Assessment practices of Irish speech and language therapists in the evaluation of voice disorders

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ABSTRACT
It is commonly accepted that the evaluation of voice disorders ought to include extensive perceptual, psychometric, and instrumental measurements. This serves to encapsulate the wide-reaching effects of such a disorder, from the physical impairment in voice production to the psycho-social impact of having a dysphonic voice. In spite of this, no international gold standard exists by which voice disorders should be evaluated, and so speech and language therapists (SLTs) are often tasked with developing an assessment battery for use in their own clinics. The purpose of this study is to determine whether the evaluation of voice disorders by Irish SLTs on a national scale is suitably comprehensive, with particular reference to the guidelines published by the European Laryngological Society. A total of 49 SLTs working in a variety of settings responded anonymously to an electronic survey regarding their assessment practices. Results indicate that therapists are comprehensive in non-instrumental evaluation of voice, but lack both access to and training in instrumental assessment techniques.

Introduction

Within the Irish health care system, patients with voice disorders are usually referred by an ear, nose, and throat (ENT) specialist to a speech and language therapist (SLT) for evaluation and management of their dysphonia, following diagnosis of a voice pathology. It then falls to the SLT comprehensively to assess the physical nature of the impairment, the perceptual effects of this on voice quality, and the impact of the dysphonia on the patient’s quality of life, before recommending an appropriate management plan based on findings.

Through this study, the assessments employed by Irish SLTs when evaluating dysphonia are explored, giving consideration to the fact that no national guidelines exist at the time of writing for clinical voice evaluation in Ireland. This is done partly to highlight current trends, but, moreover, to provide insight into whether routine voice evaluations are sufficiently robust and evidence-based. It should be noted that the assessment practices being evaluated here are confined specifically to clinicians working with (hyper-)functional voice disorders, muscle tension dysphonia, organic voice disorders, and psychogenic voice disorders. These terms were specifically chosen based on an existing classification system (1), as they reflect patients attending with voice disorders that are physiologic, psycho-social, and behavioural in nature. Head and neck cancer may require additional evaluation procedures, such as intelligibility and fluency measures (2).

While no single set of assessment techniques or protocols exist that are universally agreed upon (3,4), SLTs should nevertheless seek to establish an assessment battery that is as comprehensive, valid, and reliable as possible. This not only serves to allow reporting of severity or impact of voice disorders upon the client (5), but also enables the clinician to formulate treatment goals and efficacy measures (3,6). The use of a comprehensive voice assessment protocol also allows for better reporting of outcomes from voice interventions within the literature (2), and, perhaps more importantly, it allows SLTs to monitor ‘quality and variability in clinical provision’ and clinically to ‘examine effectiveness using appropriate outcome tools’ (7 p. 418). This in turn may also justify financial investment in efficacious speech and language therapy services (3).

The findings from the current study are informed by a survey issued to Irish SLTs (see Appendix, available online). Given the relatively large number of questions and potential responses within the survey, it would be difficult to provide an in-depth analysis of the evidence behind each assessment technique reported upon, nor indeed is this the focus of this paper, though brief comments are provided on the evidence for the techniques listed. Instead, figures are provided (see Results) on the degree of clinical use of various assessment techniques. This is useful, as it may benefit clinicians and researchers alike to identify which tools are most commonly used for reporting upon clinical findings for improved transferability and interpretation of findings, or ‘a common language for reporting data’ (3 p. 2). It may also be of benefit to educators to identify
areas where evidence-based practice is not well adhered to and to address this for future generations of clinicians. While the tendency to employ certain assessment techniques amongst SLTs has previously been examined in a similar study by Behrman (8), these are investigated in greater detail here, and this appears to be the first attempt to do so in the published literature.

In reviewing the assessment practices of the clinicians that participated in this study, it is important to note that no one tool or set of tools is being recommended over another. Behrman aptly stated that ‘most common practice does not equal best practice’ (8 p. 465), and this sentiment applies equally here. In fact, the study by Behrman (8) provides an interesting discussion on the assessment practices of therapists working with voice disorders and provides context for the current study.

In her study, Behrman reflects on how suitable assessment practices are required for appropriate goal-setting for therapy. She further discusses how assessment procedures employed by therapists ought to be diagnostically salient in terms of providing adequate ‘reliability, validity, appropriate normative data, and predictive value’ (8 p. 455) and that ‘the efficacy of voice therapy is strongly dependent on the efficacy of the speech pathologist’s evaluation’ (8 p. 468). Behrman’s study and the current study share similar goals in that both aim to identify the assessment practices used by therapists working with voice disorders, with consideration for the fact that more standardized and evidence-based practice ought to improve patient care and lead to better reporting of assessment findings.

