Optimising outcome assessment of voice interventions, II: sensitivity to change of self-reported and observer-rated measures

Citation for published version:

Digital Object Identifier (DOI):
10.1017/S0022215107007839

Link:
Link to publication record in Edinburgh Research Explorer

Document Version:
Publisher's PDF, also known as Version of record

Published In:
Journal of Laryngology and Otology

Publisher Rights Statement:

General rights
Copyright for the publications made accessible via the Edinburgh Research Explorer is retained by the author(s) and / or other copyright owners and it is a condition of accessing these publications that users recognise and abide by the legal requirements associated with these rights.

Take down policy
The University of Edinburgh has made every reasonable effort to ensure that Edinburgh Research Explorer content complies with UK legislation. If you believe that the public display of this file breaches copyright please contact openaccess@ed.ac.uk providing details, and we will remove access to the work immediately and investigate your claim.
Optimising outcome assessment of voice interventions, II: sensitivity to change of self-reported and observer-rated measures

I N Steen, K MacKenzie*, P N Carding†, A Webb†, I J Deary‡, J A Wilson†

Abstract
Objectives: A wide range of well validated instruments is now available to assess voice quality and voice-related quality of life, but comparative studies of the responsiveness to change of these measures are lacking. The aim of this study was to assess the responsiveness to change of a range of different measures, following voice therapy and surgery.

Design: Longitudinal, cohort comparison study.

Setting: Two UK voice clinics.

Participants: One hundred and forty-four patients referred for treatment of benign voice disorders, 90 undergoing voice therapy and 54 undergoing laryngeal microsurgery.

Main outcome measures: Three measures of self-reported voice quality (the vocal performance questionnaire, the voice handicap index and the voice symptom scale), plus the short form 36 (SF 36) general health status measure and the hospital anxiety and depression score. Perceptual, observer-rated analysis of voice quality was performed using the grade–roughness–breathiness–asthenia–strain scale.

We compared the effect sizes (i.e. responsiveness to change) of the principal subscales of all measures before and after voice therapy or phonosurgery.

Results: All three self-reported voice measures had large effect sizes following either voice therapy or surgery. Outcomes were similar in both treatment groups. The effect sizes for the observer-rated grade–roughness–breathiness–asthenia–strain scale scores were smaller, although still moderate. The roughness subscale in particular showed little change after therapy or surgery. Only small effects were observed in general health and mood measures.

Conclusion: The results suggest that the use of a voice-specific questionnaire is essential for assessing the effectiveness of voice interventions. All three self-reported measures tested were capable of detecting change, and scores were highly correlated. On the basis of this evaluation of different measures’ sensitivities to change, there is no strong evidence to favour either the vocal performance questionnaire, the voice handicap index or the voice symptom scale.

Key words: Voice; Voice Quality; Quality of Life; Outcome Assessment (Healthcare); Outcome Measures

Introduction
Dysphonia is a multifactorial disorder which affects expressive communication, mood and general health status. As discussed in the preceding paper, a number of well validated measures is now available to assess these different domains. The responsiveness to change of these very different tools is, however, much less clear. There are comparatively few studies of the outcomes of dysphonia treatment, and most use limited outcome data sets in a highly selected patient group (for example, vocal fold medialisation). Furthermore, the number of studies of surgical as opposed to voice therapy outcomes is exceedingly small. Our objective was to compare the sensitivity to change of a number of different self-reported, perceptual and quality of life measures following conservative (i.e. speech and language therapy) and surgical intervention in a large, heterogeneous group of voice patients.

The specific aims of the study were: (1) to estimate the responsiveness to change of self-reported and perceptual ratings of voice quality and voice-related quality of life, in a large cohort of heterogeneous
dyshspheric patients; and (2) to estimate the range of
effect sizes for voice therapy and surgical interventions,
using self-reported and observer-rated measures, in
order to inform future prospective, controlled trials.

