

Characterization of effective primary voice therapy for dysphonia

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Abstract

Despite advances in the development of voice outcome measures, there is no methodology to define and quantify the elements of the complex process of speech therapy. The components of therapy given by one therapist to the intervention limb of a controlled trial were characterized according to a list of five minutes. The intervention was of proven benefit compared with a control period of observation. Indirect approaches comprised two thirds of therapy time. The types and duration of intervention were assessed but no treatment category seemed more associated with a favourable outcome. The design shows that it is possible to perform a prospective, structured analysis of the components of voice therapy. The method appears viable for the future comparison of the widely varying techniques current in voice therapy practice.

Key words: Dysphonia; Voice Disorders; Speech Therapy, Standards; Treatment Outcomes

Introduction

Measuring the effectiveness of treatment is now a basic requirement of health care delivery. Recent voice therapy literature includes claims for the ‘effectiveness of voice treatment for voice disorders related to vocal misuse, hyperfunction and muscle imbalance, including organic changes, special medical or physical conditions, and psychological disorders’.¹ Many of the studies which support this conclusion, however, have major design flaws.² Related to the lack of good evidence for optimum therapy, we have shown a diversity of practice among a sample of 163 UK voice therapists with respect to their intervention strategies for a variety of common disorders.³ While measures such as counselling and voice hygiene are widely used, direct approaches, such as relaxation, breath support, projection and reduction of hard glottal attack achieved less agreement, although they were regularly used by some therapists for certain disorders.

The process of speech therapy is essentially client centred, i.e. individually tailored to the individual’s circumstances and vocal demands. The present prospective evaluation of voice therapy was performed in the context of our randomized control trial (RCT) of voice therapy in 204 subjects.⁴ This showed that a two to six session course of voice therapy was significantly superior to a period of observation, in terms of both self report and expert observer rated

outcome variables. We now report on a subsidiary aim of the project, that was to assess how feasible it was for the treating therapist to define and quantify the elements of the (successful) therapy regimen. Such definition would be of value in future comparative studies of different types of voice intervention.

Materials and methods

Of 662 patients referred over a three-year period, with a primary symptom of ‘hoarseness’ presents for at least two months, to the Glasgow Royal Infirmary Otolaryngology department, 204 patients aged 17–87 years (mean = 52 years) were deemed eligible and agreed to sole primary intervention by a course of voice therapy. Exclusion criteria were vocal fold paralysis, laryngeal polyp, papilloma or tumour, other neurological disease or upper aero-digestive tract malignancy, performing voice user, puberphonia, previous phonosurgery or voice therapy, significant hearing impairment, acid reflux or multiple medical complaints. The majority of subjects had, therefore, either functional dysphonia, mild laryngitis, small nodules or muscle tension dysphonia.

Patients were randomly allocated to an immediate treatment group or to a control group. All treatment was delivered by one experienced senior voice therapist. Patients and treatment therapist were inevitably not blind to treatment although the laryngologist and research assistants remained so.

TABLE I

20 VOICE TREATMENT COMPONENTS QUANTIFIED FOR EACH SESSION

Indirect techniques	Direct techniques
History	Breath support
Normal voice	Co-ordination
Presenting features	Glottal attack
Voice rest	Pitch
Voice hygiene	Projection
Life style	Intonation
Counselling	Rate
Posture	Resonance
Relaxation	Complexity
	Generalize
	Maintenance

The assessment protocol (described in detail elsewhere⁴) included two key outcome measures, one patient self-report – the Carding Vocal Performance Questionnaire (VPQ),⁵ the other the observer rated Buffalo III Voice Profile,⁶ assessed by a research assistant who was at all stages blind to the status of the patient. The voice therapy treatment techniques used all have widespread acceptance in the published literature.^{5,7,8} Patients randomized to the intervention group began voice therapy immediately. A normal maximum of six sessions was allowed to follow typical voice therapy practice.^{3,9} Voice measurements were repeated at the end of therapy and after a further six to eight weeks.

At the initial attendance session, a detailed case history based on current practice¹⁰ was taken to include the nature and timing of the onset of the dysphonia, nature of voice use, presence of voice abuses (e.g. smoking, throat clearing), relevant past medical history (e.g. asthma, arthritis), and stress factors. Further observations included the treating therapist’s assessment of voice quality, posture, body tension and breathing patterns at rest and during speech. This culminated in the formulation of a causative hypothesis that was explained to the patient. This working hypothesis for the dysphonia was continuously re-evaluated during therapy sessions, and strategies modified accordingly.

Voice therapy programme. In accordance with routine clinical practice, each session lasted around 50 minutes and the patient’s therapy programme was individually designed to meet his or her particular set of causative and maintenance factors, perception of the voice problem, attitude to treatment and prior knowledge base.