Adhering to evidence-based practice in the assessment of dysphonia not only involves using appropriately validated tools, but also employing a sufficiently comprehensive battery of tools. This is done to ensure that the nature of the dysphonia is captured and that efficacy measures can be employed giving regard to the ‘multidimensional nature of voice’ (3 p. 42). In considering whether voice evaluation practices are comprehensive, the guidelines set out by Dejonckere et al. (2) on behalf of the European Laryngological Society are used here. According to the authors, these guidelines were originally intended to guide evaluation mainly for the purposes of reporting on and comparing results of assessment and intervention techniques, but they appear suitable for a comprehensive clinical evaluation. A similar, comprehensive set of guidelines have been published for paediatric populations (9,10), but these are not used here, as the current study relates to populations of dysphonic individuals from all age ranges.

Dejonckere et al. (2) acknowledge that vocal function is multidimensional but agree upon a minimum set of guidelines for voice evaluation. These include the use of: (1) perceptual measures exactly to define the features of the dysphonia, e.g. roughness/tremor/breathiness; (2) videostroboscopy to identify patterns of glottal closure, regularity/symmetry of vocal fold motion, and mucosal wave propagation; (3) acoustic measures non-invasively to establish changes in voice quality over time; 4) aerodynamic/efficiency measures to evaluate respiratory capacity for speech and efficiency of glottal airflow during phonation; and 5) subjective ratings by the patient to establish ‘the severity of disability/handicap in daily social and/or professional life’ (2 p. 80). The authors also suggest that in all assessment practices maximal objectivity in measurement ought to be sought to improve validity and reliability of data.

A further recommendation is that voice recordings be taken for each patient, especially for the purposes of using blinded ratings of voice quality. For this, they recommend using a digital recording system with a sampling frequency of 20,000 Hz with the microphone at 10 cm from the mouth and at an off-axis angle to the patient to reduce aerodynamic noise in the signal. Recordings are also recommended to be taken in a sound-treated room, or at the very least in a room with low ambient noise of <50 dB (2).

Since the recommendations for assessment provided by Dejonckere et al. (2) are being taken here to comprise a minimum set of criteria for a comprehensive assessment, a greater focus is given to the factors that may influence the use of these recommendations within this study. Specifically, consideration is given to the level of clinician experience, whether the clinician works in a dedicated voice service (or sees voice clients as part of a wider case-load), whether the clinician has a special interest in dysphonia, and the clinical setting within which the SLT works.

In considering SLT experience as a factor in how comprehensive an assessment is, little evidence exists to suggest whether this has an impact. While it is true that some attention has been given to how clinician experience and training influences the perception and rating of voice quality (11–17) and outcomes of stroboscopic evaluations (18,19), no prior studies have investigated in detail whether clinical experience influences the actual tendency to use these evaluation techniques in the first place. In fact, no known studies have been found to establish whether the use of validated perceptual rating scales for voice, use of voice samples, use of self-rating/impact scales, or the use of acoustic, aerodynamic, or stroboscopic assessment is impacted upon by clinical experience, personal interest in voice disorders, service delivery model, or clinical setting. These factors are therefore examined here using subgroup analysis. This differentiates this text from previous studies by reporting on whether SLTs use certain assessment techniques in the first place, rather than detailing the reliability, validity, and applicability of these techniques.

It was hypothesized at the outset of this study that those with a greater clinical interest in voice and those in a dedicated voice service may provide a more evidence-based and comprehensive assessment by virtue of these factors. Greater levels of clinical experience were also hypothesized to lead to a more comprehensive assessment. Given the typically higher level of instrumental assessment available in acute hospital settings and the investigative (rather than rehabilitative) nature of clinical services there, it was hypothesized that clinicians in acute hospitals would employ aerodynamic, acoustic, and stroboscopic evaluation techniques more so than would their counterparts in non-acute settings. Since these instrumental assessment techniques typically require additional post-graduate training and/or experience, subgroups were also asked to comment on self-perceived competency in the use of these techniques. It was hypothesized that those with a greater interest in voice, in a dedicated service, with greater...
experience, and in an acute hospital setting would have greater competency in the use of these techniques.