Methods
The approach adopted was to identify patients with
voice-related problems and then, using a range of
generic and voice-specific measures, to assess their
quality of life before and after medical intervention.

Three self-reported voice scales were completed by
patients. The vocal performance questionnaire5
consists of 12 items which address the physical
aspects of the voice problem and its social and
emotional impact, scored to give a total score. The
voice handicap index6 is a 30-item questionnaire
with questions grouped into three content domains,
representing the functional, emotional and physical
aspects of voice disorders. Its sensitivity to change
in voice was evaluated on a sample of 37 subjects
with various vocal fold abnormalities.5 The voice
symptom scale6 is a 30-item scale with three content
domains and a total score, the reliability and validity
of which have been assessed in a series of studies
involving over 800 subjects.7

Perceptual, observer-rated analysis of voice quality
was performed using the grade–roughness–breath-
ness–asthenia–strain scale.6–10 All voices were
recorded on digital audiotape, following a standard
procedure, both before and after treatment.11 The
recorded voice sample included rote counting and
speaking the days of the week, prolonged /a/ and
/i/ vowels, and three sentences from the Rainbow
Passage. The five grade–roughness–breathiness–
asthenia–strain parameters were scored using a four-
point rating scale, from zero (normal) to three
(extreme). Each participant was scored on a standard
pro forma by an independent expert rater. Independ-
ent raters were blinded to treatment group and treat-
ment status, but aware of each patient’s age and sex.
The short form 36 (SF 36)12 is an extensively vali-
dated, self-administered, 36-item questionnaire assess-
ing quality of life. It has eight subscales and two
global domains (mental health and physical health),
and a large body of normative data is available.13
The SF 36 is known to be abnormal in patients with
voice disorders.14

All patients also completed the hospital anxiety
and depression scale.15

Patients
One hundred and forty-four patients complaining of
hoarseness and attending out-patient clinics in New-
castle and Glasgow were assessed by the above
measures, before and after medical intervention. The patients
included a subgroup of patients described in our companion paper.2 The patient exclusion criteria
were: no intervention undertaken; defaulting from
follow-up; laryngeal cancer; age less than 18 years;
and impaired language or receptive communication
skills. At the initial out-patient appointment, each
participant completed the three self-reported voice
questionnaires, the SF 36 and the hospital anxiety

Analysis
For each questionnaire or rating scale, the effect size
was defined as the change in mean score divided by
the standard deviation of change scores. The effect
size is independent of scale and sample size and
can be used to make comparisons between the differ-
ent questionnaires and different groups of subjects. It
is accepted16,17 that values around 0.2 represent small
effect sizes, values around 0.5 represent medium effect
sizes and values around 0.8 represent large effect sizes.
If subjects experience an improvement in quality of
life, the outcome measure with the largest effect size
is clearly the most sensitive to change.

Results
Table 1 shows the mean baseline and follow-up
scores for each patient group, along with the mean
improvement in quality of life (with a 95 per cent
confidence interval (CI)) and an estimate of effect
size. A paired t-test indicates those improvements
that are statistically significant.

Both groups of subjects reported medium to large
improvements on all three voice questionnaires. The smallest changes were in the emotional subscale of
the voice handicap index (effect sizes = 0.44 and
0.48 for speech and language therapy and surgery
groups, respectively) and in the physical symptoms
subscale of the voice symptom scale (effect sizes = 0.38 and 0.43 for speech and language therapy and
surgery groups, respectively). The largest changes
in the individual scales were in the physical aspects
of voice subscale of the voice handicap index
(effect sizes = 0.71 and 0.81 for speech and language
therapy and surgery groups, respectively) and in the
voice impairment subscale of the voice symptom
scale (effect sizes = 0.78 and 1.00 for speech and
language therapy and surgery groups, respectively).
The effect sizes corresponding to the change in the
total score, respective to speech and language
therapy and surgery, for each of the three voice
questionnaires, were: vocal performance questionnaire, 1.04 and 0.82; voice handicap index, 0.62 and 0.72;
and voice symptom scale, 0.78 and 1.06. The two
patient groups were very similar both at baseline
and follow up (Figure 1), with no significant differ-
ces between them.

