Investigating current clinical practice in assessment and diagnosis of voice disorders: A cross-sectional multidisciplinary global web survey

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RESEARCH REPORT

Investigating current clinical practice in assessment and diagnosis of voice disorders: A cross-sectional multidisciplinary global web survey

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Abstract

Background: Published best-practice guidelines and standardized protocols for voice assessment recommend multidisciplinary evaluation utilizing a comprehensive range of clinical measures. Previous studies report variations in assessment practices when compared with these guidelines.

Aims: To provide an up-to-date evaluation of current global multidisciplinary practice patterns and the opinions of otolaryngologist, ear, nose and throat (ENT) and speech–language pathology (SLP) clinicians on initial assessment and differential diagnosis of adults with voice disorders (VDs).

Methods & Procedures: ENTs and SLPs worldwide who had worked with VDs within the last 10 years completed an anonymous online survey. Themes explored demographic information about the clinical practice, information about diagnostic assessment pathways, clinical assessments routinely used for initial voice evaluation and clinician perceived value of clinical assessments important for diagnosis.

Outcomes & Results: Patterns in the clinical practice of 88 SLPs and 21 ENTs from 18 countries with 1 to more than 25 years' experience were analysed. Clinicians provided services across a range of locations, and a range of assessment pathways was available for initial evaluation. Case history, laryngoscopy and auditory–perceptual measures were the most frequently selected assessments. Most clinicians favoured formal assessment measures for auditory–perceptual evaluation. Clinicians placed equal weighting on ENT and SLP assessment to aid diagnosis for muscle tension VDs and functional neurological voice disorders (FVDs).

Conclusions & Implications: Practice patterns for initial diagnostic voice assessment are largely consistent with the currently published guidelines. Decisions for the selection of assessment tools vary according to VD classification,

and assessment decisions appear to be guided by case history. Clinicians are not always following established protocols for obtaining reliable standardized measures. Further research is needed to understand the barriers to adhering to standardized protocols and to develop evidence for the use of case history in the process of VD diagnosis.

KEYWORDS
acoustic assessment, case history, laryngeal assessment, laryngology, otolaryngology, speech–language pathology, voice assessment

WHAT THIS PAPER ADDS

What is already known on the subject

- Best-practice guidelines recommend a multidisciplinary and multidimensional assessment of adults with vocal symptoms. Prior uni-disciplinary survey studies have reported a divergence in clinical practice with the recommended guidelines. No previous studies have examined otolaryngologists and SLPs concurrently to investigate the multidisciplinary approach clinicians' use in a diagnostic voice assessment.

What this paper adds to the existing knowledge

- This study highlights new insights into multidisciplinary voice evaluation practice patterns with an emphasis on diagnostic assessment from a global perspective. The findings build on prior research exploring clinical assessment pathways, service utilization and clinicians' preferences when selecting clinical tools to inform a differential diagnosis.

What are the potential or actual clinical implications of this work?

- This paper provides insights to inform future service and resource planning to ensure the delivery of evidenced-based diagnostic assessment pathways. This study also makes recommendations for areas of future research to understand barriers to clinicians following recommended best-practice guidelines.

BACKGROUND

Voice disorders (VDs) are frequently reported by adults referred to outpatient otolaryngology, ear, nose and throat surgical (ENT) and speech–language pathology (SLP) services (Cohen et al., 2012a). Symptoms of VD can indicate serious medical conditions including laryngeal carcinoma or neurological disease (Stachler et al., 2018). However, up to 60% of individuals seen for assessment have a VD of non-organic causes (Roy, 2003).

Recommended cost-effective and reliable assessment of individuals with vocal symptoms is multidimensional and multidisciplinary, and includes case history, auditory–visual assessment, auditory–perceptual evaluation, acoustic measures, physiological observations and patient self-report tools (Dejonckere et al., 2001; Stachler et al., 2018). The multidisciplinary team that contributes to assessment and diagnosis include a combination of ENTs, SLPs, voice scientists, psychologists, singing teachers and vocal coaches. Each professional provides a unique perspective to the assessment to classify the disorder (Behlau et al., 2021). The multidisciplinary pathway of diagnostic assessment for vocal complaints may include an ENT- or SLP-initiated model, where the patient is seen by each profession independently; or an interdisciplinary model, where both ENT and SLP are present for assessment (Hess et al., 2020; Payten et al., 2020). Laryngeal imaging is widely considered an essential assessment to

identify organic pathology; however, VDs classified as muscle tension and/or functional require more comprehensive case history and multidimensional assessments (Payten et al., 2022). Published evidence, including a systematic review in 2013, highlighted a lack of scientific evidence to demonstrate the diagnostic accuracy of standard clinical assessments used in the evaluation of VDs (Roy et al., 2013).

Published clinical practice guidelines in the United States, Europe and Japan recommend multidisciplinary voice evaluation using a comprehensive range of clinical assessments (Lechien et al., 2023; Umeno et al., 2020; Stachler et al., 2018). These include taking case history, obtaining patient-reported outcome measures (PROMs), auditory–perceptual measures, aerodynamic measures and auditory–visual analyses. Additionally, published recommended protocols for voice evaluation aim to improve the standardization in the use of specific assessment tools to improve the validity of these measures in clinical and research practice (Dejonckere et al., 2001; Patel et al., 2018).

Published guidance may not fully account for 'real world' clinical practice. Previous studies in the United States and Ireland have reported variations in the process of assessment and differences in clinicians' opinions on the value of assessment tools (Behrman, 2005; Cohen et al., 2012; Kenny, 2017; McAlister & Yanushevskaya, 2020). Research examining voice evaluation by SLPs when measuring treatment outcomes demonstrated clinical practice was divergent with published guidelines and suggested a difference in practice patterns according to geographical location of service (e.g., United States versus Ireland) (Behrman, 2005; Kenny, 2017). Whilst these prior studies have provided a foundation of knowledge for practice patterns in the assessment of VDs, the goal of this study was to explore the clinical practices and opinions of both ENT and SLPs with respect to a multidisciplinary diagnostic assessment of voice. We hypothesize diagnostic evaluation is multidisciplinary, and clinicians will use a variety of assessment tools encompassing a multidimensional approach underpinned by current published guidelines. However, based on the findings of prior research, *real world* clinical assessment practices may not meet standards recommended by the published protocols (McAlister & Yanushevskaya, 2020).

Study aims

The study's aims were to provide an up-to-date evaluation of current practice patterns and the opinions of ENT and SLP clinicians on initial assessment and differential diagnosis of adults with VDs by exploring four research questions:

- What referral and assessment pathways are currently available for initial diagnostic evaluation of adults with newly acquired vocal symptoms?
- What is the availability and utility of clinical assessments for initial diagnostic evaluation of adults with newly acquired vocal symptoms?
- Which clinical assessments do clinicians perceive to be the most valuable in the differential diagnosis/classification of VDs?
- How does the current clinical practice compare with the available published best-practice guidelines and recommended protocols?

METHODS AND PROCEDURES

This cross-sectional international web survey was developed in accordance with the Checklist for Reporting Results of Internet E-Surveys (CHERRIES) (Eysenbach, 2004) to ensure transparent reporting.

Survey development

The survey was developed by the research team including three SLPs (C.P., K.W. and C.M.) using purposive sampling (see Supplementary File 1 in the Supporting Information section). Some questions were adapted from previously published surveys designed to investigate clinicians practice patterns in assessment of VDs with author permissions (Cohen et al., 2012; Kenny, 2017; McAlister & Yanushevskaya, 2020). Additional questions were included after consultation with published best-practice guidelines in VD assessment (Lechien et al., 2023; Stachler et al., 2018; Umeno et al., 2020) and a recently published systematic review of VD assessment (Roy et al., 2013). The survey questions were refined by the first author with expert advice from co-authors through an iterative process to ensure relevance before piloting.

Pilot phase

A draft survey was piloted by a convenience sample of SLPs ($n = 2$) and ENTs ($n = 2$) to check for semantic comprehension, question logic and to ascertain the time for completion. The pilot respondents were known to the first author and chosen because of their known expertise in the field for VD assessment and diagnosis. The average time for completion of the pilot survey was 23.17 min. Minor adjustments to the survey-flow and grammar were made based on feedback prior to the go-live date.