Materials

An electronic survey was created and made freely accessible. An electronic survey was chosen over a paper-based survey, as there is no record within the Irish health care system of the number of SLTs working with voice disorders and, therefore, it was impossible to identify a specific cohort to which to send the survey. The survey was piloted before launch with three experienced SLTs working within the author’s own speech and language therapy department. This was designed to evaluate readability and time to completion and to ensure that the question logic of the survey was accurate. Errors in logic were addressed, no changes were made for readability purposes, and the survey was found to take approximately 5 to 10 minutes to complete. It was anticipated that the short time to completion would improve response rates. The therapists who reviewed the survey did not participate in the final study.

Questions (and potential answers/choices) for the survey were chosen based primarily on a review of the literature, and a search was conducted for common assessment practices and tools employed by therapists. Broad search terms (such as: dysphonia, assessment, acoustic, instrumental, etc.) were used. Results were collated and assessment techniques reported in the literature were categorized by the author under the following headings: (1) Auditory-perceptual and subjective assessment techniques (e.g. perceptual rating scales and impact scales); (2) Objective assessment (e.g. acoustic software, nasometry); and (3) Case information-taking (e.g. medical history, social information). These formed the basis for the development of subsections of the survey.

As a clinical voice examination is complex in nature, it is difficult to determine whether published papers account for all assessment practices currently in use by therapists. The author wished to examine practices employed by therapists that may or may not be fully accounted for in the literature, and so a number of questions based on clinical experience and knowledge were included. In doing so, the author wished to identify not only whether the guidelines set out by Dejonckere et al. (2) are applied in clinical practice, but also whether other elements of assessment not identified these authors are routinely incorporated into practice.

Where responses to questions did not necessarily require a binary choice answer (e.g. yes/no), multiple response options were provided, and in most instances participants were given the option to include responses not offered in the survey (see Appendix, available online).

Methods

Recruitment

A recruitment e-mail was sent to three special interest groups (SIGs) in Ireland, namely the Voice SIG, Adult Acquired Communication Disorders SIG, and the Adult Dysphagia SIG. These were chosen as they have large membership numbers and members of these groups are more likely to encounter dysphonia as part of their case-load compared to other SIGs. At the time, no SIG existed which might specifically cover paediatric dysphonia. An advertisement for the survey was also posted on the website of the Irish Association of Speech and Language Therapists (IASLT), the professional body associated with SLTs in Ireland. A brief description of the purpose of the study and a link to the survey was included in both the e-mail and the advertisement.

No personally identifying information was gathered throughout the survey, ensuring anonymity for participants. Consent for participation was assumed by virtue of participants engaging with the survey. On the advice of the author’s local ethics board, ethical approval was not deemed necessary for the study, as it was considered an audit/service review.

Inclusion/exclusion criteria

An introductory page was presented to users, before the survey began. This explained the purpose of the study in detail, as well as inclusion and exclusion criteria. Therapists working on a full-time or part-time basis were included in the study. Student therapists, as well as those working on a voluntary basis were excluded from the study, as a lack of clinical experience and a lack of permanent institution from which to make reference (e.g. a hospital clinic) may have skewed results.

Subgroup analysis

Subgroup analyses are also presented in this study. Four groups were chosen for analysis as follows: those with a clinical interest in voice disorders versus those without; level of clinical experience in years (0–5, 6–10, 11+); whether the clinician providing voice assessment is in a dedicated voice service or sees voice clients as part of a wider case-load; and whether or not the service takes place in an acute hospital.

These subgroups were evaluated for their tendency to use: (1) validated perceptual voice rating scales; (2) voice samples; (3) self-rating/impact scales with patients; (4) aerodynamic instrumental and non-instrumental assessment; (5) acoustic instrumental assessment; (6) videostroboscopy; and also for (7) self-perceived competency in the use of instrumental techniques.

Results

Response rate

A total of 50 SLTs responded to the electronic survey. One participant did not complete the survey and so was excluded from the study. The reason for this participant not completing the survey was not captured. The total number of responses therefore included for analysis was n = 49. The survey was open for response for a 3-month period. A response rate for the survey is difficult to calculate, as there is no way to estimate the number of therapists that viewed the survey request from the IASLT website. In terms of the SIGs, there were a total of
222 members in the SIGs during the period the survey was open. This would correspond to a response rate of 22.5%, though it is also not known how many individuals were members of more than one SIG at once.

**Demographic information**

Respondents were asked to state how many years they have worked as an SLT, regardless of case-load. The mean value was 11.1 years, with a range of 0 (newly graduated) to 30 years and a median of 8 years, indicating a wide range of clinician experience.