Unlike routine practice, however, the structure of each therapy session was carefully documented by the treating clinician in units of five minutes for later analysis. This written documentation was performed immediately after the treatment session in order to represent consultation time as accurately as possible. Patient contact and therapy were characterized

according to 20 categories,² nine indirect and 11 direct (Table I). If progress toward a specific target or therapy aim was unsatisfactory, then the hypothesis and therapy strategy were reformulated. In most cases individual therapy aims should be achievable within short (one or two week) intervals^{2,8,10,11} and unsatisfactory progress could easily be identified by both the clinician and patient. In the final therapy session the individual was offered a reminder of general advice, and specific indirect strategies and direct treatment previously undertaken to reinforce their importance in future management of vocal function. Data analysis was by Statistical Package for Social Sciences (SPSS) Version 8.0.

Results and analysis

The therapy course was completed by 74 of 100 patients randomized to the intervention group. There were eight exclusions after randomization but before therapy, and 18 who defaulted before the treatment was complete. Of the 74, 35 had the full six sessions, 10 had five sessions and in the remainder, the agreed goals were achieved in four or fewer sessions. Overall, 67 per cent of therapy time was devoted to indirect methods (Table II). The average total therapy time for an individual was 242 minutes (range 60 to 400 minutes, Table III).

Over the six sessions, the percentage of time devoted to direct therapy increased from just one per cent in the first session to over 60 per cent of the two final sessions (Table II). Direct therapy techniques were selected according to proven efficacy^{1,12,13} and clinician preference. Table III details the relative use of direct therapy techniques where considerable use of breath support, co-ordination of breathing with phonation and reducing hard glottal attack is evident. The indirect and direct methods listed in Table III are aspects of vocal behaviour which are the focus of particular therapeutic strategies rather than techniques *per se*. The time devoted to maintenance of technique obviously increased as treatment progressed. Certain direct therapies were found to be required very seldom (Table III). Where issues relating to possible underlying psychological distress were clearly the focus of concern to the individual, a counselling approach was adopted.

As previously described,⁴ the overall results of the therapy programme indicated significant benefits in both the VPQ (effect size = 0.54 of the standard deviation – SD, $p < 0.0001$) and the Buffalo scale (effect size = 0.76 SD, $p < 0.001$) over observation alone. The improvement scores for each subject were then correlated with the total session duration, the duration of history taking, the duration of the remaining therapy time, the total indirect therapy

TABLE II
TOTAL THERAPY TIMES FOR THE WHOLE GROUP (MINUTES)

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6	Total therapy time (%)
Total indirect	5820	2315	1735	1330	845	685	12 730 (67)
Total direct	30	985	1215	1595	1340	1045	6210 (33)
Total time overall	5850	3300	3020	2835	2170	1710	18 940 (100)

TABLE III
MEAN DURATION OF VOICE THERAPY COMPONENTS (IN MINUTES)

	Session 1	Session 2	Session 3	Session 4	Session 5	Session 6
No. subjects in session	84	70	66	53	47	36
<i>Indirect methods</i>						
History	49	10	10	10	10	13
Normal voice	5	0.5	0	1	0	0
Presenting features	6	2	1	2	1	1
Voice rest	3	1	0	1	0	0
Voice hygiene	5	2.5	2	2	1	0
Life style	5	2	2	1	1	1
Counselling	10	2	2	2	0	2
Posture	0	4	0	0	0	0
Relaxation	0	9	8	7	6	2
<i>Direct methods</i>						
Breath support	0	11	9	8	5	0
Co-ordination	0	2	4	7	5	5
Glottal attack	0	0	2	0	6	4
Pitch	0	0	0	0	1	2
Projection	0	0	0	1	1	0
Intonation	0	0	0	0	0	0
Rate	0	0	0	0	0	0
Resonance	0	0	0	0	0	0
Complexity	0	0	0	1	3	2
Generalize	0	0	0	0	0	0
Maintenance	0	0	2	4	7	15
Mean session time	69	47	46	48	46	48

One subject had 7th and 8th sessions (not shown). Presenting features = identifying and explanation of the patients presenting features. Co-ordination = appropriate co-ordination of breathing and phonatory tension. Rate = controlling speech rate. Complexity = complex and specific techniques such as on/off voice timing or reducing excessive laryngeal vertical movement during phonation.

and the total direct therapy times. All correlation coefficients, both rank and parametric, were near to zero (Table IV).