The final 48-item survey included a mix of closed choice and open ended survey items aligning to four concepts: demographic information ($n = 15$), information about referral and assessment pathways ($n = 4$), clinical assessments routinely used for initial voice evaluation ($n = 19$) and clinicians' perceptions of which clinical assessments are most valuable ($n = 10$).

The same survey was administered to both ENTs and SLPs. Adaptive questioning and text piping was used to ensure each profession was presented with questions relevant to their practice in order to capture a comprehensive picture of the multidisciplinary assessment–diagnostic pathway. To prevent possible bias, response options for certain closed-response questions were randomized; where Likert-scale options were used the response options were randomly displayed.

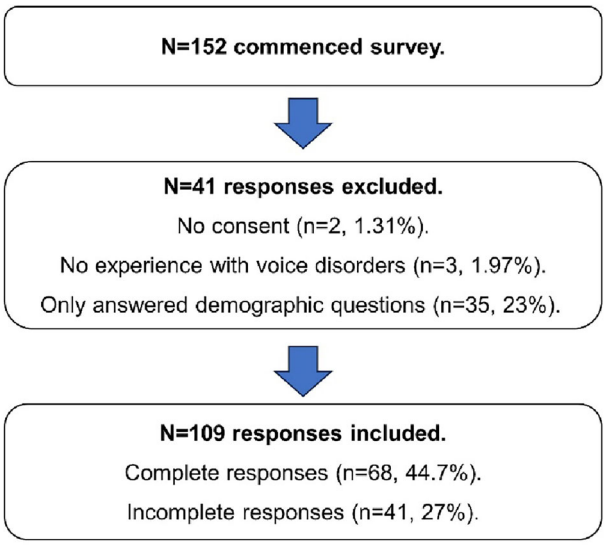


FIGURE 1 Survey responses.

Eligibility and consent

Eligible participants were registered SLPs and ENTs with experience of evaluating VDs within the last 10 years, for any proportion of their clinical caseload. The survey received ethical approval from (The University of Sydney Human Research Ethics Committee (HREC), project number 2022/546). Informed consent was required to take part in the survey.

Sample size

The survey aimed to recruit at least 100 participants and was conducted on a convenience sample with the aim of capturing opinions from as many geographical regions as possible. Given no single list of SLPs and ENTs working with VDs worldwide was available, consideration was given to previous published surveys. Prior e-surveys in a single geographical region obtained a range of 33–77 responses (Behrman, 2005; Kenny, 2017; McAlister & Yanushevskaya, 2020). A higher target sample of 100 reflected the possibility of more respondents from an international and multidisciplinary cohort.

Recruitment and survey administration

The web-based anonymous survey was administered through the Qualtrics online survey platform (October 2020, Provo, UT, USA). Recruitment was open from 1 September 2022 to 31 March 2023. The survey was advertised through email circulation to peak body organizations and advertising on social media platforms (Twitter, LinkedIn, ResearchGate and Facebook). Correspondence and social media adverts included an anonymized link for potential participants to access the survey webpage. Participation was voluntary and no incentives were offered.

Data analysis

Data were exported from Qualtrics software into an Excel spreadsheet for data cleaning. Screening of the data occurred to check validity and completeness of responses. The data were analysed using SPSS version 25 (IBM SPSS Statistics for Windows, Version 25.0, Armonk, NY, USA). To improve readability and facilitate discussion of results, the data were grouped in the following ways: responses from ENTs and laryngologists were grouped as ENT; countries were grouped according to geographical regions as Africa/Asia, Australia/New Zealand, Europe, and America/Canada; the percentages of clinical caseload dedicated to VDs were reduced to 10–30%, 40–60% and 70–100%.

OUTCOMES AND RESULTS

A total of 152 SLPs and ENTs commenced the survey, and 109 (71.7%) responses were selected for analysis of which 68 (44.7%) were complete and 41 (27%) where incomplete (Figure 1). A response was considered complete if the respondent answered all survey items, and incomplete if any of the questions beyond the demographics section were not answered.

Results are reported as a percentage of those who responded to each question and not the total number of survey participants.

TABLE 1 Participants' characteristics.

	ENT *N* = 21	SLP *N* = 88
Years of practice		
1–5 years	7 (33.33%)	20 (22.72%)
6–15 years	12 (57.14%)	34 (38.63%)
16–25 years	1 (4.76%)	23 (26.13%)
> 25 years	1 (4.76%)	11 (12.50%)
Country/region		
Africa/Asia		
Metropolitan	3 (50%)	9 (75%)
Regional/rural	3 (50%)	3 (25%)
America/Canada		
Metropolitan	0	15 (83.33%)
Regional/rural	0	3 (16.67%)
Australia/New Zealand		
Metropolitan	6 (85.71%)	31 (80.65%)
Regional/rural	0	7 (22.15%)
Other (combined metropolitan and rural)	1 (14.29%)	–
Europe		
Metropolitan	6 (75%)	20 (53.85%)
Regional/rural	2 (25%)	14 (46.15%)
Frequency of working with VDs		
Daily	7 (33.33%)	24 (27.27%)
Several times a week	12 (57.12%)	43 (48.86%)
Once a week	2 (9.52%)	10 (11.36%)
Once a month	0	6 (6.82%)
Several times a month	0	5 (5.68%)
Percentage of clinical caseload dedicated to VDs		
10–30%	11 (52.38%)	34 (38.04%)
40–60%	6 (28.57%)	15 (17.05%)
70–100%	4 (19.05%)	39 (44.32%)
	Mean = 40.00%	Mean = 54.77%
	SD = 23.87	SD = 31.55

Note: VDs = voice disorders; ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist; Africa/Asia = Afghanistan, Bangladesh, India, Iran, Israel, Nigeria and the Philippines; America/Canada = including countries within the regions of the Caribbean, Central America and Brazil; Europe = Greece, Ireland, Italy, the Netherlands, the UK and Northern Ireland.

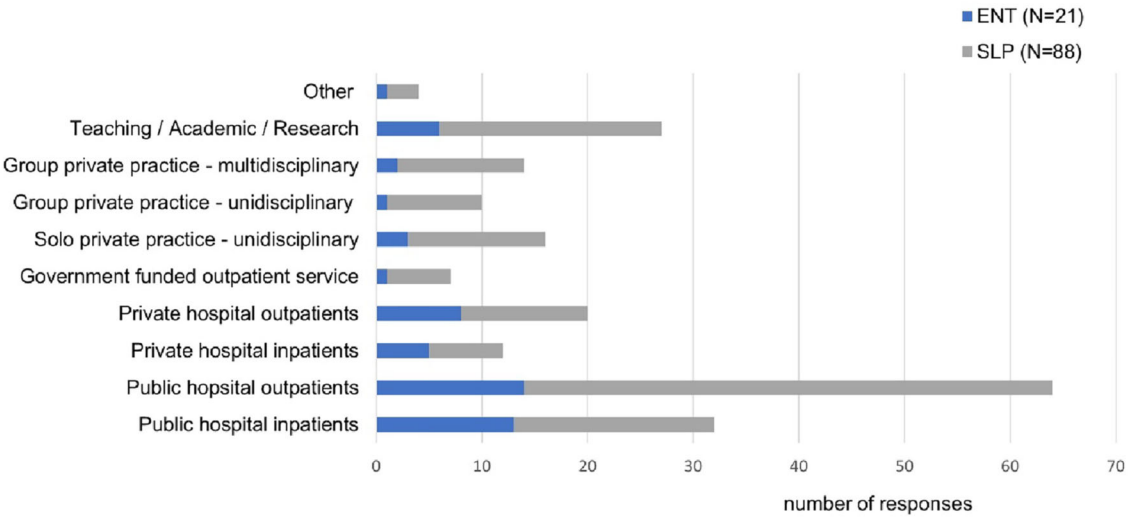
Participants

Most of the participants were SLPs (n = 88/109, 80.73%) (Table 1). Respondents represented four geographical regions (18 countries) and most worked in metropolitan or regional services. Clinicians ranged from 1 to more than 25 years' professional experience, regardless of clinical specialism. SLPs and ENTs spent on average 54.77% and 40% of clinical time working with VDs, respectively.