Figure 1 indicates the variety of settings in which the respondents to the survey reported working, while Figure 2 indicates the population with whom participants reported working. Overlap in numbers indicates that some therapists are working in more than one environment simultaneously, and analysis of the data reveals that 19/49 participants (38.8%) fit this profile.

In terms of service provision, 42/49 (85.7%) of respondents stated that their service is not a dedicated voice service, but that voice-disordered patients are part of a wider case-load, while the remaining 7/49 (14.3%) work solely with voice.

Participants were asked to state whether voice disorders were a clinical interest of theirs; 18/49 (36.7%) responded ‘yes’, and 31/49 (63.3%) ‘no’.

**Case information-taking**

All participants reported that they routinely take a case history from their clients, though only 28/49 (57.1%) have access to medical records for their client, which suggests that therapists are reliant on their clients for medical information that may potentially affect their voice production.

Respondents indicated a consistently high level of information-taking around environmental and medical/surgical factors that may influence voice production, as indicated in Figure 3. A total of 47/49 (95.9%) of participants reported probing the client for significant events around the time of onset of voice difficulties. All respondents stated that they explore phono-traumatic behaviours, such as excessive throat clearing or shouting; 38/49 (77.6%) reported that they evaluate the client’s mood; 28/49 (57.1%) evaluate the client’s personality type; and 45/49 (91.8%) state that they evaluate their clients for the potential presence of reflux.

**Auditory-perceptual evaluation**

Following a review of the literature, the author chose 11 common auditory-perceptual evaluation tools and asked participants to state which (if any) were used. Participants were given the option to list any tools not included by the author. Results are given in Table I, with the GRBAS scale (20) being listed as the most common. Participants were given the opportunity to supply answers not offered within the survey, and one participant reported using The Voice Index (21), while another participant reported using a scale of their own creation. As such, 100% of participants use some form of auditory-perceptual evaluation when assessing patients clinically, though 10/49 (20.4%) do not use a validated scale.

Despite the relatively high use of the GRBAS scale and other formalized assessment tools, only 25/49 (51%) of respondents
indicated that they have had any training (formal or informal) in the use of those tools.

In terms of physical examination, only 23/49 (46.9%) of respondents palpate their patient’s laryngeal structures, including examining for signs of laryngeal tension. Of those respondents working in a dedicated voice service 86% ($n=6$) reported performing laryngeal palpation, while only 40% ($n=17$) working in a non-dedicated voice service did so, perhaps due to the training required to employ this technique (see Discussion). A total of 37/49 (75.5%) reported performing an examination of their client’s oral cavity, including oral-motor function.

Therapists also noted that they subjectively evaluate other features, both directly and indirectly related to voice production, including 39/49 (79.6%) evaluating speech rate, 47/49 (95.9%) evaluating respiratory patterns, 49/49 (100%) judging breath support and co-ordination for speech, 27/49 (55.1%) assessing for modal voice, 49/49 (100%) evaluating their client’s body posture/movement, and 45/49 (91.8%) assessing the client’s ability to alter voice production (pitch/loudness) in response to modelling.

As part of an overall assessment, 40/49 (81.6%) of respondents take a voice recording/sample from their clients, in compliance with the recommendations set out by Dejonckere et al. (2). Participants were asked during the course of the survey whether they use a standard piece of text to evaluate vocal function, and the ‘Grandfather Passage’ and the ‘Rainbow Passage’ were given by way of examples of such texts. Such a text was used by 43/49 (87.8%), and 48/49 (98%) reported evaluating vocal function based on conversational speech.

In terms of evaluating the client for their own perceptual impression of changes to sensation in their throat (e.g. feelings of tightness/dryness/irritability), all respondents indicate that they evaluate their clients in this regard.

**Psychometric evaluation**

Participants were asked to choose which self-rating/impact scales they use with their patients (Table II). The most commonly used impact scale was the Voice Handicap Index (22). Participants were again given the option of supplying answers not offered in the survey, and one participant reported using no scale, while one other reported using the Vocal Tract Discomfort Scale, part of the Laryngeal Manual Therapy approach (23).

**Objective and instrumental assessment**

The S/Z ratio (24) is used as a clinical tool by 44/49 (89.8%) of respondents, while the maximum phonation time (25) is used by 45/49 (91.8%).

The availability of specialized instrumental assessment to SLTs was reportedly poorer. Table III indicates which tools therapists reported having access to within their clinics. While no ‘None’ value was given as an option by the author in the survey, 11/49 (22.4%) respondents added a comment indicating that they have no access to instrumental assessment. Participants were then asked to list the instrumental tools they had access to outside of their department, such as

![Population Groups](image.png)
Figure 3. Environmental and medical/surgical information typically taken by therapists.

