while the patient's perspective is central, it is not all encompassing.

The five factors identified in the Phase 3 study account for a substantial proportion of the variance. Four of the five components had high levels of internal consistency. As might be expected, a communication factor accounted for the greatest single contribution. Voice sound and psychosocial distress are clearly linked, although separable, domains. Two factors are particularly interesting as they comprise allied physical symptoms—throat infection and phlegm. Such physical pharyngeal symptoms are well recognised as part of the background to many organic and functional disorders. The throat infection factor includes not only sore throat, swollen glands and frequency of throat infections, but also pains in the chest and concern about the possibility of catching a throat infection. Thus, the items of this component may in part be tapping medically unexplained symptoms. The phlegm component is a good example of a domain of voice dysfunction not included in previous voice questionnaires. The items are, however, all common ancillary symptoms—globus, phlegm, blocked nose and, perhaps most importantly, throat clearing—which many patients volunteer as a lead symptom but about which surprisingly little has ever been written.

The two most frequently used, previously published measures of voice problems are the VHI and the VPQ. The VHI has three domains (10 items in each domain)—functional, physical and emotional—derived from 85 initial

items [13]. The most commonly employed UK measure is the 12-item VPQ. Both questionnaires produce rich information as to the reasons why these patients seek help for their voice problems and why some of them may respond better to different treatment regimes [3]. Similarly, both measures have been shown to be sensitive to change following voice intervention. The VHI is the longer of the two questionnaires—30 versus 12 items in the VPQ—but has a number of features which appear to justify further examination of voice disorders from the patient's experience of symptoms, despite its increasing use. The instrument appears to have been derived from symptoms identified from written case histories, rather than at interview or in the type of prospective open sheet design used for the prototype VoiSS. [The 85 items originally identified were from 'case history interviews over the past 7 years.'] Thus, there may be bias in that symptoms not felt to be important by the record keepers over that preceding 7-year period may not have been noted. More importantly, the 65 subjects used to refine the list would not be regarded as representative of the average laryngology clinic, as 84% had either a mass lesion, a neurogenic disorder or—in 26%—had actually undergone removal of the larynx! [13]. The authors then grouped their original 85 symptoms a priori into three subscales, whereas the five VoiSS subscales described here derived empirically from modelling of actual VoiSS scoring patterns in a large cohort.

The weighting of the three VHI subscales and their contribution to the total score was judged to be equal (10 items each) when the final selection of items was made on the basis of the scores of the 65 subjects. One immediately apparent effect of this difference in approach to questionnaire design relates to the content of a group of VoiSS items, for which there are no comparable items in the VHI—items such as sore throat, throat clearing, globus and swollen glands. These include the items in Factors 2 ('sore throat') and 5 ('phlegm'), and are features which would not strictly, at face value, appear to relate to 'voice handicap,' but of course do relate directly to issues of voice hygiene which frequently underlie the 'nonsurgical' voice disorders which comprise the majority of voice therapy caseload.

Voice disorders affect general quality of life and its assessment, notably with regard to employment [14]. Sataloff and Abaza [15] have proposed an employment-related impairment classification as a basis for compensation settlements, which may be incorporated to the AMA guidelines. Interestingly, VHI scores appear to be lower (less severely abnormal) in singers, but this may reflect the spoken-speech bias of most clinical voice tools [16]. In the VoiSS responses reported, singing was one of only three items, which failed to load at or above .4 on any factor. Despite this, it was a frequent complaint.

The present report presents important steps in the generation of a comprehensive, validated voice outcome measure with a known factor structure. Our ongoing task

is to establish its sensitivity in comparison with other voice outcome tools. Our three completed phases of development of a voice outcomes tool have reached a stage where we can apply the VoiSS to a further sample of patients and perform a direct comparison with other voice instruments—notably the much shorter VPQ and the more similar but differently-generated VHI. The content validity of VoiSS is assured by the extent of the preceding patient consultation, by the scrutiny of items in relation to the WHO criteria and by detailed comparisons with the VHI. The total score on the VoiSS has high reliability (internal consistency) as an omnibus indicator of voice problems. The subscales of the VoiSS may be used to assess five different, though partly correlated, aspects of voice pathology. Further empirical exploration of the VoiSS is still justified, as it may in future be possible to reduce the total number of items, and hence clarify further the number of genuinely discrete voice symptom domains. For example, it is likely that the sore throat and phlegm factors are related more closely to each other than to other domains. Nonetheless, data from a total of 481 subjects has been used so far in the generation of the current 43 item VoiSS. It remains much the most rigorously evaluated of any comparable questionnaire to date.

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