Most participants received ≤ 20 VD referrals per month (n = 64/109, 58.72%), whilst 20.18% (n = 22/109) received more than 40. More than half included VD as an area of specialist interest in their job description (ENT, n = 11/21, 52.38%; SLP, 69/88, 78.40%); 76.19% of ENTs (n = 16/21) and 63.64% of SLPs (n = 56/88) were enrolled as a member of a voice specialist interest organization; more than 50% had attended a voice-related professional development event in the prior 12 months (ENT, n = 14/21, 66.67%;SLP, n = 69/88, 78.41%).

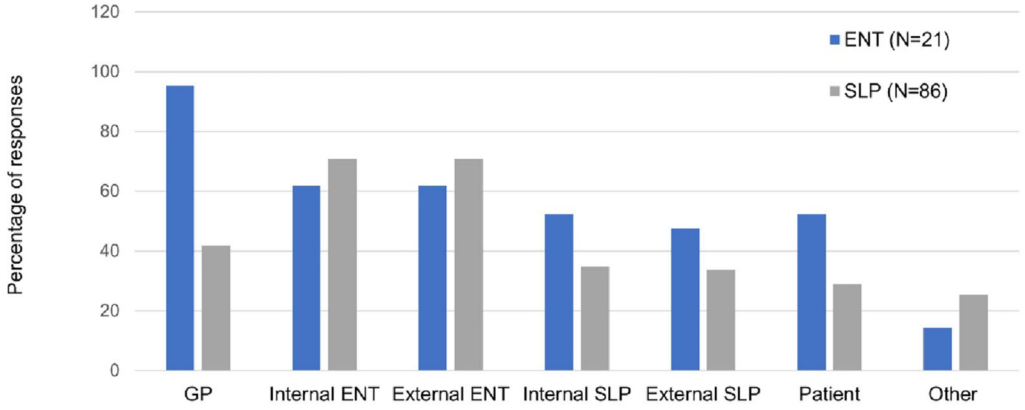
Referral and assessment pathways

Respondents provided VD services across a range of settings (Figure 2).



Note. Respondents were able to select more than one option; ENT=Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP=Speech-Language Pathologist.

FIGURE 2 Survey respondents' primary place of work.



Note. Respondents were able to select more than one option; ENT=Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP=Speech-Language Pathologist.

FIGURE 3 Source of referrals for adults with voice disorders (VDs).

The most frequent source of referrals reported by the ENTs were general practitioners (GPs) ($n = 20/21$, 95.24%) (Figure 3). SLP respondents received most referrals from ENTs ($n = 61/86$, 70.93%).

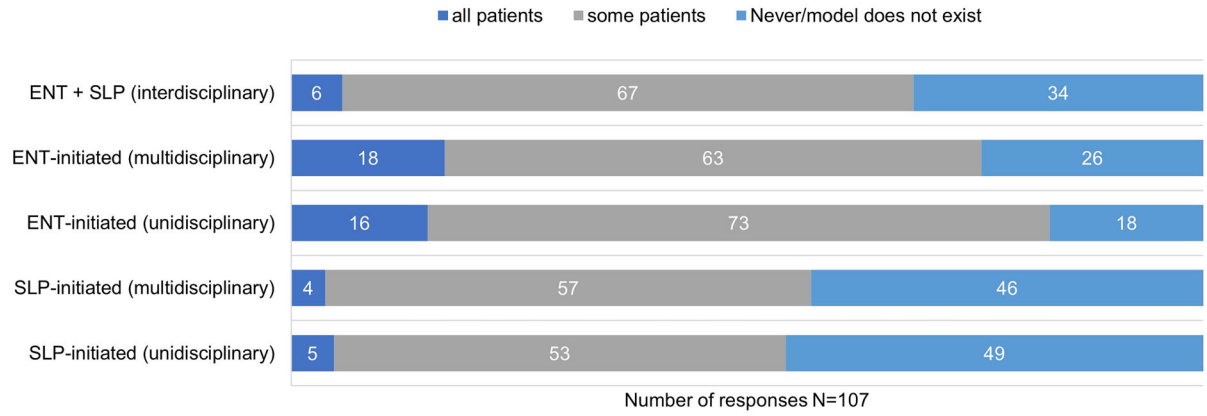
On average, ENTs spent most of their clinical time on assessment (53.04%, SD = 12.51); whilst SLPs spent more time devoted to VD treatment (Table 2).

A range of clinical assessment pathways (clinic models) for initial diagnostic voice assessment were reported (Figure 4) and most utilized more than one model in their practice. The most common was ENT-initiated. Over half of respondents ($n = 63/107$, 62.62%) reported an interdisciplinary assessment model available to some patients with VD, whilst only 5.61% ($n = 6/107$) reported this model

TABLE 2 Estimated percentage of clinical time spent on the triage, assessment and treatment of voice disorders (VDs).

		Referral triage		Assessment		Treatment	
	N	**Mean**	**(SD)**	**Mean**	**(SD)**	**Mean**	**(SD)**
ENT	21	10.52	(8.44)	53.04	(12.51)	36.42	(14.15)
SLP	88	13.73	(17.42)	37.76	(17.29)	48.51	(20.15)

Note: ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist.



Note. Respondents were able to select more than one option; ENT=Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP=Speech-Language Pathologist;

SLP-initiated (unidisciplinary)=SLP will see the patient before ENT, where both SLP and ENT are in a different practice;
ENT-initiated (unidisciplinary)=ENT will see the patient before SLP, where both SLP and ENT are in a different practice;
SLP-initiated (multidisciplinary)=SLP will see the patient before ENT, where both SLP and ENT are in the same practice;
ENT-initiated (multidisciplinary)=ENT will see the patient before SLP, where both SLP and ENT are in the same practice;
ENT and SLP (interdisciplinary)=both ENT and SLP will see the patient for a simultaneous evaluation.

FIGURE 4 Available clinic models for initial diagnostic evaluation of adults with voice disorders (VDs).

available for all patients. SLP-initiated assessment models were reported by more than 50% of respondents.

Utility of clinical assessment tools

Participants used a range of assessment tools during initial diagnostic voice evaluation (Figure 5). Most ENTs (n = 10/16, 72.5%) and 59.04% (n = 49/83) of SLPs said they probably or definitely accessed all the assessments they required. A small number of ENTs (n = 4) reported videostroboscopy was not always available. Some SLPs reported problems with access and/or training in the use of acoustic assessments (n = 12), aerodynamic assessments (n = 2) and the ability to review laryngeal imaging performed by the referring ENT (n = 2).

ENTs selected fewer clinical tools for initial diagnostic evaluation (Figure 5), whilst SLPs used more instrumental and non-instrumental evaluation tools.

ENTs mostly utilized laryngoscopy (n = 19/21, 90.5%), followed by neck palpation (18/21, 85.7%) and informal auditory perceptual judgment (15/21, 71.4%). SLPs most utilized formal auditory–perceptual measures (74/83, 89.2%), PROMS (72/83, 86.7%), subjective observations of body and respiratory function (70/83, 84.3%), and observation of the patient's ability to modify voice (63/83, 75.9%) (Figure 5).

All clinicians included a comprehensive set of themes in their case history during initial evaluation of VD. Over 90% included all suggested themes from a recent scoping review of voice case histories (Krosch et al., 2022) (see Supplementary File 2 in the Supporting Information section).

Participants were asked how frequently they typically use each assessment for diagnostic evaluation. The results are presented in Table 3 and summarized below.

Most ENTs (17/19, 89.47%) reported they always used laryngoscopy, and 36.8% (n = 7/19) always included laryngeal stroboscopy. SLPs reported they would always (23/77, 29.87%) or sometimes (23/77, 24.68%) review ENT laryngoscopy imaging in their initial diagnostic assessment. Few SLPs always performed laryngoscopy (n = 8/77, 10.39%) or stroboscopy (n = 28/77, 36.36%) as part of a diagnostic assessment (Table 3).

Around half of respondents always included auditory perceptual measures as part of their initial diagnostic evaluation. Most (n = 69/96, 71.88%) always used formal (published) auditory–perceptual evaluation tools (Table 3), and 81.36% had received formal/informal training in auditory–perceptual voice measures (n = 48/59).