**Table I.** Perceptual rating scales used by SLTs.

| Perceptual rating scale                                      | n  | %   |
|-------------------------------------------------------------|----|-----|
| GRBAS                                                       | 39 | 79.6 |
| Own verbal descriptor (e.g. breathy/creaky)                  | 37 | 75.5 |
| Mild/moderate/severe scale                                   | 21 | 42.9 |
| Vocal Profile Analysis Scheme (VPA)                           | 10 | 20.4 |
| Consensus Auditory-Perceptual Evaluation of Voice (CAPE-V)   | 10 | 20.4 |
| Phonetic symbols (e.g. Voice Quality Symbols/VoQS)           | 3  | 6.1  |
| GRBASI                                                       | 2  | 4.1  |
| Quick Screen for Voice (QVS)                                 | 2  | 4.1  |
| The Voice Index                                              | 1  | 2    |
| Self-devised scale                                           | 1  | 2    |

Where no respondent chose a given option, it has been excluded from the table above.

**Table II.** Self-rating and impact scales used by patients/therapists.

| Self-rating/impact scale                                      | n  | %   |
|-------------------------------------------------------------|----|-----|
| Voice Handicap Index (VHI)                                   | 37 | 75.5 |
| Simple numerical scale (e.g. 1 to 10)                       | 31 | 63.3 |
| Verbal descriptor (e.g. mild/moderate/severe)                | 24 | 49   |
| Line bisection scale                                         | 14 | 28.6 |
| Voice-Related Quality of Life (VR-QoL)                       | 14 | 28.6 |
| Voice Symptom Scale (VoSS)                                   | 14 | 28.6 |
| Visual Analogue Self-Esteem Scale (VASES)                    | 12 | 24.5 |
| Voice Handicap Index-10 (VHI-10)                             | 7  | 14.3 |
| Paediatric Voice Handicap Index (pVHI)                       | 3  | 6.1  |
| Voice Activity and Participation Profile (VAPP)              | 1  | 2    |
| Vocal Tract Discomfort Scale                                 | 1  | 2    |
| None                                                        | 1  | 2    |

Where no respondent chose a given option, it has been excluded from the table above.

as by onward referral to a specialized centre (Table IV). As with the previous question, no option for ‘None’ existed, but 7/49 (14.3%) of participants added comments to report that they had no access to outside instrumental assessment.
Statistical analysis was conducted using SPSS Statistics 20 for Windows. Pearson’s chi-square analysis was used to test all groups with all test conditions, with significance threshold set at 0.05.

For auditory-perceptual evaluation practices, participants were tested to see whether they used validated perceptual rating scales and whether they took a voice recording from clients. Therapists with a clinical interest in voice disorders were more likely to use a validated rating scale ($P < 0.001$). This corresponds to 29/31 (93.5%) of participants with a clinical interest in voice disorders using a validated perceptual rating scale versus 10/18 (55.6%) for those with no clinical interest. Clinical interest was also found significantly to influence likelihood of taking a voice recording from a client ($P < 0.039$), with 28/31 (90.3%) of those with a clinical interest utilizing voice recordings versus 12/18 (66.7%) in the group with no clinical interest. No significant effects were found for other groups.

In terms of using a validated self-rating/impact scale on clients, those with a clinical interest were once again found to be significantly more likely to employ such a validated scale ($P < 0.001$), with 100% of participants with a clinical interest in voice using such a validated scale, versus 10/18 (55.6%) for those with no clinical interest. SLT experience, dedicated service, and clinical setting had no effect.

Subgroups were then tested to see whether any group had more access to instrumental acoustic assessment tools, instrumental aerodynamic tools, or videostroboscopy than other groups. For the purposes of these tests, instrumental acoustic tools were considered to include the Computerized Speech Lab/Multi-Dimensional Voice Program (KayPentax, Montvale, New Jersey, USA), Visi-Pitch (KayPentax, Montvale, New Jersey, USA), Praat (developed by Paul Boersma and David Weeninck, Amsterdam, The Netherlands), and Dr Speech (Tiger DRS, Inc., Putuo, Shanghai, China). Access to tools was considered to include both within-clinic and external access. For acoustic instrumental assessment, those in a dedicated voice service were statistically more likely to have access to instrumental acoustic assessment tools, instrumental aerodynamic tools, or videostroboscopy than other groups.

