Title	Predicting the outcome of conservative (non-surgical) voice therapy for adults with laryngeal pathologies associated with hyperfunctional voice use
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Predicting the outcome of conservative (non-surgical) voice therapy for adults with laryngeal pathologies associated with hyperfunctional voice use

Key Messages

1. Conservative voice therapy is the first choice of treatment for hyperfunctional voice problems.
2. Not all dysphonic patients will benefit from voice therapy.
3. A set of instrumental and perceptual variables that can be used to predict the outcome of therapy have been developed in this study.

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Introduction

Conservative (non-surgical) voice therapy is the typical choice of treatment for adults with laryngeal pathologies associated with hyperfunctional voice use. However, not all patients will benefit from conservative voice therapy as it involves behavioural changes that require cooperation of the patients.[1] Owing to the high demand for conservative voice therapy in Hong Kong, selecting appropriate patients could ensure health care resources for this purpose are used cost-effectively.

Objectives

The primary objective of this study was to investigate how well two factors (severity of pathology and perception of activity limitation and/or participation restriction) can predict the outcome of conservative voice therapy. The study aimed to determine whether these two factors could be used as patient selection criteria for conservative voice therapy.

Methods

This project was conducted from November 1998 to December 2001, and consisted of two studies. The first was to develop an assessment tool for quantifying patient's perception of the impact of voice disorders. The second was to investigate the efficacy of a voice therapy programme and the likelihood of predicting successful outcomes based on: (1) severity of pathology, and (2) perception of activity limitation and/or participation restriction.

Subjects

The first study involved 80 subjects (40 dysphonic with various laryngeal pathologies, 40 with normal voice). The second study involved 159 dysphonic subjects. However, due to attrition factor, only 80 female dysphonic subjects were included in the final analysis.

Study instruments

Study 1 involved designing a questionnaire and preliminary testing with 45 dysphonic subjects and 10 speech therapists. It was further validated with 80 dysphonic subjects. Study 2 involved acoustic, aerodynamic, and perceptual measurements with the questionnaire developed in study 1, to determine how well it could be used to predict the outcome of voice therapy.

Intervention

Study 2 involved an intervention voice programme, consisting of 10 weekly sessions. It entailed standard instructional procedures for all individuals. Subjects were randomly allocated to treatment or no-treatment group and all subjects were assessed before and after the intervention.

Main outcome measures

In study 2, acoustic measures, aerodynamic measures, perceptual ratings of

Table 1. Activity limitation and participation restriction scores of the dysphonic and control groups

Profile section	Maximum score	Mean (SD) activity limitation score	Mean (SD) participation restriction score
Dysphonic group			
Job	20	11.52 (5.38)	5.70 (6.04)
Daily communication	60	23.66 (13.37)	27.22 (14.21)
Social communication	20	6.28 (5.56)	6.19 (5.88)
Total	100	41.46 (19.95)	39.10 (23.20)
Control group			
Job	20	1.19 (2.72)	0.54 (1.39)
Daily communication	60	4.45 (6.24)	2.53 (3.98)
Social communication	20	0.74 (1.80)	0.51 (1.08)
Total	100	6.38 (8.42)	3.57 (5.45)

Table 2. Acoustic measurements in the treatment and no-treatment groups

Acoustic measurements	No. of subjects*	Mean	SD	Range	Mean	SD	Range
Treatment group			Pre-treatment			Post-treatment 1	
Maximum fundamental frequency (Hz)	42	723.00†	266.83	277.00-1568.00	912.80†	310.93	311.00-1568.00
Fundamental frequency range (semitone)	42	31.85†	90.20	13.00-48.00	37.18†	8.99	14.00-56.00
Jitter %	30	3.57†	1.23	1.59-6.46	2.89†	1.22	1.33-6.69
Shimmer %	30	9.56†	2.89	5.69-15.80	7.33†	2.23	4.23-14.35
No-treatment group			Assessment 1			Assessment 2	
Maximum fundamental frequency (Hz)	42	848.32	293.46	277.00-1319.00	825.28	207.15	440.00-1245.00
Fundamental frequency range (semitone)	42	34.89	10.76	3.00-56.00	35.07	6.88	24.00-50.00
Jitter %	34	3.35	1.16	1.64-6.86	3.41	1.29	1.70-6.24
Shimmer %	34	9.19	2.22	5.96-15.72	9.82	2.46	6.68-16.77

* Group size varied for each measurement because the subjects produced some unanalysable aperiodic signals
† Significant difference between pre-treatment and post-treatment 1, P<0.05

