# Is More Intensive Better? Client and Service Provider Outcomes for Intensive Versus Standard Therapy Schedules for Functional Voice Disorders

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**Summary: Background.** Functional dysphonias are commonly associated with reduced treatment attendance leading to variable treatment outcomes. Preliminary research has proposed that intensive treatment may improve client adherence and outcomes; however, further research into the application of intensive models in functional dysphonia in comparison with standard intensity models is warranted.

**Aims.** The present study evaluated the impact of intensive and standard treatments on functional, well-being, and service outcome measures in clients with functional dysphonia.

**Methods.** Participants with a functional dysphonia were randomly allocated to one of two treatment groups: (1) intensive treatment (n = 7) or (2) standard treatment (n = 9). Participants completed the voice handicap index (VHI) and the Australian therapy outcome measures voice assessment (conducted by a blinded assessor) before and after treatment and 4 weeks after treatment. Satisfaction questionnaires were completed after treatment and data pertaining to attendance and duration of intervention were collected throughout treatment. In addition to a vocal hygiene education session, all participants received a total of 8 hours of treatment; intensive treatment consisted of four 1-hour treatment sessions per week over 2 weeks, whereas the standard group received one 1-hour treatment session per week over 8 weeks.

**Results.** High satisfaction and statistically significant improvements on the VHI ratings were found after treatment in the intensive group. Significantly greater attendance rates were found in the intensive group. Intensive treatment is a potentially viable service delivery option for functional dysphonia and warrants further larger scale investigation.

**Key Words:** Functional dysphonia–Treatment–Intensive–Motor learning.

## INTRODUCTION

Voice disorders currently impact up to 4% of Australian adults and 6.6% of adults in America.[1,2] Functional dysphonia, being the result of technical misuse, voice overuse/strain, and inappropriate laryngeal tension, is the most prevalent voice disorder seen by speech pathologists[3] and is reported to account for 57% of voice referrals.[4] Individuals with functional dysphonia often experience difficulties in performing daily tasks requiring oral communication, especially in occupations dependant on voice use,[5] and often report reduced well-being.[6] Not surprisingly, it has been estimated that up to a third of the individuals with voice disorders suffer from greater stress, anxiety, and depression compared with the healthy population.[7] Indeed, client reports of quality of life impairments as a result of their voice disorder have been found to be comparable if not more severe than medical conditions, such as rheumatoid arthritis, hemodialysis treatments, and asthma, which would generally be considered to be more serious.[8]

To maximize functional voice outcomes and resultant well-being, voice therapy by a speech pathologist is considered to be the preferred option for treating functional voice disorders as other surgical or medical interventions are generally not indicated.[9] Although a systematic review of seven randomized controlled trials has indicated that voice therapy is effective in improving vocal performance in individuals with functional dysphonia,[10] traditional voice therapy services are frequently associated with poor client compliance, cancellations, and nonattendance.[11–13] Reduced client adherence and cancellations not only lead to emotional frustration for clinicians[14] but also reduced cost efficiency of public health services.[13] However, of even more importance is the negative impact reduced adherence to treatment may have on vocal outcomes, potentially hindering not only an individual's functional voice use but also their overall quality of life as a result of the continued or recurring dysphonia.[13] As the success of voice therapy is heavily reliant on the client's compliance with the voice therapy process,[14] further investigation into service delivery models which both maximize client adherence and voice outcomes and resultant well-being is warranted.

Traditionally, voice therapy services for functional dysphonia are provided approximately once a week over a number of months,[15] with published voice therapy techniques using a once weekly format for approximately 8 weeks.[16,17] A new and innovative service delivery model that has been proposed to not only increase client attendance but also yield improved client outcomes is a high-intensity voice therapy model.[18] In contrast to standard weekly voice therapy, an intensive model provides greater opportunity for practice and transfer/generalization,[18] being consistent with the principles of motor learning, which certain authors assert to be essential for acquisition and maintenance of healthy vocal behaviors.[19,20] Although

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increased attention into the principles of motor learning has emerged in the area of speech pathology with particular focus on intensity of treatment[21] or using a massed practice schedule (ie, more sessions provided over shorter amount of time), limited research has been devoted to exploring how principles of motor learning including practice distribution apply to therapy for functional voice disorders.