The changes in the three voice questionnaires were
highly correlated, as follows: vocal performance ques-
tionnaire vs voice symptom scale, 0.74 (95 per cent CI: 0.65, 0.81); vocal performance questionnaire vs voice
handicap index, 0.76 (95 per cent CI: 0.68, 0.83); and
voice symptom scale vs voice handicap index, 0.83 (95
per cent CI: 0.76, 0.87). All differences were signifi-
cant (p < 0.0001). The correlation between the
voice symptom scale and the voice handicap index
was greater, due in part to the small number of
shared items between the two questionnaires.
Changes in the subscale components of the voice
<table>
<thead>
<tr>
<th>Scale &amp; subscale</th>
<th>Group</th>
<th>Baseline mean (SD)</th>
<th>Follow-up mean (SD)</th>
<th>Mean*</th>
<th>95% CI</th>
<th>Effect size†</th>
<th>t</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>VPQ</td>
<td>Total</td>
<td>SLT 32.3 (9.2)</td>
<td>21.8 (6.8)</td>
<td>10.5</td>
<td>8.3, 12.6</td>
<td>1.04</td>
<td>9.67</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 32.2 (9.2)</td>
<td>22.9 (8.3)</td>
<td>9.3</td>
<td>6.1, 12.4</td>
<td>0.82</td>
<td>5.92</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td></td>
<td>VHI</td>
<td>Physical aspects</td>
<td>SLT 21.4 (6.7)</td>
<td>15.3 (8.2)</td>
<td>6.1</td>
<td>4.3, 7.9</td>
<td>0.71</td>
<td>6.72 &lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 19.4 (7.3)</td>
<td>13.1 (8.2)</td>
<td>6.3</td>
<td>4.2, 8.5</td>
<td>0.81</td>
<td>5.89 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Functional aspects</td>
<td>SLT 14.4 (9.0)</td>
<td>9.7 (8.1)</td>
<td>4.8</td>
<td>2.9, 6.6</td>
<td>0.54</td>
<td>5.16 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 14.6 (9.4)</td>
<td>10.4 (7.4)</td>
<td>4.2</td>
<td>2.3, 6.1</td>
<td>0.61</td>
<td>4.41 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emotional aspects</td>
<td>SLT 11.8 (9.5)</td>
<td>7.9 (8.4)</td>
<td>3.9</td>
<td>2.05, 5.8</td>
<td>0.44</td>
<td>4.16 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 12.5 (10.4)</td>
<td>7.9 (7.4)</td>
<td>4.5</td>
<td>1.9, 7.1</td>
<td>0.48</td>
<td>3.51 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>SLT 47.8 (22.8)</td>
<td>32.9 (22.7)</td>
<td>14.9</td>
<td>9.9, 19.9</td>
<td>0.62</td>
<td>5.92 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 46.3 (24.6)</td>
<td>31.4 (21.2)</td>
<td>15.0</td>
<td>9.3, 20.8</td>
<td>0.72</td>
<td>5.24 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>VoISS</td>
<td>Impairment</td>
<td>SLT 30.7 (11.8)</td>
<td>20.1 (11.7)</td>
<td>10.5</td>
<td>7.7, 13.4</td>
<td>0.78</td>
<td>7.27 &lt;0.001</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 32.2 (11.7)</td>
<td>20.4 (12.3)</td>
<td>11.8</td>
<td>8.5, 15.2</td>
<td>1.00</td>
<td>7.12 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Physical symptoms</td>
<td>SLT 9.7 (4.9)</td>
<td>8.1 (5.5)</td>
<td>1.6</td>
<td>0.7, 2.4</td>
<td>0.38</td>
<td>3.56 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 9.0 (5.0)</td>
<td>7.6 (5.2)</td>
<td>1.4</td>
<td>0.5, 2.3</td>
<td>0.43</td>
<td>3.15 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emotion</td>
<td>SLT 8.2 (6.7)</td>
<td>4.7 (5.5)</td>
<td>3.4</td>
<td>2.04, 4.8</td>
<td>0.52</td>
<td>4.92 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 9.3 (8.0)</td>
<td>4.7 (5.5)</td>