Table 3. Voice Activity and Participation Profile (VAPP) scores for the treatment and no-treatment groups

VAPP sections	No. of subjects*	Mean	SD	Range	Mean	SD	Range
Treatment group			Pre-treatment			Post-treatment 1	
Self-perceived severity	41	6.60†	1.89	2.20-9.60	3.68†	2.09	0.60-8.30
Job	41	15.21	11.66	0.00-35.30	12.71	9.98	0.00-35.40
Daily	41	62.17†	27.37	8.20-103.70	47.29†	22.77	6.40-91.30
Social	41	14.04†	11.79	0.00-35.70	9.10†	8.79	0.00-22.50
Emotion	41	33.15†	17.79	3.20-69.00	24.86†	17.81	2.00-64.90
Total activity limitation score	41	50.01†	22.74	5.70-85.20	35.23†	17.99	6.70-77.40
Total participation restriction score	41	43.33†	22.74	5.20-81.60	33.88†	19.35	5.50-79.90
Total VAPP	41	132.77†	57.72	20.90-245.30	97.66†	52.32	16.60-220.60
No treatment group			Assessment 1			Assessment 2	
Self-perceived severity	38	6.05	2.43	0.90-10.00	5.71	2.42	1.10-9.50
Job	38	16.95	10.07	0.00-37.40	17.91	10.56	0.00-36.60
Daily	38	57.14	29.69	0.00-115.00	60.33	31.88	0.00-112.80
Social	38	15.88	12.66	0.00-47.30	15.83	10.68	0.00-37.90
Emotion	38	37.03	19.08	0.20-6.70	36.21	21.16	0.00-65.40
Total activity limitation score	38	46.48	23.01	0.00-94.80	47.89	24.67	0.00-95.40
Total participation restriction score	38	43.49	24.28	0.00-86.20	46.18	25.90	0.00-91.20
Total VAPP	38	133.06	65.27	1.80-256.70	136.01	70.51	1.10-260.70

* Group size varied for each measurement because the subjects produced some unanalysable aperiodic signals
† Significant difference between pre-treatment and post-treatment 1, P<0.01

breathiness and roughness, and the Voice Activity and Participation Profile (VAPP) scores were used as the outcome parameters. Selected variables were used in the discriminant function analyses.

Results

Study 1 developed a validated assessment tool (VAPP) for documenting patient perception of voice activity limitation and participation restriction. The study found that subjects who were dysphonic perceived greater impacts than those with normal voices in the occupational domain, daily communication, social communication, and emotional aspect (Table 1). It also found that activity limitation and participation restriction could be affected separately. Specifically, this dissociation was found in the occupational domain, in which a subject might note limitation in activities but had no choice but to continue participating.

In study 2, a conservative voice therapy programme was developed and shown to be effective in treating patients with hyperfunctional voice problems. Subjects who completed the programme showed significant improvement in jitter %, shimmer %, maximum fundamental frequency, fundamental frequency range (Table 2), all the VAPP scores excepting job domain (Table 3). They also showed

Table 4. Change of perceptual voice quality for the treatment and no-treatment groups*

Voice quality	No. of subjects	Treatment group			No-treatment group			*t* value	P value
		Mean	SD	Range	Mean	SD	Range		
Roughness	42	1.71	1.06	0.00-4.50	-1.73	1.25	-5.00 to 2.50	13.602	0.001†
Breathiness	42	1.79	1.68	1.50-5.00	-1.54	1.35	-4.50 to 1.50	10.005	0.001†
Overall severity	42	2.36	1.29	0.50-4.50	-1.89	1.38	-4.50 to 2.00	14.647	0.001†

* Positive and negative values denote improvement and worsening of vocal quality, respectively
† Significant at 0.001 level (2-tailed)

improvement in all three perceptual voice qualities ratings (Table 4), in comparison to subjects who were given no treatment. Furthermore, three predictive variables (Pearson *r* at autocorrelation peak, mean flow rate for sentence production, noise-to-harmonic ratio and the total VAPP score) were all found to show high discriminative power in predicting changes in severity (perceptual breathiness) after treatment.

Discussion

The findings of this study have led to the development of an assessment battery that can be used to reliably predict the outcome of voice therapy. The battery consists of instrumental and perceptual analysis of the vocal pathology and condition, and a questionnaire surveying patients' perception of disability and handicap caused by the vocal impairment. The assessment battery can be used as a clinical tool to select patients for conservative voice therapy. This tool will improve the accountability and cost-effectiveness of voice therapy.

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Reference

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