Discussion

The study has confirmed the feasibility of a simple, prospective structured analysis of the components of speech and language therapy in a large number of individuals. The results characterize the successful regimen employed in a randomized controlled study of dysphonia patients typical¹⁴ of those likely to be referred for primary voice therapy. It is clear (Table III) that case history review at each session represents an important part of the therapy process (total 36 per cent of session time, an average of over 90 minutes per client during the whole therapy course). This enables the therapist to identify all of the 'precipitating and perpetuating' factors and may have ongoing therapeutic value, as the patient develops increasing insight into the problem and contributes further relevant information which in turn may shift the direction of treatment.

Explanation of normal voice production to the patient occupied on average 1.3 minutes, almost exclusively in the first few sessions of treatment (90 per cent in the first four sessions). More emphasis (Table III) was given to presenting features i.e. an account by the therapist of the patient's deviation from the norm and explanation of possible causes. Counselling remained an important treatment strategy throughout all six sessions, emphasizing the importance of life stresses and psychological imbalances^{14,15} in a dysphonia caseload.

Further analysis shows that the indirect therapy techniques in total (history, normal voice, presenting symptoms, voice rest, vocal hygiene, life style, counselling, posture and relaxation) represents two thirds of the treatment time for patients in this study. This confirms the selected strategies to be in keeping with the greater degree of consensus on the use of indirect approaches in the UK.^{3,16,17} Further, Carding *et al.*² found indirect treatment techniques as effective as direct in a subgroup of patients who consequently did not require any further (direct) treatment.

TABLE IV
CORRELATION OF VOICE OUTCOMES 6 TO 8 WEEKS AFTER THE END OF THERAPY WITH THERAPY DURATION
(Nonparametric Spearman rho, Parametric Pearson r)

Therapy time	Reduction in VPQ		Reduction in Buffalo	
	(rho)	(r)	(rho)	(r)
Length of session	0.017	-0.024	-0.060	-0.011
History of taking	0.151	0.078	-0.130	-0.102
Remaining therapy	-0.035	-0.064	-0.028	0.025
Indirect therapy	0.012	-0.037	0.059	0.101
Direct therapy	-0.032	-0.067	-0.083	-0.030

The tendency for therapy to become steadily more direct throughout a course of therapy (Table II) may indicate that subjects undergoing more sessions either have more refractory problems, requiring more direct interventions or, conversely, that those who undergo only a few sessions miss out on more specific treatments. The latter possibility is worthy of further investigation, especially as there are large international differences in recommended treatment lengths. The treating therapist in the present study (CS) appears to have matched therapy length to requirement. The maintenance of voice quality six to eight weeks after the end of therapy was not related to the number of sessions undertaken (Table IV).

A number of recent approaches^{10,18} favour treatment of vocal malfunction by direct means such as laryngeal manipulation or reducing laryngeal constriction.¹⁹ Relaxation therapy was a major strand of the therapy given (Table III). It encompasses both general relaxation (whose goal is a relaxed state of body and mind) and specific neck/shoulder/laryngeal relaxation (aiming to release tense musculature in and around the vocal apparatus). Some clinicians regard relaxation as a prerequisite for successful therapy, other authorities^{19,20} view voice production and therapy to be active processes, that may even be impaired by a focus on relaxation.

The value of direct work on breath support for phonation is likewise controversial^{11,19} but it proved to be a central part of direct therapy treatment in this study, together with co-ordination of breathing for speech (Table III). The next most common direct method was reduction of hard glottal attack, that is commonly accepted as appropriate in the treatment of hyperfunctional dysphonias.^{7,10,18} Attempts to refine laryngeal tone (altering pitch, developing voice projection, increasing vocal tract resonance) occurred late in the therapy process and in only a minority of cases. Conversely, a significant proportion (six per cent) of therapy time is spent on the maintenance of skills learnt in the therapy process.

The present study reports on the outcomes of hypothesis-based therapy, with continuous evolution of the working hypothesis throughout, according to the clinical responses observed by the treating therapist. There are difficulties associated with monitoring and quantifying the underlying principles behind such an approach. The need for further research to analyse the therapy process is well recognized.² In the present sample of subjects, no clear associations emerged between the relative use of direct or indirect therapeutic techniques and the final outcomes or the total duration of therapy and the final outcomes. The most likely explanation for this, given the nature of the design, is that the ongoing adaptation of the therapy programme, and the identification of its optimum duration were indeed judged fairly precisely. In other words, most patients seem to have received what was for them sufficient therapy to achieve the desired outcome. Had this not been the case, a relationship might have emerged suggesting that longer therapy duration, overall or for one of its major categories, would have

yielded even better results. This explanation remains open to subsequent testing, however, by the prospective evaluation of predetermined packages of different durations.