One intensive voice treatment that boasts a large body of evidence supporting its efficacy is the Lee Silverman Voice Treatment or LSVT-LOUD.[22–25] This program is delivered intensively (using a massed practice schedule), over 16, 1-hour sessions for 4 days a week throughout 4 weeks and has been evidenced to yield functional voice improvements in individuals with Parkinson disease (PD) for up to 2 years after treatment.[24] Although such evidence supports the use of a high-intensity treatment model for voice disorders in PD, research into the application of intensive voice treatment for functional voice disorders requires further exploration.

A concept article by Patel et al[18] examined the notion of a voice therapy "Boot Camp" for individuals with functional dysphonia in which participants received approximately 5 hours of therapy for 1–4 successive days with up to seven different clinicians. Therapy was individualized to address the client's unique needs and aimed to complete in 1 day the content that is typically taught in 2 weeks of traditional therapy. Although potential advantages to intensive therapy were discussed, no specific outcomes were reported in the article.

Another study investigated the effectiveness of 2 weeks of intensive voice therapy in 37 individuals with functional and organic dysphonia in combination with physiotherapy and manual therapies compared with a group of 40 healthy control participants.[26] The study revealed significant improvements in a voice handicap questionnaire for participants with moderate dysphonia after the intensive treatment.[26] Although the study did not compare the intensive treatment with a traditional schedule, the authors postulated its potential superiority over less-intensive traditional models. As Fischer et al[26] involved the use of additional physical therapies in its design, it is still unknown what effect the use of intensive voice treatment alone may have on individuals with functional dysphonia. Moreover, it is unknown how an intensive treatment model compares with traditional model once weekly schedules in terms of client outcomes and well-being, as well as client adherence and satisfaction, which would assist in determining the clinical feasibility of such a model.

Verdolini-Marston et al[19] described the effects of providing two different treatment methods (ie, confidential voice and resonant voice) for vocal nodules using an intensive model (eight individual sessions over 2 weeks) compared with a control group (receiving single voice hygiene session only). All participants receiving treatment (n = 8) improved on at least one outcome measure after treatment, with three of these improving across all measures compared with zero of five participants in the control group. The authors indicated that the homework adherence was a predictor of success after both intensive treatments. Although the study demonstrated the potential benefit to voice outcomes that some individuals may achieve after intensive voice therapy, it is unclear whether similar outcomes may have been achieved had a more traditional treatment schedule been used. Furthermore, as participants were not randomly allocated to treatments, potential bias may be inherent within the results. Although nonfibrous vocal fold nodules, as investigated by Verdolini-Marston et al,[19] are considered to be a form of functional dysphonia secondary to muscle tension dysphonia,[27] further research into the use of an intensive treatment schedule in other types of functional dysphonia is warranted.

As highlighted by the current evidence gap, there subsequently exists a need for further investigation into the functional impact of intensive voice therapy in comparison with standard therapy in functional dysphonia, as well as evaluating the effects of treatment on client satisfaction and attendance.

### Aims and hypotheses

The primary aim of the research project was to compare intensive voice therapy with standard weekly voice therapy on their impact on functional outcomes and well-being in individuals with functional voice disorders. Second, the study aimed to investigate the clinical feasibility of the intensive treatment model in comparison with the standard treatment model, in relation to client satisfaction, attendance, and compliance. It was hypothesized that individuals receiving the intensive voice therapy would demonstrate comparable or superior functional outcomes in comparison with individuals receiving the standard weekly voice therapy schedule because of the greater opportunity for motor learning. Moreover, it was expected that the project would indicate that the intensive voice treatment would be a clinically feasible service delivery model resulting in comparable if not greater client satisfaction, attendance, and compliance compared with the standard treatment model.

## METHODS

### Participants

Inclusion and exclusion criteria. Participants were adult outpatients aged between 32 and 76 years referred to Gold Coast Hospital and Health service's voice outpatient clinic at Robina Hospital and presented with a functional dysphonia arising from musculoskeletal etiologies and/or occupational voice use. All participants underwent a nasendoscopy performed by an ear nose throat (ENT) specialist before participation to ensure that there was no vocal fold pathology present where therapy is contraindicated. Participants were excluded if he or she presented with poor English proficiency, known cognitive impairment or neurologic pathology, significant hearing loss, a history of malignant vocal fold pathology or laryngeal surgery, benign vocal fold pathology for which voice therapy is not indicated (eg, vocal polyps, granuloma, cyst), a diagnosed conversion voice disorder, or pregnancy.