<td>4.6</td>
<td>2.8, 6.5</td>
<td>0.69</td>
<td>4.99 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Total</td>
<td>SLT 48.4 (18.1)</td>
<td>32.5 (19.2)</td>
<td>16.0</td>
<td>2.2, 20.4</td>
<td>0.78</td>
<td>7.16 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 50.4 (19.9)</td>
<td>32.4 (19.5)</td>
<td>18.0</td>
<td>13.2, 22.8</td>
<td>1.06</td>
<td>7.57 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td>GRBAS</td>
<td>Grade</td>
<td>SLT 1.9 (1.1)</td>
<td>1.3 (0.7)</td>
<td>0.7</td>
<td>0.4, 0.9</td>
<td>0.55</td>
<td>5.09 &lt;0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 2.1 (1.1)</td>
<td>1.7 (0.8)</td>
<td>0.4</td>
<td>0.09, 0.8</td>
<td>0.35</td>
<td>2.53 0.01</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Roughness</td>
<td>SLT 1.1 (0.9)</td>
<td>0.9 (0.8)</td>
<td>0.2</td>
<td>−0.05, 0.4</td>
<td>0.16</td>
<td>1.56 0.12</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 1.2 (0.9)</td>
<td>0.9 (0.8)</td>
<td>0.3</td>
<td>0.01, 0.6</td>
<td>0.29</td>
<td>2.09 0.04</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Breathiness</td>
<td>SLT 1.5 (0.9)</td>
<td>1.0 (0.6)</td>
<td>0.5</td>
<td>0.3, 0.7</td>
<td>0.57</td>
<td>5.21 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 1.8 (0.9)</td>
<td>1.5 (0.9)</td>
<td>0.3</td>
<td>0.03, 0.6</td>
<td>0.32</td>
<td>2.23 0.03</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Asthenia</td>
<td>SLT 1.1 (1.0)</td>
<td>0.6 (0.6)</td>
<td>0.5</td>
<td>0.3, 0.7</td>
<td>0.49</td>
<td>4.58 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 1.4 (0.9)</td>
<td>1.2 (0.9)</td>
<td>0.2</td>
<td>−0.03, 0.5</td>
<td>0.25</td>
<td>1.77 0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Strain</td>
<td>SLT 0.9 (0.9)</td>
<td>0.6 (0.8)</td>
<td>0.3</td>
<td>0.03, 0.6</td>
<td>0.36</td>
<td>2.13 &lt;0.001</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 1.1 (0.8)</td>
<td>1.2 (0.9)</td>
<td>−0.1</td>
<td>−0.4, 0.2</td>
<td>−0.13</td>
<td>−0.90 0.37</td>
<td></td>
</tr>
<tr>
<td></td>
<td>SF 36</td>
<td>Physical component</td>
<td>SLT 35.2 (14.2)</td>
<td>38.1 (17.1)</td>
<td>2.9</td>
<td>0.6, 5.3</td>
<td>0.26</td>
<td>2.50 0.01</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 41.6 (14.3)</td>
<td>39.5 (15.6)</td>
<td>−2.1</td>
<td>−4.5, 0.4</td>
<td>−0.23</td>
<td>−1.67 0.10</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mental component</td>
<td>SLT 45.7 (12.5)</td>
<td>47.2 (12.1)</td>
<td>1.5</td>
<td>−0.7, 3.7</td>
<td>0.15</td>
<td>1.37 0.18</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 45.7 (12.6)</td>
<td>48.4 (12.0)</td>
<td>2.7</td>
<td>−0.07, 5.4</td>
<td>0.27</td>
<td>1.96 0.06</td>
<td></td>
</tr>
<tr>
<td></td>
<td>HAD</td>
<td>Depression</td>
<td>SLT 4.3 (3.4)</td>
<td>3.7 (3.7)</td>
<td>0.6</td>
<td>−0.02, 1.1</td>
<td>0.21</td>
<td>1.91 0.06</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 4.5 (3.6)</td>
<td>4.1 (3.7)</td>
<td>0.4</td>
<td>−0.5, 1.3</td>
<td>0.12</td>
<td>0.88 0.39</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Anxiety</td>
<td>SLT 7.2 (4.3)</td>
<td>6.6 (4.7)</td>
<td>0.6</td>
<td>−0.08, 1.3</td>
<td>0.19</td>
<td>1.77 0.08</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Surg 7.1 (4.0)</td>
<td>6.3 (4.6)</td>
<td>0.8</td>
<td>−0.1, 1.7</td>
<td>0.24</td>
<td>1.71 0.09</td>
<td></td>
</tr>
</tbody>
</table>