A total of 50% of SLPs and 19% of ENTs included acoustic measures in their clinical practice (Figure 5). Only 27.27% of SLPs (n = 21/77) and 10.53% of ENTs (n = 2) always included these measures in their diagnostic assessment (Table 3). Aerodynamic measures were also frequently utilized in a diagnostic voice evaluation. Most (SLP = 56/77, 72.7%, ENT = 4/19, 21.1%) used non-instrumental judgments (e.g., maximum phonation time, MPT and S/Z ratio) (Eckel & Boone, 1981; Neiman & Edeson, 1981) more than instrumental aerodynamic assessment tools (e.g., Phonatory Aerodynamic System, PAS Model 6600) (Kay Pentax, 2023.) (SLP = 11/77, 14.3%, ENT = 0/19) (Table 3).

TABLE 3 Frequency of assessment use for clinical diagnostic assessment.

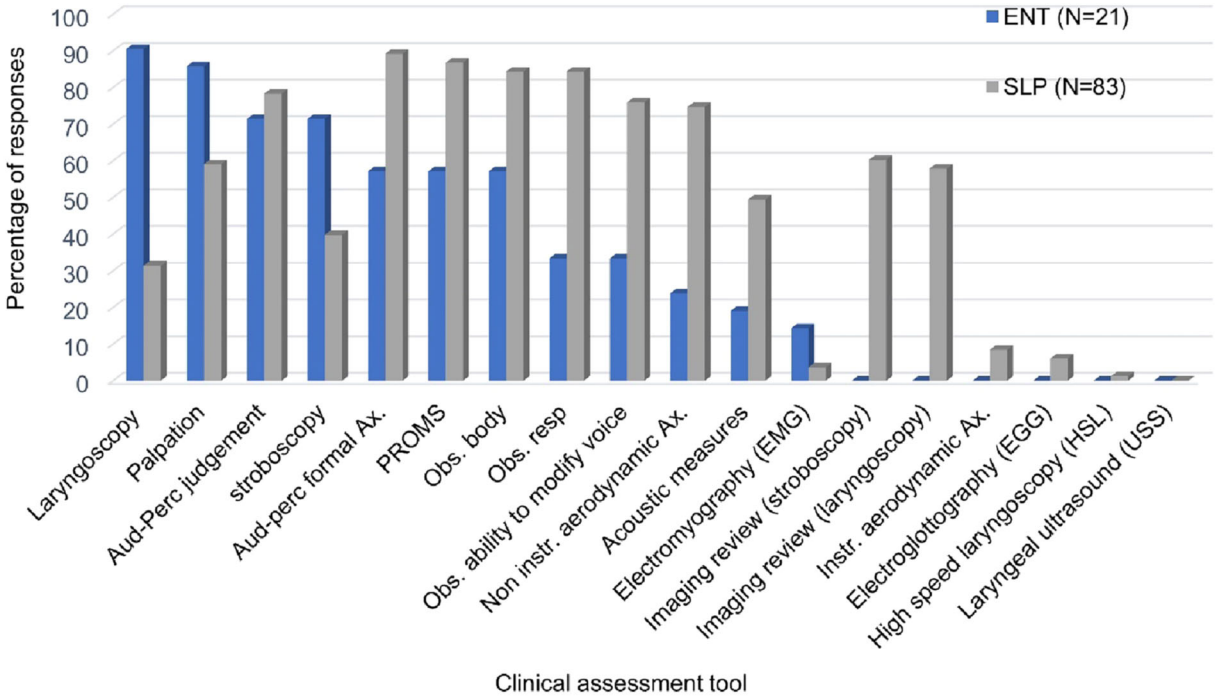
		ENT *N* = 19	SLP *N* = 77
Laryngoscopy	Always	17 (89.17%)	8 (10.39%)
	Sometimes	0	15 (19.48%)
	Never	0	0
Stroboscopy	Always	7 (36.84%)	28 (36.36%)
	Sometimes	5 (26.32%)	20 (25.97%)
	Never	1 (5.26%)	1 (1.30%)
SLP review of laryngoscopy imaging performed by the ENT	Always	–	23 (29.87%)
	Sometimes	–	19 (24.68%)
	Never	–	1 (1.30%)
SLP review of stroboscopy imaging performed by the ENT	Always	–	16 (20.78%)
	Sometimes	–	28 (36.36%)
	Never	–	1 (1.30%)
Informal auditory–perceptual judgement (e.g., mild, moderate, severe)	Always	13 (68.42%)	45 (58.44%)
	Sometimes	2 (10.53%)	11 (14.29%)
	Never	0	3 (3.90%)
Published auditory–perceptual rating (e.g., CAPE-V)	Always	8 (42.89%)	61 (79.22%)
	Sometimes	2 (10.53%)	5 (6.49%)
	Never	0	1 (1.30%)
Laryngeal/neck palpation	Always	11 (57.89%)	17 (22.08%)
	Sometimes	5 (26.32%)	25 (32.47%)
	Never	0	0
Acoustic assessment	Always	2 (10.53%)	21 (27.27%)
	Sometimes	2 (10.53%)	16 (20.78%)
	Never	0	0
Non instrumental aerodynamic assessment (e.g., maximum phonation time)	Always	2 (10.53%	44 (57.14%)
	Sometimes	2 (10.53%)	12 (15.58%)
	Never	0	0
Instrumental aerodynamic assessment (e.g., PAS)	Always	0	6 (7.79%)
	Sometimes	0	5 (6.49%)
	Never	0	1 (1.30%)
Observation of body movement and position	Always	5 (26.32%)	50 (64.94%)
	Sometimes	5 (26.32%)	13 (16.88%)
	Never	0	0
Observation ability to modify voice	Always	2 (10.53%)	50 (64.94%)
	Sometimes	5 (26.32%)	13 (16.88%)
	Never	0	0
Observation of respiratory pattern	Always	1 (5.26%)	45 (58.44%)
	Sometimes	5 (26.32%)	19 (24.68%)
	Never	0	0
High-speed laryngoscopy (HSL)	Always	0	0
	Sometimes	0	1 (1.30%)
	Never	0	0

(Continues)

TABLE 3 (Continued)

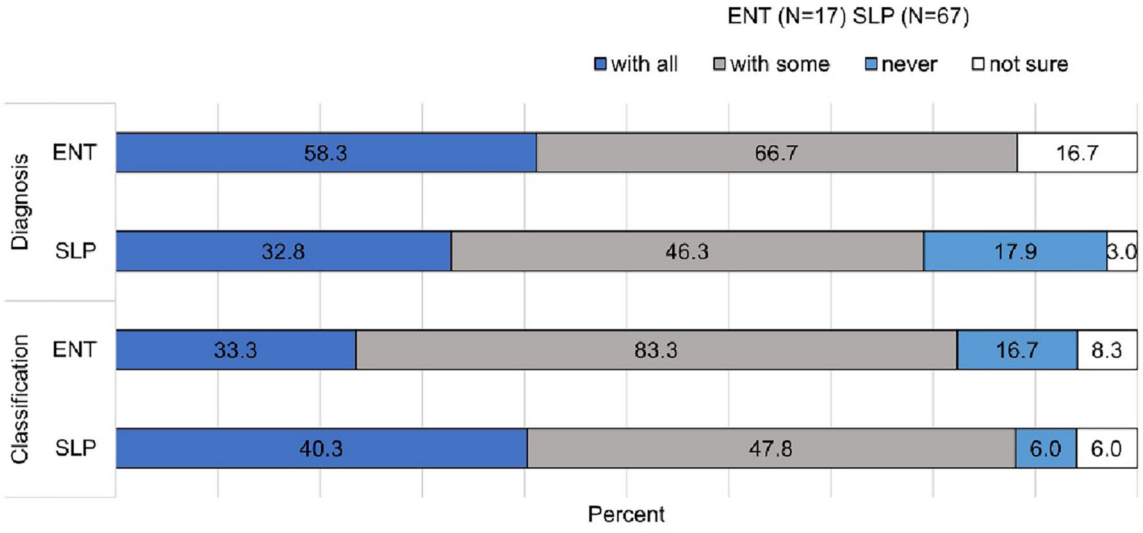
		ENT $N = 19$	SLP $N = 77$
Electroglottography (EGG)	Always	0	3
	Sometimes	0	2 (2.60%)
	Never	0	0
Electromyography (EMG)	Always	0	0
	Sometimes	2 (10.53%)	2 (2.60%)
	Never	0	0
Laryngeal ultrasound (USS)	Always	0	0
	Sometimes	0	0
	Never	0	0

Note: ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist; CAPE-V = Consensus Auditory Perceptual Evaluation of Voice (Kempster et al., 2009); Observation ability to modify voice = observation of the person's ability to modify the voice to direction (voice therapy stimulability testing); PAS = Phonatory Aerodynamic System.