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Given that access to tools does not necessarily equate to competency in using those tools, subgroups were tested for self-reported competency in using the instrumental assessment techniques described. For acoustic tools, those with a clinical interest in voice disorders were more likely to self-report competency in their use ($P < 0.039$). For videostroboscopy, competency was more likely in those with a clinical interest ($P < 0.018$) and those in a dedicated voice service ($P < 0.04$). No other effects were found.

Finally, since the S/Z ratio (24) and maximum phonation time (25) can be used as reliable aerodynamic measures independent of instrumental testing, subgroups were tested to see if any group was more likely to use these tools. Therapists with a clinical interest in voice disorders were significantly more likely ($P < 0.006$) to use the maximum phonation time, with 100% of respondents indicating that they do so, versus 14/18 (77.8%) in the group with no clinical interest. Otherwise, no correlations were found.

### Table III. Within-clinic access to instrumental assessment.

| Instrumental Assessment Type                        | n   | %   |
|----------------------------------------------------|-----|-----|
| Loudness measure (e.g. sound level meter)          | 27  | 55.1|
| Pitch measure (e.g. pitch tuner)                    | 16  | 32.7|
| None                                               | 11  | 22.4|
| Computerized Speech Lab/Multi-Dimensional Voice Program | 8   | 16.3|
| Videostroboscopy                                   | 6   | 12.2|
| Nasometer                                          | 6   | 12.2|
| Endoscopy                                          | 5   | 10.2|
| Praat                                              | 4   | 8.2 |
| Dr Speech                                          | 1   | 2   |
| Aerodynamic assessment tools                        | 1   | 2   |
| Electrogastroscopy                                 | 1   | 2   |
| Visi-Pitch                                         | 1   | 2   |

### Table IV. Outside-of-clinic access to instrumental assessment.

| Instrumental Assessment Type                        | n   | %   |
|----------------------------------------------------|-----|-----|
| Endoscopy                                          | 28  | 57.1|
| Videostroboscopy                                   | 19  | 38.8|
| None                                               | 7   | 14.3|
| Nasometer                                          | 7   | 14.3|
| Loudness measure (e.g. sound level meter)          | 6   | 12.2|
| Pitch measure (e.g. pitch tuner)                    | 5   | 10.2|
| Computerized Speech Lab/Multi-Dimensional Voice Program | 5   | 10.2|
| Praat                                              | 3   | 6.1 |
| Dr Speech                                          | 1   | 2   |
| Aerodynamic assessment tools                        | 1   | 2   |
| High-speed digital imaging                          | 1   | 2   |
| Electromyography (EMG)                              | 1   | 2   |

### Table V. Self-reported competency in instrumental assessment.

| Instrumental Assessment Type                        | n   | %   |
|----------------------------------------------------|-----|-----|
| Loudness measures (e.g. sound level meter)          | 31  | 63.3|
| Pitch measures (e.g. pitch tuner)                    | 18  | 36.7|
| None                                               | 11  | 22.4|
| Computerized Speech Lab/Multi-Dimensional Voice Program | 9   | 18.4|
| Videostroboscopy                                   | 8   | 16.3|
| Endoscopy                                          | 8   | 16.3|
| Praat                                              | 6   | 12.2|
| Nasometer                                          | 5   | 10.2|
| Visi-Pitch                                         | 1   | 2   |

Finally, participants were asked to rate which of the instrumental assessment tools listed they felt competent in using, whether through formal training or experience, as shown in Table V; 11/49 (22.4%) commented that they felt they were not competent in using any instrumental assessment tool.

### Subgroup analysis

Subgroup analysis was conducted on the findings to determine whether particular groups of therapists are more inclined than others to adhere more reliably to the guidelines set out in Dejonckere et al. (2). Therapists were grouped by clinical interest in voice disorders, years of experience, whether or not they worked in a dedicated voice service, and whether or not they worked in acute hospital setting (see Introduction). Statistical analysis was conducted using SPSS Statistics 20 for Windows. Pearson’s chi-square analysis was used to test all
Discussion

National use of assessment techniques

At the outset of this study, it was sought to establish whether assessment practices were uniform and comprehensive on a national scale. In terms of establishing whether assessment practices are uniform, it is clear from overall percentage values that therapists tend to apply the same protocols nationally for non-instrumental assessment. For example, the use of the GRBAS (20), Voice Handicap Index (22), S/Z ratio (24), maximum phonation time (25), and use of voice recording is found in a sizeable majority of therapists.