Recruited participants. A total of 24 people diagnosed with a functional voice disorder who met the inclusion/exclusion criteria were invited to participate in the study, as depicted in Figure 1. Of these, 17 consented to participate in the study. As detailed in Table 1, eight participants (all female) were

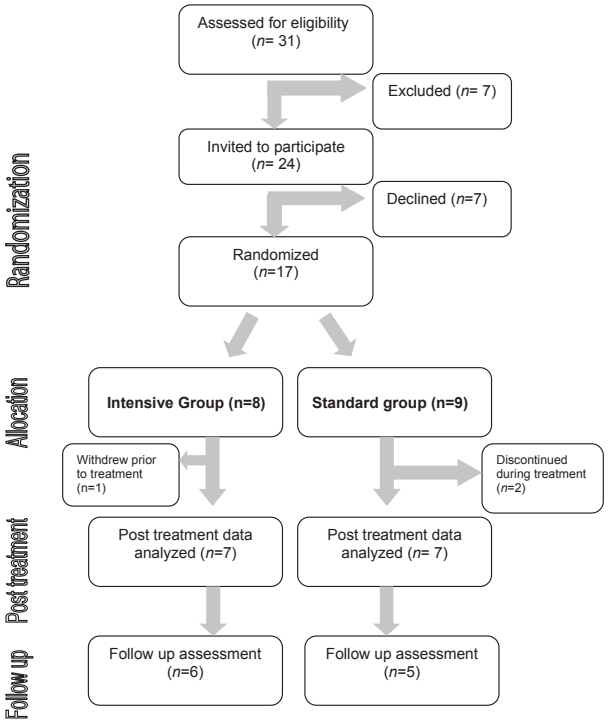


**FIGURE 1.** Schematic flowchart of participants through study.

randomly allocated to the intensive group with a mean age of 50.7 years (standard deviation [SD], 14.3 years; range, 32–75 years). Nine participants (eight women and one man) were randomly allocated into the standard group with a mean age of 58.4 years (SD, 10.88 years; range, 39–76 years). Median time after onset for the intensive group was 1.75 years (SD, 13.6 years; range, 0.3–40 years); median time after onset for the standard group was 1.5 years (SD, 1.67 years; range, 0.5–6 years). Nonparametric independent sample tests indicated that groups did not significantly differ in age ($P = 0.200$) or time after onset ($P = 0.963$).

Participant 15 from the intensive group withdrew after baseline assessment before treatment commencing because of unforseen changes with work commitments; consequently, their data were unavailable to be used in the study. Participants 5 and 12 in the standard group withdrew after commencing treatment as a result of unexpected health complications. Participant 5 withdrew in the final week of the treatment protocol and was unavailable for assessment, whereas participant 12 withdrew after 4 weeks of treatment. Subsequently, organizational data for participants 5 and 12 were analyzed; however, functional, well-being, and satisfaction outcomes were not available.

Randomization. The study used a concealed randomization method using number tables by a researcher not involved in participant assessment or treatment. Groups were stratified according to dysphonia severity being (1) mild and mild-moderate and (2) moderate and moderate- severe, as determined by an expert speech pathologist according to the Australian therapy outcome measures (AusTOMs) impairment level descriptor.[28] Because of uneven participant numbers near the end of data collection and funding constraints restricting subsequent participant recruitment, the final three participants (ie, participants 15, 16, and 17) in the study were block randomized into the intensive group.

## Procedure

Before commencing treatment, a nasendoscopy performed by an ENT Specialist was conducted to evaluate vocal fold function and classify the functional voice disorder according to the standard classification by Morrison and Rammage,[29] as listed in Table 1.

A detailed initial case history regarding the participant's perception of their voice, history of the problem, voice usage, and other relevant behaviors and medical history was undertaken by a speech pathologist independent to the treating clinician and blind to the participant's treatment group.