Note. ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist;
SLP = Speech-Language Pathologist;
Palpation = laryngeal or neck palpation;
Aud-perc judgement = informal auditory perceptual judgement (e.g., mild, moderate, severe);
Aud-perc formal Ax. = formal auditory perceptual rating (e.g., CAPE-V);
PROMS = patient reported outcome measures;
Obs. body = observation of body movement & position;
Obs. resp = observation of respiratory pattern;
Obs. ability to modify voice = observation of persons ability to modify the voice to direction (voice therapy stimulability testing);
Non instr. aerodynamic Ax. = non instrumental aerodynamic assessment (e.g., MPT);
Imaging review (stroboscopy) = SLP review of stroboscopy imaging performed by ENT;
Imaging review (laryngoscopy) = SLP review of laryngoscopy imaging performed by ENT;
Instr. aerodynamic Ax. = instrumental aerodynamic assessment (e.g., PAS);

FIGURE 5 Utility of assessments for initial diagnostic evaluation of voice.



Note. Respondents were able to select more than one option; ENT=Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP=Speech-Language Pathologist.

FIGURE 6 Respondents' preferences to use a classification system or aim for specific diagnosis during diagnostic assessment work-up.

Participants used a range of subjective assessments as part of an initial voice evaluation, including laryngeal/neck palpation (ENT = 16/19, 84.21%; SLP = 42/77, 54.54%), observations of body movement/position (ENT = 10/19, 52.63%; SLP = 63/77, 81.81%) and observation of respiratory patterns (ENT = 6/19, 31.57%; SLP = 64/77, 83.11%). Furthermore, 74.02% of SLPs (n = 57/77) and 36.84% of ENTs (n = 7/19) reported they would sometimes or always observe a person's ability to modify the voice in response to verbal direction and/or modelling.

PROMS were included by many respondents in their initial diagnostic evaluation of VD (Figure 5). Supplementary File 3 in the Supporting Information section contains a comprehensive list of PROMS used by respondents. Those most frequently used with all patients were the voice handicap index 10 (VHI-10), voice handicap index (VHI-30) and the reflux symptom index (RSI) (Belafsky et al., 2002; Jacobson et al., 1997; Rosen et al., 2004).

Perceived value of clinical assessment tools and practices

During their provisional diagnostic work-up of VD clinicians indicated they used both a classification approach and aimed to identify a specific diagnosis. ENTs were more likely give a specific diagnosis, whereas SLPs most frequently favoured a classification approach (Figure 6). Less than half reported being aware of any of the eight published classification frameworks identified in a recent scoping review (Payten et al., 2022). However, when clinicians were aware of the frameworks, they frequently used multiple frameworks in combination to guide their diagnostic evaluation, rather than preferencing one over another.

Respondents were asked to rank assessments tools they use in order of perceived importance in the diagnostic evaluation and differential diagnosis of four voice classification groups; functional neurological (psychogenic) voice disorder (FVD); muscle tension voice disorder (MTVD), organic voice disorder of structural, trauma, inflammatory aetiology (OVD); and neuromuscular voice disorder (NVD). The survey included definitions and classification criteria for these VDs as outlined in a recent scoping review (Payten et al., 2022).

Case history was most frequently selected as the top-ranking assessment by the ENTs for MTVD (mean = 1.47, n = 15/16), FVD (mean = 1.50, n = 16/16) and OVD (mean = 1.56, n = 16/16) (Table 5). ENTs ranked videostroboscopy higher than laryngoscopy only for MTVD (mean = 2.38, n = 8/16). SLPs ranked videostroboscopy as the most important assessment tool for OVDs (mean = 1.71, n = 41/53) and preferred case history over other assessment tools for FVD (mean = 1.96, n = 52/53), and MTVD (mean = 2.44, n = 52/53) (Table 4).

A total of 69 clinicians (ENT = 16/2, SLPs = 53/88) responded to the question when working in a multidisciplinary context: 'What weighting (%) do you think each profession contributes to classification of each of these disorders (ENT, SLP or Other e.g., neurologist)?' The majority estimated almost equal weighting for MTVD (ENT, mean = 44.49%, SD = 22.90; SLP, mean = 53.54%, SD = 22.47) and FVD (ENT, mean = 39.96%, SD = 24.07, SLP, mean = 55.51%, SD = 23.64). Weighting of

TABLE 4 Respondents' preference for assessment type for each voice disorder (VD) classification type by profession.

	Muscle tension voice disorder (MTVD)n				Functional neurological voice disorder (FVD)			
	ENT ($N = 16$)	**Mean rank**	**SLP ($N = 53$)**	**Mean rank**	**ENT ($N = 16$)**	**Mean rank**	**SLP ($N = 53$)**	**Mean rank**
1	Case history	1.47 ($n = 15$)	HSL	2.0 ($n = 1$)	Case history	1.5 ($n = 16$)	Case history	1.96 ($n = 52$)
2	Stroboscopy	2.38 ($n = 8$)	Case history	2.44 ($n = 52$)	Laryngoscopy	2.17 ($n = 12$)	Stroboscopy	3 ($n = 29$)
3	Laryngoscopy	2.4 ($n = 10$)	Stroboscopy	2.45 ($n = 31$)	Aud.-perc. Ax.	2.71 ($n = 7$)	Aud.-perc. Ax.	3.17 ($n = 42$)
4	Palpation	3.2 ($n = 10$	Laryngoscopy	3.56 ($n = 46$)	Aerodynamic Ax.	3.0 ($n = 1$)	Laryngoscopy	3.33 ($n = 21$)
5	Aud.-perc. Ax.	3.43 ($n = 7$)	Aud.-perc. Ax.	3.63 ($n = 46$)	Stroboscopy	3.17 ($n = 6$)	Voice stimulability	3.39 ($n = 33$)
6	Voice stimulability	4.25 ($n = 4$)	Voice stimulability	4.53 ($n = 32$)	Obs. resp.	3.5 ($n = 2$)	PROMS	4.13 ($n = 32$)
7	PROMS	5.67 ($n = 6$)	Obs. body	4.74 ($n = 38$)	PROMS	4.0 ($n = 6$)	Obs. body	5 ($n = 24$)
8	Obs. resp.	5.67 ($n = 3$)	Palpation	4.97 ($n = 29$)	Voice stimulability	4.5 ($n = 2$)	Obs. resp.	5.19 ($n = 21$)
9	Obs. body	6.17 ($n = 6$)	Obs. resp.	5.19 ($n = 31$)	Obs. body	4.8 ($n = 5$)	Acoustic	5.27 ($n = 11$)
10	Aerodynamic Ax.	7.0 ($n = 1$)	Acoustic	5.5 ($n = 16$)	Palpation	5.5 ($n = 2$)	Palpation	5.75 ($n = 12$)
11	Acoustic	7.5 ($n = 2$)	Aerodynamic Ax.	5.65 ($n = 17$)	HSL	0	Aerodynamic Ax.	6 ($n = 15$)
12	EMG (EMG)	8.0 ($n = 1$)	PROMS	5.81 ($n = 32$)	Acoustic	0	EGG	8 ($n = 1$)
13	HSL	0	EGG	9.0 ($n = 2$)	EGG	0	HSL	0
14	EGG	0	EMG	0	EMG	0	EMG	0
15	USS	0	USS	0	USS	0	USS	0

(Continues)

TABLE 4 (Continued)