These findings comply with the guidelines set out by Dejonckere et al. (2); however, there is also an overall tendency towards the use of non-validated tools for perceptual voice assessment, which does not adhere to the principles of maximal objectivity that these authors propose. While the reliability of perceptual voice assessment tools has been questioned due to factors such as the interpretation of terminology used in rating scales (26) and the lack of anchors or training to which to refer (15,27–29), validated perceptual rating scales are still considered to be reliable (29) and are an important component of voice evaluation (4). This would seem unusual, given the strong focus academically in Ireland on the use of evidence-based assessment and therapy techniques. Therapists should therefore be encouraged both in academic and clinical settings to promote the use of validated tools.

As evidenced above, most therapists use both a standard reading text and conversational speech for evaluating voice production. The use of a standard text allows cross-referencing of severity between patients, although it is somewhat dependent on the text’s phonetic make-up (30). Evaluating conversational speech is of course a much more naturalistic means of evaluating voice, allowing for observation of vocal behaviours that may not occur during reading aloud or sustained single-phoneme phonation (3).

Practices diverge when instrumental assessment techniques are considered. In terms of overall availability of and self-reported competence in instrumental assessment, it is evident from the findings presented here that relatively few therapists have access to the acoustic, aerodynamic, and stroboscopic measurement tools that are advised as being part of standard practice per Dejonckere et al. (2). Given that this is the case, it is suggested that assessment practices are only uniform and comprehensive in terms of non-instrumental assessment and that clinics providing voice assessment services ought to have greater access to and training in the instrumental assessment techniques described by Dejonckere et al. (2).

Other aspects related to voice assessment were also examined in this study, despite not being explicitly mentioned as part of the assessment guidelines given above (2). Clearly, a comprehensive case history is required to diagnose a voice disorder properly, and therapists appear to be both uniform and comprehensive in doing so, though many therapists lack access to medical reports, which may provide insightful clues into factors contributory to the patient’s dysphonia.

Participants also reported evaluating for the presence of certain features of voice production, despite a lack of concrete evidence to support their inclusion in an assessment battery. Examples include examination of speech rate (31) and respiratory support for speech (32).

By contrast, other features related to voice production with at least some evidence for their importance are also included in therapists’ assessment batteries. Examining for modal voice may be relevant, as muscle tension dysphonias and organic lesions are often associated with altered pitch (33). Body posture and movement also appear to be related to adequate vocal function (34), and frameworks exist for objective means of measuring this (35). While there is no consensus regarding the exact extent to which laryngopharyngeal reflux (LPR) impacts upon voice production (36,37), therapists do routinely screen for this.

During the survey, therapists were asked whether they perform an oral-motor examination as part of their assessment protocol. Routine oral–motor examination does not appear to be strongly supported in the literature, but it is possible that certain features (e.g. cleft palate, velopharyngeal dysfunction) would have an effect on vocal resonance (38).

More strongly evidenced features of voice production that are considered to be linked with dysphonia were also examined by therapists. This includes interviewing patients regarding life events that may be perceived as significant around the time of origin of the voice disorder. This is relevant, as many voice disorders originate or co-occur with stress (39) or life events perceived to be significant by the patient (40). Likewise, the role of mood, personality, and coping abilities has been found to be relevant to voice production (40,41), while a relationship between mental health and voice disorders has also been established in the literature (42), and the findings above demonstrate consistent evaluation of these features.

The use of circumlaryngeal manual therapies in the evaluation of a patient for the presence of a muscle tension dysphonia typically begins with questions regarding sensations of dryness/tightness/irritability etc. in the throat, and all therapists responded that they evaluate for these features. A more comprehensive set of features is discussed in Mathieson et al. (23), in which the authors discuss the relationship between perceptual sensations within the throat with mucosal changes in the larynx. It then follows that patients are typically palpated for the presence of muscle tension around the larynx. In this study, only 46.9% of therapists reported performing palpation, but this is likely as a consequence of the specialist training required for certain therapeutic interventions that focus on manual relief of tension in the larynx (43–46).

Of further interest is the comparison of the findings of this survey with cross-cultural results from the study conducted in the USA by Behrman (8). In this study, Behrman (8) invited speech–language pathologists with a minimum of 3 years’ recent experience in the evaluation of video-stroboscopic examinations to indicate how likely they were to use various instrumental and clinical diagnostic procedures. This contrasts somewhat with the present study, as the survey used here was issued to any qualified therapist working with dysphonia. This may influence comparison of findings between the two studies, as the cohort presented in Behrman’s study (8) will likely have more experience and training than some of the participants presented here.
In terms of clinical diagnostic procedures, there appears to be a high degree of correspondence in findings between studies, with Behrman (8) reporting that maximum phonation time is employed by 94% of therapists (91.8% here), S/Z ratio by 87% of therapists (89.8% here), the Voice Handicap Index (19) by 77% of therapists (75.5% here), and an auditory-perceptual rating tool by 100% of therapists (100% here). Unfortunately, comparison of findings with relation to use of instrumental assessment is not feasible, as Behrman (8) surveyed participants on their use of such tools, while access to and training in instrumental assessment (rather than actual use) were examined in this study.