## Functional measures

To evaluate both the participant's and the clinician's perspective on the client's voice impairment and impact on everyday function, participants completed the voice handicap index (VHI)[30] (self-report questionnaire) and were also rated on the AusTOMs by a blinded assessor before treatment, immediately after treatment and at follow-up, being 4 weeks after treatment. The VHI is a 30-item questionnaire that evaluates people's perception of their voice disorder and its impact on their well-being and everyday functioning. It includes a total score and three subscales: functional, physical, and emotional. The AusTOMs evaluate the impact of the voice disorder across four domains (impairment, activity, participation, and well-being) in accordance with the International Classification of Functioning, Disability, and Health[31] framework. The assessment involves the clinician rating the severity of the individual's vocal function across these four domains on an 11-point scale from 0 to 5 (half points are given between two descriptor points), having the same procedure as the original United Kingdom version of the therapy outcome measure,[32] however having modified language to be more relevant to the Australian clinical context.

Because of funding time constraints, no follow-up data were available for participants 13 and 14 in the standard treatment group. Follow-up data on the AusTOMs were also unavailable for participant 9 in the intensive group as they were unable to attend a face-to-face assessment. This participant was however able to complete the VHI questionnaire remotely.

## Service outcome measures

Compliance and attendance. Data pertaining to the number and length of sessions and participant attendance were collected by the treating speech pathologist throughout the duration of the treatment, as listed in Table 4.

Satisfaction. A short questionnaire partially based on a previously published satisfaction questionnaire[19] was provided to participants by a speech pathologist independent to the treating clinician immediately after treatment to evaluate treatment satisfaction. Participants were asked to state their level of agreement with 11 statements on a Likert scale of 1–5 with 1 indicating that they "strongly disagree" and 5 indicating that they "strongly agree." Three additional free-form questions were

**TABLE 1.**
**Participant Details**

| Participant Number | Group | Gender | Age | Severity* | Diagnosis | ENT Rating† | Duration Since Onset (Months) | Occupation |
|---|---|---|---|---|---|---|---|---|
| 1 | Intensive | Female | 75 | Moderate | MTD with anterior-posterior narrowing and false vocal fold constriction | 2b and 3 | 480 | Retired nurse educator (carer for husband) |
| 3 | Intensive | Female | 44 | Mild | Chronic laryngitis/MTD with anterior-posterior constriction | 1 and 3 | 6 | Business marketing consultant |
| 9 | Intensive | Female | 67 | Mild | Abduction dysphonia | 1 | 3 | Retired cleaner |
| 10 | Intensive | Female | 39 | Mild | MTD and prenodular swelling | 1 | 6 | Singing teacher |
| 11 | Intensive | Female | 45 | Moderate | Vocal fold nodules | 1 | 36 | Naturopath |
| 16 | Intensive | Female | 54 | Moderate | MTD | 1 | 30 | Disability pension and previous retail |
| 17 | Intensive | Female | 50 | Mild | MTD with anterior-posterior constriction, false vocal fold constriction, and true vocal fold adduction | 2a, 2b, and 3 | 12 | Checkout operator |
| 15 | Intensive | Female | 32 | Mild-moderate | Slight phonatory gap on some vocal tasks, anterior-posterior constriction, and mild false vocal fold hyperfunction | 1, 2b, and 3 | 36 | Clinical educator |
| 4 | Standard | Female | 57 | Mild-moderate | MTD and some adduction false vocal folds | 2b | 72 | Social worker |
| 2 | Standard | Female | 76 | Moderate | MTD | 1 | 30 | Retired singer |
| 6 | Standard | Male | 39 | Mild | Nodules | 1 | 18 | Music teacher |
| 7 | Standard | Female | 58 | Mild | MTD with anterior-posterior constriction | 3 | 6 | Opera singer |
| 8 | Standard | Female | 49 | Moderate | MTD, with splinting of the vocal folds preventing complete adduction, and supraglottic lateral constriction/ hyperfunction | 1 and 2b | 6 | Housewife and mother |
| 13 | Standard | Female | 61 | Mild | Some anterior-posterior constriction and hyperfunction of false vocal folds, with ventricular folds approximating in the midline and occluding view of the true vocal folds during phonation | 2b and 3 | 36 | Primary school teacher |
| 14 | Standard | Female | 53 | Mild | False vocal fold and anterior-posterior constriction and early vocal fold nodules | 1, 2b, and 3 | 6 | University student |