	Organic VD (structural/inflammation)				Neuromuscular VD			
	ENT (*N* = 16)	**Mean rank**	**SLP (*N* = 53)**	**Mean rank**	**ENT (*N* = 16)**	**Mean rank**	**SLP (*N* = 53)**	**Mean rank**
1	Case history	1.56 (*n* = 16)	Videostroboscopy	1.71 (*n* = 41)	Case history	1.5 (*n* = 16)	Case history	2.25 (*n* = 48)
2	Laryngoscopy	2 (*n* = 13)	Laryngoscopy	2.12 (*n* = 26)	Laryngoscopy	2.33 (*n* = 16)	Stroboscopy	2.32 (*n* = 31)
3	stroboscopy	2.25 (*n* = 8)	Case history	2.59 (*n* = 46)	Aud.-perc. Ax.	2.75 (*n* = 12)	Laryngoscopy	3 (*n* = 27)
4	Aud.-perc. Ax.	3.38 (*n* = 8)	Aud.-perc. Ax.	3.16 (*n* = 44)	Stroboscopy	2.8 (*n* = 5)	Aud.-perc. Ax.	3.09 (*n* = 45)
5	PROMS	3.8 (*n* = 5)	Acoustic	4.44 (*n* = 16)	Acoustic	3.5 (*n* = 2)	EMG	3.5 (*n* = 2)
6	Palpation	3.8 (*n* = 5)	EGG	4.5 (*n* = 2)	Palpation	4.33 (*n* = 3)	Acoustic	4.11 (*n* = 18)
7	Acoustic	5 (*n* = 1)	PROMS	4.96 (*n* = 23)	PROMS	4.75 (*n* = 4)	Voice stimulability	4.44 (*n* = 27)
8	EMG	6 (*n* = 1)	Aerodynamic Ax.	5 (*n* = 18)	Obs. body	5 (*n* = 4)	Obs. body	4.59 (*n* = 22)
9	Obs. body	6.5 (*n* = 2)	Obs. resp.	5.25 (*n* = 16)	EMG	5 (*n* = 1)	PROMS	4.72 (*n* = 25)
10	HSL	0	Obs. body	5.29 (*n* = 14)	Obs. resp.	6 (*n* = 1)	Aerodynamic Ax.	5 (*n* = 17)
11	Aerodynamic Ax.	0	Palpation	5.67 (*n* = 9)	Aerodynamic Ax.	7 (*n* = 1)	Obs. resp.	5.39 (*n* = 23)
12	EGG	0	Voice stimulability	5.71 (*n* = 17)	Voice stimulability	7 (*n* = 1)	EGG	6.5 (*n* = 2)
13	Voice stimulability	0	HSL	0	HSL	0	Palpation	7 (*n* = 7)
14	Obs. resp.	0	EMG	0	EGG	0	HSL	0
15	USS	0	USS	0	USS	0	USS	0

Note: Respondents were asked to rank each assessment in order of preference (1–15) for each VD classification type (e.g., 1 = most preferred, 15 = least preferred); ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose, and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist; HSL = high-speed laryngoscopy; Aud.-perc. Ax. = auditory perceptual assessment; Aerodynamic Ax. = aerodynamic assessment; voice stimulability = observation of the person's ability to modify the voice to direction (voice therapy stimulability testing); Obs. resp. = observation of respiratory pattern; PROMS = patient-reported outcome measures; Obs. body = observation of body movement and position; Palpation = laryngeal or neck palpation; EMG = electromyography; EGG = electroglottography; USS = laryngeal ultrasound.

TABLE 5 Respondents' estimated weighting (%) of each profession's contribution to the classification of voice disorders (VDs).

VD classification		ENT ($N = 16$)		SLP ($N = 53$)	
		Mean	**(SD)**	**Mean**	**(SD)**
MTVD	ENT	48.75	(21.86)	43.21	(23.25)
	SLP	48.75	(21.87)	54.98	(22.65)
	Other (e.g., neurologist)	2.50	(10.00)	1.81	(7.14)
FVD	ENT	54.56	(17.62)	35.55	(24.14)
	SLP	42.50	(17.10)	59.43	(23.93)
	Other (e.g., neurologist)	2.94	(8.13	5.02	(8.87)
OVD	ENT	77.81	(12.78)	73.40	(18.00)
	SLP	21.25	(12.71)	25.64	(17.86)
	Other (e.g., neurologist)	0.94	(2.72)	0.96	(4.05)
NVD	ENT	46.50	(23.18)	42.08	(18.56)
	SLP	35.19	(20.30)	32.45	(16.34)
	Other (e.g., neurologist)	18.31	(22.98)	25.47	(20.03)

Note: MTVD = muscle tension voice disorder; FVD = functional neurological (psychogenic) voice disorder; OVD = organic voice disorder of structural, trauma, inflammatory aetiology; NVD = neuromuscular voice disorder; ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist.

assessment favoured ENT for OVD (mean = 74.42%, SD = 16.95) and NVD (ENT, mean = 43.10%, SD = 19.64, SLP, mean = 33.09%, SD = 17.21) (Table 5).

Most SLPs considered an ENT assessment prior to completing their voice evaluation was essential (n = 47/86, 54.65%) or desirable (n = 13/86, 15.12%), whereas 22.09% (n = 19/86) considered this to be case dependent and 2.33% (n = 2) reported ENT assessment was not required (see Supplementary File 4 in the Supporting Information section).

ENTs were most likely to refer patients to SLP for assessment to assist with diagnosis for a dysphonia of uncertain aetiology with no lesions and no paralysis/paresis, and for a range of other disorders outlined in Supplementary File 5 in the Supporting Information section.

Clinical practice in line with recommended protocols

A total of 71 respondents (n = 95, 74.74%) reported being aware of at least one of the published clinical practice guidelines or recommended protocols on evaluation of VD, of which 74.65% (n = 53/71) reported they used these to guide their initial assessment (see Supplementary File 6 in the Supporting Information section).

Recording practices and acoustic measures

A total of 61% of respondents routinely collected an audio recording during initial diagnostic voice evaluation (Table 6). Most recorded a sustained vowel (n = 48/56, 85.71%) and short reading passage (n = 44/56, 78.57%). The most frequently reported recording equipment was acoustic software package (n = 25/56), using a device in-built microphone (n = 32/50, 58%). Only 30% (n = 15/50) used a head-mounted microphone in line with the current recommended guidance (Patel et al., 2018).

Respondents who used acoustic measures in their diagnostic voice assessment reported that they record a range of measures (Table 7). Most collected frequency measures of mean speaking fundamental frequency (F^0) (n = 33/43, 76.74%), pitch (F^0) range (n = 33/43, 76.74%) and jitter (n = 30/43, 69.77%). Fewer respondents included harmonics-to-noise ratio (HNR) (n = 26/43, 60.47%) and smoothed cepstral peak prominence CPPS (n = 14/43, 32.56%). When asked what factors are most important to consider when making a voice recording, respondents reported eliciting speech samples representative of the patients speaking voice, microphone quality and microphone placement as very important factors. The quality of equipment, ambient noise, recording level and sampling rate were rated on average moderately important by the respondents to the survey.

Professional and geographical differences

A sub-analysis of geographical differences to survey responses about availability of clinical assessment pathways, access to equipment and utilization of assessment tools according to location of practice is presented in Supplementary File 7 in the Supporting Information section.

All assessment pathways were reported in all regions of the world and equally across metropolitan, regional and

TABLE 6 Audio recording practices of the survey participants.

	ENT *N* = 6	SLP *N* = 50
Voice recording equipment		
Digital audio tape (DAT) recorder	0	2 (4%)
Digital voice recorder (e.g., Dictaphone, MP3)	0	10 (20%)
Directly on your PC/Mac or laptop	2 (33.33%)	18 (36%)
External digital sound card connected to your PC/Mac or laptop	0	7 (14%)
Within an acoustic analysis package (e.g., VisiPitch, LingWAVES)	2 (33.33%)	24 (48%)
Mobile phone	2 (33.33%)	22 (44%)
Other	1 (16.66%)[a]	2 (4%)[b]
Microphone type		
Hand-held	2 (33.33%)	13 (26%)
Head mounted	2 (33.33%)	15 (30%)
Device built in	3 (50%)	29 (58%)
Lapel mic	2 (33.33%)	4 (8%)
Other	0	4 (8%)[c]
Recording samples		
Sustained 'ah'	4 (66.66%)	44 (88%)
Short reading passage	3 (50%)	41 (82%)
Spontaneous speech	4 (66.66%)	39 (78%)
Pitch range	1 (16.66%)	35 (70%)
Dynamic range	1 (16.66%)	29 (58%)
Sing	1 (16.66%)	15 (30%)
Phonemically loaded phrases	0	27 (54%)
Vowel onset phrases	1 (16.66%)	14 (28%)
Other	1 (16.66%)	8 (16%)[d]

Notes: Respondents could select more than once response. Free-text responses were edited for brevity and spelling. ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist.

