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Pragmatic detection of anxiety and depression in prospective voice outpatient clinic attenders:

A cross sectional study

Introduction

Dysphonia is associated with psychological distress^{1,2}. The VoiSS questionnaire has been used for patient reported voice assessment for over a decade³. It is a validated 30 item questionnaire whose three domains are emotional (8 items); impairment (15 items) and physical / pharyngeal symptoms (7 items)⁴. Each item is scored from 0 to 4, with 0 being the least and 4 the most affected.

We have found the VoiSS useful as it has a robust factor structure, whose physical score encompasses important aspects of the patient experience, which are not fully captured by tools that focus principally on voice quality^{3,4}. Also, the VoiSS is sensitive to change over time⁵. Other similar instruments have a less well-defined factor structure. For example the 30-item Vocal Handicap Index now tends to be used in a mono-factorial, abbreviated version, the VHI-10⁶.

The potential of the emotional subscale of VoiSS has yet to be explored; previous research has indicated that the subscales could detect psychological dysfunction that is not yet adequately managed⁷. This is an important omission, as it may be able to detect occult psychological distress in throat clinic attenders. The detection of such distress is of potential practical value, since we know that psychological distress is prevalent in voice clinic attenders, but discrimination between functional and organic voice disorders does not distinguish between individuals with and without significant psychological distress¹. Such discrimination is important, as psychological interventions, such as cognitive behavioural therapy, have the potential to augment speech and language therapy or voice therapy outcomes, and are likely to most benefit those with higher levels of baseline psychological distress. Conversely, their indiscriminate application to non-distressed individuals results in disengagement and a waste of scarce resources⁸.

In this audit of VoiSS scores in our voice clinic population (new patients referred to the department with suspected benign pathology), we therefore compared the emotional subscale with a validated questionnaire for anxiety and depression, the Hospital Anxiety and Depression Score.⁹

Materials and Methods

Design and Setting

At the Glasgow Royal Infirmary voice clinic, between February 2011 and July 2012, consecutive new patients were prospectively asked to complete the VoiSS and HADS questionnaires (n=210). All responses were anonymously recorded along with age, sex, principal presenting complaint, diagnosis, comorbidities and management. When incomplete responses were removed (any value missing in HADS or VOISS scores), there were 177 correctly completed questionnaires for audit. Results were analysed using SPSS, version 22(2013, IBM, USA).

Statistical Analysis

Data were tested for normality using Kolmogorov Smirnov Testing. Paired comparison was by Wilcoxon ranked sign testing and students t test (using significance $p < 0.05$). Spearman's nonparametric correlation was used to test the strength of any associations between the VoiSS and HADS (significance $p < 0.01$). Two VoiSS parameters were used – 1) emotional domain and 2) the residual items (impairment plus physical /pharyngeal). Receiver operating characteristic (ROC) curve analysis was used to show sensitivity of emotional VoiSS in detecting HADS "caseness". Multinomial logistic regression was used to test for association between nominal categories of HADS < 8, HADS 8-10 and HADS >10 for both anxiety and depression, and variables of age, sex, comorbidity, emotional and impairment/physical VoiSS.

Ethical Considerations

All responses were recorded anonymously. Formal ethical approval for this questionnaire study was not required. No funding was received for this work. The authors declare no conflict of interest.

Results

There were 177 (84% of 210) completed, paired VoiSS and HADS questionnaires available for analysis. Reasons for non-inclusion were inability or unwillingness to complete the questionnaires, ambiguous or missing responses. The age range was 18 to 90 years (mean 56.0, median 57.2), with the predicted female preponderance¹⁰ (n= 125, 71%). The principal presenting complaints were: hoarseness (n = 112, 63%), pain (n=18, 10%), singing difficulty (n=14, 8%), choking (n=13, 7%), globus sensation (n=13, 7%), asymptomatic (n=4, 2%) and dysphagia (n=2, 1%). One patient attended for consideration of a reduction thyroid chondroplasty.

Comorbidities were recorded in 63(36%) cases, most commonly gastro-oesophageal reflux, (n=35, 20%). The remaining comorbidities comprised respiratory, cardiovascular and endocrine conditions. The diagnosis and corresponding VoiSS (total) scores are outlined in Table 1.

The commonest management strategy was, as expected, referral to speech and language therapy (106 cases, 60%). Thirty-three patients (19%) were subsequently managed surgically (30 microlaryngoscopies, and three vocal cord medialisation injections). A further 47 (27%) patients were issued a prescription for anti-reflux medication and seven (4%) patients were prescribed nasal saline douching.

The mean total VoiSS (maximum score 120) for all patients was 39.7 (SD 22.2). The mean subscale VoiSS scores were: emotional 7.6/22 (SD 7.5), impairment 22.6/60 (SD 13.0), physical 10.1/38 (SD 5.2). Figure 1 shows the distribution of the emotional subscale, with a positive skew. Scores for HADS subscales ranged from 1 to 21, with medians for both anxiety and depression of 6.0, (means = anxiety 6.5 (SD 5.2), depression 7.1 (SD 4.8)). Given the distribution of VoiSS emotional scores (Figure 1), we separately plotted HADS scores against emotional VoiSS scores above and below the median VoiSS emotional score of 5 (figure 2) demonstrating that HADS caseness corresponds to an above median VoiSS emotional score.

Kolmogorov Smirnov testing confirmed data deviated significantly from the normal distribution, $p=0.001-0.008$ in HADS and VoiSS component score sets, except total VoiSS ($p=0.57$). A Spearman's rank order correlation was performed to determine the relationships between HADS anxiety subscale, depression subscale, and emotional VoiSS subscales. Anxiety and depression HADS scales were significantly correlated with the emotional VoiSS subscale (*Spearman's Rho*= 0.68, and 0.62 respectively, both $p < .001$, (figures 3A and 3B).