**Findings from subgroup analysis**

The author hypothesized that clinicians working in an acute hospital setting and those with more years of clinical experience would adhere more strictly to the guidelines recommended by Dejonckere et al. (2) and that they would have greater self-reported competency in instrumental assessment techniques. In fact, no significant correlation was found here, and so these hypotheses are rejected.

By contrast, clinical interest in voice disorders and whether the clinician works in a dedicated voice service does impact how comprehensive an assessment is conducted, with clinical interest being the more strongly deciding factor of the two. Clinical interest corresponds to a significantly increased likelihood to use validated perceptual and self-rating/impact scales, voice recordings, and maximum phonation time, and an increased likelihood of the clinician being self-perceived as competent in acoustic and stroboscopic assessment techniques. Working in a dedicated service is also significantly linked with self-perceived competency in stroboscopic evaluation, while those working in this setting have significantly more access to instrumental acoustic evaluation tools.

While it may be understandable that a clinical interest may lead to more developed clinical skills in that area, therapists should consider that the guidelines given in previous work (2,3,9,10) collectively advise the use of validated rating scales, voice recordings, and maximum phonation time. These tools are freely available in the clinical setting, and their use is therefore encouraged amongst all therapists working with voice disorders.

Access to and competency in instrumental assessment are more complex issues to consider. While these are recommended by Dejonckere et al. (2), the reality is that few clinical centres in Ireland have access to these tools, and, without access, the capacity to become competent in their use is limited. This may be out of the control of individual clinicians, but may be a consideration for service providers, such as hospitals. Instrumental assessment is used as a component of the multidimensional evaluation of dysphonia and to evaluate outcome measures. Apart from being of benefit to the patient, the case may also be made that ‘services with poor evidence of treatment effectiveness are likely to receive limited financial support’ (3 p. 2), so it is in the interests of service providers to invest in these tools.

**Limitations**

There are limitations to this study in terms of how truly nationally representative the responses obtained are. For example, the geographical distribution of therapists was not gathered, so if multiple therapists from the same practice setting using the same assessment protocols responded, there may have been a weighting towards these findings. This would perhaps be more pronounced given the relatively small number of respondents. Furthermore, two of the three SIGs chosen for recruitment e-mails are adult-focused and may have led to a respondent bias in terms of reflecting adult (rather than paediatric) assessment practices.

A response rate for the survey could not be accurately calculated, which further limits the interpretation of how representative the sample is. The reasons for the seemingly low response rate should also be considered. It may have been the case that those with an interest in voice assessment practices were more inclined to participate, which may have biased results towards more favourable outcomes, as the results indicate that those with a clinical interest in voice disorders are more likely to use more comprehensive and evidence-based assessment techniques.

Some questions in the survey also lacked a ‘none of the above’ option in questions where multiple responses were possible. This meant that some respondents entered this response into the ‘other’ textbox, which could have been avoided if a ‘none’ response were included as an option, though it should be noted that the option merely not to tick any response was valid, effectively allowing a ‘none’ response.

**Conclusions**

This study was conducted to provide a snapshot of the most commonly employed assessment practices of SLTs working currently in Ireland and is the first to evaluate in detail whether recommended assessment techniques are used by SLTs in daily clinical practice. Findings from this study may be beneficial to SLTs and service providers in identifying gaps in service delivery and areas for development and improvement, with particular attention to the use of evidence-based practice and the use of validated tools. Researchers and educators alike may also benefit from understanding what tools are commonly used by practising SLTs, in particular for cross-reporting and dissemination of findings.

Further research is clearly required to determine why therapists tend to use non-validated tools when validated ones exist, why clinics have limited access to instrumentation, and why the impact of clinical interest in voice disorders on assessment competence is so significant when all therapists ought to be trained to equal standards. It is suggested that these questions ought to be explored through a more qualitative methodology. While this study is applied to the Irish context, it may also provide a framework by which therapists in other countries may examine their own practices internally.

**Declaration of interest**

The author reports no conflicts of interest.
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