(*Continued*)

**TABLE 1.**
***(Continued)***

| Participant Number | Group | Gender | Age | Severity* | Diagnosis | ENT Rating† | Duration Since Onset (Months) | Occupation |
|---|---|---|---|---|---|---|---|---|
| 5 | Standard | Female | 68 | Severe | Total supraglottic closure, anterior-posterior and lateral constriction, and mild Reinke edema | 1, 2b, and 3 | 36 | Retired |
| 12 | Standard | Female | 65 | Mild | Anterior-posterior laryngeal constriction and incomplete vocal fold adduction on some tasks | 1 and 3 | 8 | Retired |

*Abbreviation:* MTD, muscle tension dysphonia.
* Severity ratings based on AusTOMs impairment descriptor.
† Ratings based on scale by Morris and Rammage[29]: 1 = laryngeal isometric; 2a = glottic hyperadduction; 2b = supraglottic hyperadduction; 3 = supraglottic anterior-posterior constriction.

also included in the questionnaire that allowed participants to comment on what they liked most about the treatment, what aspects of the treatment they did not like, and opportunity to provide suggestions regarding improving the treatment.

## Treatment

**Vocal hygiene education.** All participants attended a single 1-hour vocal hygiene education session before commencing treatment provided by an expert speech pathologist who was independent to the treating clinician and unaware of treatment group allocation. The session involved a power point presentation that included education regarding voice production and a discussion of evidenced-based vocal hygiene strategies. As part of the session, participants also viewed an 8-minute digital video disc excerpt regarding anatomy and physiology of the voice.[33]

**Individual treatment.** Participants in both groups were provided with an individualized treatment program by the same certified speech pathologist, C.W, experienced in providing treatment for individuals with voice disorders. Treatment was composed of elements from current evidence-based behavioral treatments including resonance voice therapy[17,34] and Voicecraft techniques.[35] Specific treatment techniques that each participant received are found in Table 2.

All participants were offered a total of 8 hours of treatment, with the intensity of treatment delivery varying depending on group allocation. Participants randomly allocated to take part in the intensive treatment group were scheduled to receive four 1-hour treatment sessions per week for 2 weeks. Participants in the standard treatment group were scheduled to receive one 1-hour treatment session per week for 8 weeks.

**Homework.** As part of individualized treatment, participants in both groups were asked to practice tasks learnt in the session independently. Participants recorded how many minutes per day of homework they completed which was reported to the treating speech pathologist at the beginning of each session.

## Data analyses

Statistical analyses were performed using the *SPSS computer software program* (version 19; IBM, Armonk, NY). Because of small sample sizes, nonparametric-related sample Friedman two-way analysis of variance by ranks were used to determine if any main effect for time was found for the VHI and AusTOMs variables within each treatment group. Because of multiple comparisons being performed, statistical corrections were made for the four subtests of the AusTOMs and three subtests of the VHI. As such, a *P*-value of less than 0.0125 was considered statistically significant for the AusTOMs subtests and less than 0.0167 for the VHI subtests and total score subtests. When a main effect was found, appropriate post hocs (ie, Wilcoxon matched pairs) were used to determine where the degree of change (ie, between pre-post follow-up and post follow-up) occurred. To identify significant differences between the two treatment groups at each time point, Mann-Whitney *U* tests were performed. The same tests were performed to determine whether any significant difference occurred between the groups for the organizational variables (eg, number and length of