A HADS score of 8-10 represents "borderline caseness", with scores of greater than 10 indicative of "caseness". In our cohort there were 35 (20%) patients, with "borderline caseness" ($n =$ both anxiety and depression 12, anxiety 9, depression 14). A further 30 (17%) patients had "caseness" ($n =$ both anxiety and depression 26, anxiety 3, depression 1). We decided to examine HADS scores above and below the median emotional VoiSS score to assess for differences in "caseness" (either anxiety or depression) frequency. The breakdown of HADS category scores against VoiSS emotional scores (cut off of median score of 5) is shown in figure 2, with a significant difference between frequency of "caseness" relative to the designated cut off score on emotional VoiSS (Chi squared 39.1, $p<0.001$.) The odds of having HADS caseness (including borderline cases) for emotional VoiSS scores >5 are 11.9 times more likely than for emotional VoiSS scores < 5 (OR 0.08, 95% CI 0.04- 0.17). Figure 4 shows a receiver operator characteristic (ROC) curve demonstrating good discriminatory ability of emotional VoiSS in detection of "caseness" (Area under curve 0.88).

The emotional VoiSS subscale was found to correlate most strongly with HADS anxiety (0.68, $p<0.001$) and HADS depression (0.62, $p<0.001$). The impairment and physical VoiSS score were less strongly correlated with HADS anxiety (0.55 and 0.41, $p<0.001$) or depression (0.48 and 0.23, $p=0.02$).

The presence of comorbidity was independently higher in those with HAD scores greater than 10, compared to those less than 8, (41% versus 32%, $p=0.02$.) There was no significant association between age and HADS scores; or with presenting complaint and HADS. These features are presented in table 2.

Discussion

The Hospital Anxiety and Depression Score (HADS) has been extensively compared to other patient reported outcome measures in patients with physical symptoms⁹ for over 30 years¹¹. The HADS consists of two subscales, each scored 0-21, for anxiety and depression (maximum total score 42). These subscale scores are used separately. A score of greater than 10 in the HADS anxiety or depression scores identifies “caseness”. This is the point above which a diagnosis of anxiety or depression is more likely¹¹. Borderline caseness is considered with a score of 8-10.

Longitudinal studies have shown that HADS scores improve with psychosocial intervention¹² such as pharmacotherapy or psychological rehabilitation. Patients with “case” scores are likely to be prescribed antidepressant medication or engaged with psychological services¹³. In both VoiSS and HADS, a higher score implies a greater problem for the patient. The HADS has previously been correlated with the Voice Handicap Index¹⁴, but this global association does not offer any added diagnostic specificity in the voice clinic setting.

Our results indicate a significant correlation between the emotional VoiSS score and the HADS score. The ROC curve analysis (area under curve = 0.88) approaches excellence in association between the emotional VoiSS and “caseness” on HADS. This is the first time this relationship has been examined and established. Using the emotional VoiSS score as a marker for anxiety and depression could be of potential benefit in assessment of patients attending a voice clinic. Questionnaire or “survey” fatigue is a well-recognised factor that undoubtedly affects patients. Shorter questionnaires tend to be better perceived by patients and are more likely to be completed¹⁵. Previously, the emotional subscale of the Vocal Handicap Index has shown weak correlations with HADS anxiety ($r = 0.27$) and depression ($r = 0.19$)¹⁴, as has the total VHI score (anxiety $r = 0.23$, depression $r = 0.17$). By using the emotional domain as a marker for anxiety and depression, we hope to better serve our patients’ emotional needs.

The analysis of the emotional domain of the VoiSS questionnaire shows the mean scores to be highest in the diagnoses of vocal cord palsy, Reinke’s oedema and laryngitis (table 2). Patients with Reinke’s oedema as expected, were more likely to be female. Functional dysphonia, a diagnosis typically associated with anxiety, has a low-level emotional VoiSS score (median 3), and

correspondingly low HADS scores (anxiety 4, depression 5). This highlights previous research that has shown no psychological difference between the diagnoses of functional and organic dysphonia and suggested that organic pathology of the larynx may be secondary to voice misuse or abnormal muscle functioning¹. Despite popular belief that functional dysphonia is associated with high levels of psychological distress, there is no evidence to support this¹⁶, and our findings reiterate this. There was a higher rate of comorbidity in those with higher HADS score, in line with expectation, as comorbidity is known to increase rates of anxiety and depression¹⁷.

The commonest management strategy in the present study, as in almost all series, was referral for voice therapy. Previous evidence¹⁸ has shown that voice therapy is effective in treating voice quality, but not the psychological distress associated with the condition. The prevalence of anxiety and depression in our cohort suggest that we require greater input with psychological strategies, either by creating stronger links with psychology services or further development of psychological support currently offered by our dedicated speech and language therapists.

Our results highlight the importance of the separate domains that contribute towards the total VoiSS score. To rely solely on the total score, a high emotional score could be overlooked. This examination of subdomains is an important feature that has been recognised in another commonly used otolaryngology questionnaire, the sino-nasal outcome test¹⁹.

Conclusion

In conclusion, emotional VoiSS correlates well with the anxiety and with depression subscales of HADS. The emotional domain of the VoiSS questionnaire could be used as a measure of anxiety and depression and therefore allow targeted treatments for voice clinic attenders. Prior assumptions about the pathogenesis of functional dysphonia require closer scrutiny and emotional distress seems in fact to be more linked to comorbidity than to the absence of intra-laryngeal pathology.

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