[a]videostroboscopy tape recording

[b]tablet, patient home recording

[c]LingWAVES = microphone on a stand. The one I have for my acoustic analysis software has a folding ruler attached at the front so the client can maintain the correct distance.

[d]Counting 1–15, counting 1–10 in the local language, abc's, sustained /i:/, tasks as required, e.g., tremor versus spasmodic dysphonia, trial of therapy techniques.

rural locations. More European ENTs and SLPs reported they definitely or probably have access to all the assessments they needed, although fewer European ENTs used videostroboscopy in their diagnostic assessment. More European SLPs performed laryngoscopy and videostroboscopy, and SLPs in America and Canada were more likely to use acoustic measures and instrumental aerodynamic measures than SLPs in other geographical locations. Furthermore, SLPs were more likely to perform laryngoscopy with or without stroboscopy if they worked in a public hospital out-patient setting (n = 25/50, 50%), government funded community service (n = 3/6, 50%) or teaching and academic clinical practice (n = 9/21, 42.86%) (Table 8).

DISCUSSION

This cross-sectional multidisciplinary international survey examined common practice patterns of participating ENTs and SLPs from 18 countries with a focus on diagnostic assessment of VDs. Our findings extend previous knowledge through providing insight into the multidisciplinary assessment practices of participating clinicians on referral and assessment pathways, and their preferred utility of assessments in the diagnostic evaluation process. Survey respondents were considered a representative sample of clinicians when compared with similar cohorts described in prior studies (Behrman, 2005; Cohen et al., 2012; Kenny, 2017; McAlister & Yanushevskaya, 2020).

TABLE 7 Types of acoustic measures recorded by respondents.

	ENT *N* = 4	SLP *N* = 39
Mean fundamental frequency (F^0)	3 (75%)	33 (84.92%)
Fundamental frequency (F^0) range	3 (75%)	33 (84.62%)
Mean speaking intensity	1 (25%)	16 (41.03%)
Dynamic range	2 (50%)	18 (46.15%)
Jitter	3 (75%)	30 (76.92%)
Shimmer	3 (75%)	28 (71.92%)
Harmonics-to-noise ratio (HNR)	3 (75%)	26 (66.67%)
Smoothed cepstral peak prominence (CPPS)	1 (25%)	14 (35.90%)
Acoustic voice quality index (AVQI)	0	8 (20.51%)
Dysphonia severity index (DSI)	0	10 (25.64%)
Cepstral spectral index of dysphonia (CSID)	1 (25%)	9 (23.08%)
Other	0	7 (17.95%)
Free-text responses		Nasalance oral pressure intensity; nasal pressure intensity; standard deviation of mean speaking frequency; voice breaks; Multi-dimensional voice profile (MDVP, Kay Elemetrics Corporation, Lincoln Park, New Jersey, USA); soft phonation index; degree or # of subharmonics (if relevant, high); sound pressure level (SPL); peak amplitude variation (vAM); fundamental frequency variability (vF0), voice turbulence index (VTI)

Note: Respondents could select more than once response. Free-text responses were edited for brevity and spelling. ENT = Otolaryngologist Head and Neck Surgeon (Ear, Nose and Throat Surgeon) including Laryngologist; SLP = Speech–Language Pathologist.

TABLE 8 Speech–language pathologists (SLPs) performing laryngoscopy and/or stroboscopy according to the location of the clinical practice.

	N
Public hospital outpatients (*N* = 50)	25 (50%)
Government-funded community service (*N* = 6)	3 (50%)
Teaching/academic clinical practice (*N* = 21)	9 (42.86%)
Public hospital in-patients (*N* = 19)	7 (36.84%)
Group private practice (multidisciplinary) (*N* = 12)	5 (22.22%)
Solo private practice (*N* = 13)	2 (15.38%)
Group private practice (uni-disciplinary) (*N* = 9)	2 (41.67%)
Private hospital outpatients (*N* = 12)	2 (16.67%)
Private hospital inpatients (*N* = 7)	0

Key findings

Study findings suggest clinicians work within the recommended multidisciplinary framework incorporating both ENT and SLP assessments to aid diagnosis and may prioritize the value/contribution of SLP or ENT assessment according to the VD classification. Additionally, findings demonstrate clinicians follow recommended clinical guidelines for a multidimensional assessment approach using a range of assessments to inform differential diagnosis, with a preference of case history, laryngeal visualization, laryngeal/neck palpation and auditory–perceptual judgements (Speech Pathology Australia, 2019; Stachler et al., 2018; Umeno et al., 2020). However, we found a divergence in clinical practice to published guidelines in the use of standardized assessment protocols including formal auditory–perceptual evaluation, videostroboscopic laryngeal imaging of vocal fold vibratory characteristics, voice recording practices, acoustic and aerodynamic measures (Dejonckere et al., 2001; Lechien et al., 2023; Patel et al., 2018; Stachler et al., 2018; Umeno et al., 2020).

Diagnostic assessment pathways

The interdisciplinary clinic model with ENT, SLP and other professional groups is often cited as the preferred assessment pathway to improve diagnostic accuracy and treatment compliance (Cohen et al., 2014; Flock et al., 2023; Stachler et al., 2018). Respondents reported this assessment pathway was rarely available for all people with VD in their practice; most recorded greater access to an ENT-led approach. Additionally, more than half the respondents reported SLP-initiated assessment path-

ways were also available for some people with VD in their practice. These findings demonstrate a possible shift in practice to the recommended guidance, perhaps due to resource and service implications (Hess et al., 2020). With the need to provide cost-effective healthcare, the interdisciplinary model may be considered expensive when not all VDs require management from both ENT and SLP (Productivity Commission, 2015; Cohen et al., 2012b). Over the last decade, SLP-led pathways have been described as an alternative to the medical-led evaluation, including multidimensional assessments with reduced wait times and safe cost-effective healthcare delivery (Butler et al., 2023; Schwarz et al., 2022; Payten et al., 2020). Further research, and careful selection at point of triage is needed to determine which patients will most benefit from a unidisciplinary-led and interdisciplinary assessment model, and then translate into clinical guidelines.

Regardless of assessment pathway, survey respondents valued the multidisciplinary assessment approach. Most SLPs considered ENT assessment prior to SLP evaluation important, whilst ENTs recognized the value of referral to SLPs across different VD types. These results are comparable with prior studies in the United States (Cohen et al., 2012). Building on this research, the current survey findings highlight patterns in how clinicians may perceive working partnerships during the diagnostic assessment process. On average, respondents gave equal weighting to ENT and SLP involvement in the diagnosis of MTVD or FVD, and greater emphasis for ENT assessment for OVD. This suggests clinicians have a common understanding that each profession offers unique perspectives that inform the diagnosis of different cohorts of presenting VD classifications.

Utility and preferences of clinical assessment tools

Over half the survey respondents reported using published protocols to guide their initial assessment and used a range of assessments for voice evaluation in line with these guidelines. Respondents from all professional groups selected case history most frequently as the first-choice assessment tool for diagnosis across most VD types. This finding supports a commonly held view that a detailed voice history is essential to guide the diagnostic process of VD (Sataloff et al., 2007). Several guidelines recommend gathering a history as part of a voice evaluation (Speech Pathology Australia, 2019; Stachler et al., 2018; Umeno et al., 2020). When combined with auditory–perceptual measures a medical history can accurately predict patient diagnosis and urgency for ENT assessment (Fujiki et al., 2022). However, there is currently no agreed standardized approach to obtaining a voice case history (Krosch et al., 2022).