**TABLE 2.**
**Therapy Techniques Used**

| | | Techniques Used | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Group | Participant Number | Stretch | Resonant Voice | Sob | Twang | Silent Giggle | Onset of Tone | Gentle Onset |
| Intensive | 1 | ✓ | | | | ✓ | ✓ | |
| | 3 | ✓ | ✓ | | ✓ | ✓ | ✓ | |
| | 9 | ✓ | ✓ | | | | | ✓ |
| | 10 | ✓ | | | | ✓ | ✓ | |
| | 11 | ✓ | ✓ | | | ✓ | ✓ | |
| | 16 | ✓ | ✓ | | | | | ✓ |
| | 17 | ✓ | ✓ | | | | | ✓ |
| Standard | 2 | ✓ | ✓ | ✓ | | | | |
| | 4 | ✓ | | | | ✓ | ✓ | |
| | 6 | ✓ | | | ✓ | ✓ | ✓ | |
| | 7 | ✓ | | | ✓ | ✓ | ✓ | |
| | 8 | ✓ | ✓ | | ✓ | | | ✓ |
| | 13 | ✓ | ✓ | | | | | |
| | 14 | ✓ | ✓ | | | | | |
| | 5* | ✓ | ✓ | | | | | |
| | 12* | ✓ | ✓ | | | | | |

* These participants did not complete the entire treatment block.

sessions, attendance) and the Likert scale responses of the satisfaction questionnaire. Qualitative methods were used to identify key themes in the free-form response sections participant satisfaction questionnaires.

The VHI data were furthermore analyzed according to clinically significant criterion as established in the literature.[30] Subsequently, a change of 18 points or more on the total VHI score and a shift of eight points or more for the functional, physical, and emotional subscales were considered clinically significant and not because of unexplained variability inherent in the VHI.[30]

## RESULTS

### Functional measures

Voice handicap index. No statistically significant differences between groups were found for the total VHI score or the three subscales at any time point. It should be noted that high variability between participants with large SDs were found for the VHI (as well as the AusTOMs), as shown in Table 3. Within-group changes however were identified in the intensive group. Statistical analyses in the intensive group revealed a main effect for time for the total VHI (Table 3) and the physical scores. Post hoc analyses indicated significant improvements from pre- to post-treatment for the total VHI score ($P = 0.008$) and physical score ($P = 0.002$), with the total score maintaining significance at follow-up ($P = 0.005$) The improvement between pretreatment and follow-up on the total VHI score was also found to be clinically significant.

Although a general trend of improved mean VHI ratings were found after treatment and at follow-up in the standard group (as shown in Table 3), no significant main effects for time were found for any of the VHI variables. Inspection of individual changes in the standard group (Appendix 1) revealed that four participants demonstrated clinically significant improvements at posttreatment and/or follow-up for the VHI on at least one of the subscales.

AusTOMs ratings. No statistically significant between-group differences or main effects for time within either group were found for any of the AusTOMs ratings (Table 3). Although not statistically significant, inspection of individual data revealed that at least four of seven participants in the intensive group demonstrated improved ratings for activity limitation, participation, and well-being after treatment, which were generally maintained at follow-up (Appendix 2). In the standard group, five of seven participants demonstrated improvements to ratings across all four domains after treatment, with most improvements also being maintained at follow-up.

### Service outcomes

Compliance and attendance. Statistically significant differences between groups were found for three of the measures including total amount of homework completed; percentage of canceled appointments, being greater in the standard group (Table 4); and total amount of treatment received, being greater in the intensive group. It should be noted that when the amount of homework was averaged in accordance with the length of respective treatment, no significant difference between groups was found for the average amount of homework completed per week. Although not statistically significant, there was a higher percentage of shortened sessions in the standard group compared with the intensive group. The only participants who withdrew from the treatment were two participants in the standard group. Reasons for nonattendance in the intensive and standard groups included sickness and conflicting appointments. Other reasons in the standard group also included family factors, work commitments, and "emotional factors."