Data represent scores for the various measures. *Mean change from baseline in the direction consistent with an improvement in quality of life (QOL) (a negative score implies a deterioration in quality of life). †Effect sizes = improvement in quality of life divided by the standard deviation (SD) of change scores. CI = confidence intervals; VPQ = vocal performance questionnaire; SLT = speech and language therapy; Surg = surgery; VHI = voice handicap index; VoISS = voice symptom scale; GRBAS = grade–roughness–breathiness–asthenia–strain scale; SF 36 = short form 36; HAD = hospital anxiety and depression scale

Handicap index and the voice symptom scale were also significantly correlated. The greatest correlation was between the voice handicap index physical aspects of health subscale and the voice symptom scale impairment subscale (r = -0.76; 95 per cent CI: 0.67, 0.82). Changes in the three voice handicap index subscales were correlated with each other (all correlations > 0.6). Changes in the three subscales of the voice symptom scale were less strongly correlated with each other (correlations between 0.2 and 0.6). The weakest correlations were between the voice symptom scale physical symptom subscale and all the other subscales (correlations between 0.2 and 0.4).

For both groups of subjects, there was some evidence of change on the grade–roughness–breathiness–asthenia–strain scale, but the effect sizes were much smaller than those observed with the self-reported measures. For subjects undergoing speech and language therapy, there were small or medium effects in each grade–roughness–breathiness–asthenia–strain component. For subjects undergoing surgery, the effect sizes were smaller in all components except for roughness, the least sensitive component.

There was little evidence of substantive change in any of the generic health status instruments – all effect sizes were less than 0.3. Thus, although some of the changes were statistically significant, the small effect sizes suggest that they were not clinically important.

**Discussion**

The pattern of effect sizes observed in Table I indicates very small changes in the generic health
status instruments in comparison with the voice-specific measures. This supports the conclusion of a previous study which assessed voice therapy alone. Following intervention, there were fairly large changes in self-reported, voice-related quality of life. Similar effect sizes were observed across the three self-reported voice questionnaires. The changes in total scores were highly correlated, suggesting that the three self-reported voice questionnaires were detecting changes in the same sets of patients.

When considering the voice handicap index and the voice symptom scale component scores, greatest change was observed in the voice symptom scale impairment subscale and in the voice handicap index physical aspects of voice subscale. Inspection of the individual items that make up these two subscales suggests that they are more or less equivalent; both relate to voice quality. The very high correlation between the changes in these two subscales supports this suggestion. The remaining two voice handicap index components (functional and emotional aspects of health) broadly overlap with the voice symptom scale emotion component; this is reflected in the correlation in change scores between these components. The voice symptom scale physical symptom component has almost no overlap with any of the voice handicap index components; this is reflected in the

![Box and whisker plots of pre- and post-intervention scores for the three self-reported questionnaires completed by (a) the speech and language therapy group, and (b) the surgery group. Scores have been numerically standardised for comparison. The x-axis shows the number of fully completed questionnaire sets, by questionnaire. The lower and upper edges of each box represent the 25th and 75th percentiles, respectively. Medians are indicated by the horizontal line within each box. The range is denoted by the whiskers; individual outliers are indicated as circles. QOL = quality of life; VPQ = vocal performance questionnaire; VHI = voice handicap index; VoiSS = voice symptom scale](image-url)
much weaker correlations of this subscale with the voice handicap index subscales, and indeed with the other voice symptom scale components.