It should be noted that survey respondents were asked to reflect on their assessment practices with prior knowledge of the voice classification, and this may not replicate the real-world practices where typically the diagnosis prior to assessment is unknown. Therefore, research is needed to understand the decision-making processes of clinicians and their utilization of assessment tools for differential diagnosis of VD. However, our findings suggest clinicians may use case history information to possibly hypothesize a potential diagnosis and then select the required tools to guide subsequent decision making, rather than following a standard battery of assessments to reach a diagnosis. Therefore, these findings support the conclusions of a recent scoping review for the need for high quality research to develop a standardized case history evaluation tool and core dataset to assist with VD diagnosis (Krosch et al., 2022).

Clinical practice against the recommended guidance and protocols

Our findings suggest a clear divergence between clinical practice and published recommended assessment protocols aimed to standardize practice. Examples of variations include the routine use of videostroboscopy, instrumental acoustic and aerodynamic measures, published auditory–perceptual measurement tools and standardized audio sample collection procedures. Whilst we anticipated possible geographical differences in practice, inadequate sampling across geographical regions meant no patterns could be determined from the data.

Videostroboscopy is highly recommended as part of a comprehensive assessment of laryngeal function to improve diagnostic accuracy (Dejonckere et al., 2001; Lechien et al., 2023; Stachler et al., 2018; Umeno et al., 2020). Only 63% of ENTs reported they routinely used videostroboscopy for initial diagnostic evaluation, 50% of SLPs reviewed ENT imaging, and 61% of SLPs performed videostroboscopy in their initial assessment. This demonstrates poor compliance with recommended guidance but also a slight shift in practice when compared with prior studies. Cohen et al. reported in an American study that 5% of ENTs used videostroboscopy for laryngeal examination and 16.9% did not perform or obtain videostroboscopy (Cohen et al., 2012). Similarly, McAlister reported only 9.1% of SLPs in Ireland performed videostroboscopy, and 21.2% routinely evaluated ENT imaging results (McAlister & Yanushevskaya, 2020).

Most respondents listed Auditory–perceptual voice evaluation as a priority in their initial assessment, but many

relied on non-published assessment tools, and around half reported they did not routinely record a voice sample. Auditory–perceptual evaluation is considered an essential part of voice evaluation to differentiate normal from disordered voice. It can be correlated with underlying pathophysiology and used to track changes over time (Kempster et al., 2009). There is no single recognized method of obtaining reliable and valid auditory–perceptual judgements of the voice, however guidelines recommend a number of principles to maximize objectivity and improve reliability (Dejonckere et al., 2001). These include standard recording practices, use of published tools, standardized terminology and standardized assessment samples to evaluate different elements of the vocal signal. Survey Findings suggest a large variation in assessment practices and divergence from the published protocols with respect to recording and auditory–perceptual voice evaluation. This has implications for clinical practice as informal measures and non-standardized terminology can reduce the reliability and validity of this measurement tool (Kempster et al., 2009). Additionally, responses demonstrated a noticeable deviation to the guidelines with respect to the use of acoustic and instrumental aerodynamic assessments. Only around 50% of respondents routinely collected acoustic measures as part of an initial voice evaluation and inconsistencies with published protocols on equipment, collected voice samples, and types of measures were reported.

Findings from a systematic review on evidenced based voice assessment (2013) demonstrated acoustic and aerodynamic assessments had the potential for informing differential diagnosis of VD, however heterogenous reporting of methodology and measurement reliability confounded any conclusions that could be drawn (Roy et al., 2013). Consequently, The American Speech–Language–Hearing Association (ASHA) SIG-3 group published the recommended protocols for instrumental assessment of vocal function to address the practice variation (Patel et al., 2018). Similar protocols are documented in Europe and Australia, respectively (Lechien et al., 2023; Speech Pathology Australia, 2019). Our findings suggest very few respondents are meeting these minimum standards for voice evaluation in their clinical practice a decade later.

The present survey did not aim to explore barriers to clinicians following the recommended guidelines and further research is required to explore this. The ASHA SIG-3 recently conducted an online community discussion of 70 SLPs in the United States to explore barriers and facilitators in the practical implementation of the recommended vocal function (acoustic and aerodynamic) measures, in accordance with the published protocols produced in 2018 (Estes & Johnson, 2023). They reported several barriers in adherence to the published protocols including differences in clinical models, accessible equipment, time constraints, testing environments and clinician opinions. Facilitators included a need for further education, discussion on assessment tool implementation in different clinical models, synthesis of assessment findings relevant to the evaluation process and specific situations.

Strengths and limitations

This study successfully recruited ENTs and SLPs from a range of countries and practice locations to explore current patterns in the assessment and diagnosis of VDs, allowing comparison with the current published guidelines and previous research. This is the first study, to our knowledge, to explore both ENT and SLP practice patterns and opinions concurrently, and therefore serves a suitable snapshot of the current clinical practices.

This study focused on the practice patterns of ENTs and SLPs in their diagnostic assessment approaches. These professional groups were chosen because of their recognized expertise in an MDT evaluation of voice according to the best-practice guidelines. Additionally, this has allowed for comparison with previous survey studies exploring voice assessment practices. It is recognized that other professions (e.g., psychologists) may provide valuable contribution to assessment for many cohorts of VDs (Aldridge-Waddon et al., 2023). Future studies focusing on the contribution of these professions to a diagnostic assessment of voice would be a valuable next step.

The sample size for SLP respondents was comparable with previous studies, however ENT responses were significantly lower than anticipated. Statistical analysis comparing respondents geographically was not completed due to the low sample size from many countries outside of the United States, UK and Australia. It is possible the authors' known profession, location and research interests may have introduced a potential researcher bias to our study.

There was a complete lack of survey responses from ENTs in the United States which further impacted any conclusions that could be drawn from this data. One possible reason for this low response rate from ENTs could be the length of questionnaire (48 items), which can influence participant interest (Lefever et al., 2007). The survey length may also have implications for data reliability, given fewer responses were received from both ENTs and SLPs in the final section of this survey. Attempts to account for this were made in the design of the survey by adding a stop and save option and providing a progress bar. Certain questions in sections 3 and 4 of the survey may be seen as linguistically complex and could have contributed to incomplete responses, especially when

participants were from diverse geographical contexts. During the design of the survey, care was taken to ensure questions where clear, concise and easy to decipher. Where potentially unfamiliar terms were used (e.g., VD classification terminology), explanations were provided, and bold/italic text was used to help with readability. The survey instrument was piloted on both SLPs and ENTs from different cultural backgrounds (Australia, the UK and Vietnam) to obtain feedback on readability, time to complete and interest, no concerns were reported on any account.

A thorough sub-analysis of the response data comparing clinicians across work locations (e.g., private, public and academic) could not be completed due to the response options provided for these questions. Respondents were able to select more than one category to this question, therefore sub-analysis of this data comparing clinical practices would not have been reliable. Future studies should consider this during the instrument development phase as this will have implications for future training and skill development.

CONCLUSIONS

This study provides important insights to the current multidisciplinary practice patterns of ENTs and SLPs in the assessment of adults with VDs and the utilization of clinical assessment tools. Clinicians see patients with VDs across different assessment pathways, value a multidisciplinary approach, and prioritize diagnostic assessment tools differently according to the classification of VD. The most frequently reported assessment pathway is where the ENT initiates the evaluation, whilst interdisciplinary assessment clinics are less frequently available and SLP initiated pathways also exist globally. Clinicians overwhelmingly valued case history, in addition to laryngoscopy and auditory–perceptual evaluations, as important tools to assist with the diagnosis of VDs for most disorder types. However, clinicians may not always adhere to the published recommended protocols designed to standardize clinical and research practice when collecting assessment data. This included the use of published auditory–perceptual measures, robust and calibrated audio recording practices, videostroboscopy and the use of instrumental procedures such as acoustic and instrumental aerodynamic measures. Future high-quality research may focus on testing the validity of the most frequently selected assessment tools for diagnosis of different VD classification types and the decision-making process of clinicians when selecting these tools. Additionally, future studies are needed to identify barriers to why clinicians are not following the recommended protocols for standardized practice. Implications for clinical practice may include streamlining assessment pathways that are defined according to the presenting conditions instead of recommending a one size fits all approach.

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CONFLICT OF INTEREST STATEMENT

The authors declare there are no conflicts of interest.

DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the authors upon request.

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SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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