Most previous studies have evaluated an isolated technique for example 'confidential therapy', accent method,²¹ 'pushing exercises',²² but not a comprehensive, eclectic therapy programme. The principal strength of this study is that the effectiveness of therapy was proven by the study of a parallel non-intervention cohort. It shares, however, the limitation of the homogeneous study group required by RCTs. Primary voice therapy, however, is only appropriate for selected patients with voice disorders. The participation of a single therapist aided the strictly structured analysis of therapy components, but must raise the issue of generalization of the findings to the management of dysphonia in routine clinical practice. Only further, pragmatic controlled trials including a range of therapists, perhaps in a multicentre design, can address these issues.

Conclusions

The dysphonia of patients typically referred to speech therapists show significant improvement in voice quality following a general programme of voice therapy, based on current UK practice,³ and relying heavily on indirect therapy strategies.

The ability to report therapy schedules in a structured and systematic way by the use of 'five minute aliquots' is confirmed.

This method will allow some of the current diversity of voice interventions to be assessed in future study designs.

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References

- 1 Ramig O, Verdolini K. Treatment efficacy: voice disorders. *J Speech Lang Hearing Disord* 1998;**41**:S101-S16
- 2 Carding PN, Horsley IA, Docherty GJ. A study of the effectiveness of voice therapy in the treatment of 45 patients with non-organic dysphonia. *J Voice* 1999;**13**:72-104
- 3 Dunnet CP, MacKenzie K, Robinson K, Sellars GC, Wilson JA. Voice therapy for dysphonia – still more art than science? *Eur J Disord Commun* 1997;**32**:333-43
- 4 MacKenzie K, Millar A, Wilson JA, Sellars C, Deary IJ. Does voice therapy work? A randomised controlled trial of the efficacy of voice therapy for dysphonia. *Br Med J* 2001;**323**:658-61
- 5 Carding PN, Horsley IA. An evaluation of voice therapy in non-organic dysphonia. *Eur J Disord Commun* 1992;**27**:137-48
- 6 Wilson DK. In: *Voice Problems of Children*. 3rd edn, Baltimore: Williams and Wilkins, 1987
- 7 Boone D, Macfarlane SC. In: *The Voice and Voice Therapy*. 4th edn. Englewood Cliffs, New Jersey: Prentice Hall, 1988
- 8 Prater RJ, Smith RW. In: *Manual of Voice Therapy*. Boston/Toronto: College-Hill, 1984
- 9 Mueller PB, Larson GW. Voice therapy practices and techniques: a survey of voice clinicians. *J Common Disord* 1992;**25**:251-60

- 10 Morrison MD, Rammage LA. In: *The Management of Voice Disorders*. London: Chapman and Hall Medical, 1994
- 11 Fawcus M. *Voice Disorders and their Management*. London: Croom Helm, 1986
- 12 Roy N, Gray SD, Simon M, Dove H, Corbin-Lewis K, Stemple JC. An evaluation of the effects of two treatment approaches for teachers with voice disorders; a prospective randomized clinical trial. *J Speech, Lang Hearing Res* 2001;**44**:286–96
- 13 Holmberg EB, Hillman RE, Hammarberg B, Sodersten M, Doyle P. Efficacy of a behaviourally based voice therapy protocol for vocal nodules. *J Voice* 2001;**15**:395–412
- 14 White A, Deary IJ, Wilson JA. Psychiatric disturbance and personality traits in dysphonic patients. *Eur J Disord Commun* 1997;**32**:307–14
- 15 Scott S, Deary IJ, MacKenzie K, Wilson JA. Functional dysphonia – a role for psychologists? *Psychol Health Med* 1997;**2**:169–80
- 16 Gordon MT, Pearson L, Paton F, Montgomery R. Predictive assessment of vocal efficiency (PAVE). A method for voice therapy outcome measurement. *J Laryngol Otol* 1997;**111**:129–33
- 17 Lockhart MS, Paton F, Pearson L. Targets and Timescales: a study of dysphonia using objective assessment. *Logoped, Phoniat Vocol* 1997;**22**:15–24
- 18 Harris T, Harris S, Rubin J, Howard D. *The Voice Clinic Handbook*. London, Whurr Publishers, 1996
- 19 Estill J. *Voicecraft: A User's Guide to Voice Quality*. Santa Rosa, CA: Estill Voice Training Systems, 1995
- 20 Bagnall A. *Complete Voicecraft Manual*. North Adelaide, Voicecraft International (undated).
- 21 Fex B, Fex S, Shiromoto O, Hirano M. Acoustic analysis of functional dysphonia: before and after voice therapy (accent method). *J Voice* 1994;**8**:163–7
- 22 Yamaguchi H, Yotsukura Y, Sata H, Wantanabe Y, Hirose H, Kobayahi N, *et al.* Pushing exercise programme to correct glottal incompetence. *J Voice* 1993;**7**:250–6

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