The grade—roughness—breathiness—asthenia—strain components were less sensitive to change than the self-reported measures. Roughness did not alter much, and was also the only parameter which consistently failed to show any relationship with the total or subscales of any of the three self-reported measures.\(^2\)

The participants reported comparatively little change in the generic health status questionnaires; a much larger change was observed in the self-reported voice scales. The SF 36 and other generic quality of life instruments have proven validity and reliability, and it is reasonable to suppose that any general, subjective increase in wellbeing would be reflected in these instruments. Similarly, there was little change in the mood variables (the hospital anxiety and depression scales and the SF 36 mental health component score). This suggests that the changes observed in the voice measures were independent of a general improvement in subjective well-being as a result of receiving a medical intervention, but rather reflected real improvement in voice-related quality of life. At the same time, the lack of change in the generic measures also highlights the need for a voice-specific questionnaire in assessing voice treatment effectiveness; the SF 36 does not include voice-sensitive components.

Several self-reported voice tools seem responsive to change

The differing sensitivity of the various available tools is not known

Identification of the effect sizes of different interventions according to different tools would be useful in the standardisation of interventions and in clinical voice outcome reporting

The three self-reported voice tools studied (the vocal performance questionnaire, the voice handicap index and the voice symptom scale) all showed large effect sizes following either voice therapy or phonosurgery

Smaller effect sizes were noted for the grade—roughness—breathiness—asthenia—strain perceptual rating scale, administered by an expert rater

General health status measures were the least responsive to change

Our work suggests that all three self-reported voice measures are capable of detecting change. There is no strong evidence, on the basis of sensitivity to change evaluation, to favour one measure over the other two. Whichever one is chosen, the means and standard deviations given in Table I can be used to help determine sample size when planning an evaluation of an intervention. In the present, large sample of patients with benign disorders, the vocal performance questionnaire and the voice symptom scale showed the largest overall effect sizes, while the voice handicap index sensitivity was somewhat lower for both conservative and surgical interventions. The voice handicap index was, however, developed partly in laryngectomy patients; therefore, the responsiveness pattern may well change in subjects with laryngeal malignancy. Figure 1 shows that, especially for the surgery group, the vocal performance questionnaire and the voice handicap index inter-quartile ranges shrank post-treatment. This possibly supplies evidence for a floor effect in these questionnaires, which was not seen in the voice symptom scale.

The data shown here are among the first to record the approximate level of benefit from a heterogeneous group of phonosurgical patients. There was no prior expectation as to the relative effects of speech and language therapy and surgery. Both interventions produced very similar changes in self-reported voice quality, although the expert raters recorded larger improvements in perceived voice quality in the group undergoing speech and language therapy. The study was, however, designed principally to assess the behaviour of the clinical outcomes studied, rather than to compare different subgroups of intervention. The groups were not prospectively matched at baseline, either for disease severity or for diagnostic spread; no treatment comparison inference is therefore possible. Nonetheless, the results do provide useful evidence that the measures used can in future be applied across a range of interventions likely to affect voice-related quality of life.

Acknowledgements

This research was supported by a grant from the Wellcome Trust.

References


Address for correspondence:
Prof. Janet A Wilson,
Dept of Otolaryngology Head Neck Surgery,
Freeman Hospital,
Newcastle upon Tyne NE7 7DN, UK.
Fax: (44) 191 223 1246
E-mail: j.a.wilson@ncl.ac.uk

Professor J A Wilson takes responsibility for the integrity of the content of the paper.
Competing interests: None declared