**TABLE 3.**
**VHI and AusTOMs Group Changes**

| Variable | Group | Pre Mean (SD) | Post Mean (SD) | FU Mean (SD) | Time Main Effect $X^2$ | Time Main Effect $P$ |
|---|---|---|---|---|---|---|
| VHI | | | | | | |
| Total | Intensive | 49.14 (15.56) | 35.42 (20.9) | 26.71* (19.25) | 11.63 | 0.003† |
| | Standard | 38.00 (21.03) | 25.42 (17.18) | 26.00 (17.13) | 3.26 | 0.196 |
| Functional | Intensive | 12.57 (6.42) | 10.42 (7.59) | 6.71 (6.21) | 2.64 | 0.030 |
| | Standard | 9.00 (8.00) | 5.57 (5.99) | 6.80 (6.37) | 2.84 | 0.241 |
| Physical | Intensive | 24.71 (4.49) | 17.57 (4.85) | 13.14 (6.71) | 13.55 | 0.001† |
| | Standard | 20.57 (6.37) | 13.57 (5.34) | 13.80 (5.26) | 4.52 | 0.104 |
| Emotional | Intensive | 13.28 (6.15) | 7.42 (9.01) | 6.85 (7.49) | 6.32 | 0.042 |
| | Standard | 9.71 (8.95) | 6.28 (6.62) | 5.40 (6.80) | 5.44 | 0.066 |
| AusTOMs | | | | | | |
| Impairment | Intensive | 3.57 (0.53) | 3.78 (0.56) | 4.33 (0.76) | 7.60 | 0.022 |
| | Standard | 3.50 (0.64) | 4.28 (0.39) | 4.40 (0.42) | 6.615 | 0.037 |
| Activity | Intensive | 3.71 (0.48) | 4.28 (0.48) | 4.33 (0.57) | 7.53 | 0.023 |
| | Standard | 3.57 (0.97) | 4.71 (0.48) | 5.00 (0.00) | 4.80 | 0.091 |
| Participation | Intensive | 4.14 (0.69) | 4.57 (0.53) | 4.67 (0.57) | 2.80 | 0.247 |
| | Standard | 3.86 (0.62) | 4.85 (0.37) | 5.00 (0.00) | 7.53 | 0.023 |
| Well-being | Intensive | 3.78 (0.39) | 4.71 (0.48) | 4.67 (0.57) | 8.00 | 0.018 |
| | Standard | 3.64 (0.94) | 4.71 (0.48) | 4.60 (0.54) | 5.69 | 0.058 |

*Abbreviations:* SD, standard deviation; FU, follow-up.
* Clinically significant change.
† Significant *P*-value ($P \leq 0.0167$).

Satisfaction. Overall satisfaction was high across both treatments. No statistically significant differences between respondents were found on any items on the satisfaction questionnaire; a trend however was noted for the item "I received enough treatment for my voice" which was generally rated higher in the intensive group compared with the standard group (Table 5). Themes from the free-form questionnaire regarding what factors participants liked the most about treatment were similar across both treatment groups, as shown in Table 6. The only theme that differed between groups was one participant from the intensive group commented that they enjoyed the intensity of the treatment. Apart from one participant who commented on having more real-life transfer activities, no other participants in the intensive group identified factors that they did not like about treatment or suggestions for improvement. Three participants in the standard group provided comments regarding factors that they did not like about treatment and/or suggestions for improvement. These comments pertained to not having enough therapy and wanting more opportunities for practice and one comment about not being able to complete recommended practice.

## DISCUSSION

The present study aimed to compare the impact of intensive voice therapy with standard weekly voice therapy on functional

**TABLE 4.**
**Mean Organizational Outcomes**

| Variable | Intensive Mean (SD), n = 7 | Standard Mean (SD), n = 9 | Between-group Differences (*P*) |
|---|---|---|---|
| Average session duration (minutes) | 59.20 (1.47) | 55.74 (5.29) | 0.091 |
| Average number of shortened sessions (of maximum 8) | 0.43 (0.78) | 1.00 (0.70) | 0.142 |
| Total treatment received (hours) | 7.75 (0.38) | 5.81 (2.34) | 0.002* |
| % Original appointment attendance | 94.64 (6.68) | 72.50 (25.95) | 0.055 |
| % Rescheduled appointments | 1.78 (4.72) | 5.55 (9.08) | 0.535 |
| % Appointments canceled | 1.78 (4.72) | 23.33 (26.39) | 0.023* |
| Total duration homework completed (hours) | 3.03 (1.41) | 9.15 (5.79) | 0.042* |
| Total proportion homework completed per week (hours/week) | 1.51 (0.70) | 1.23 (0.65) | 0.606 |

*Abbreviation:* SD, standard deviation.
* Significant *P*-value ($P \leq 0.05$).

**TABLE 5.**
**Satisfaction Questionnaire Results**

| | | | % of Total Responses on Likert Scale | | | | |
|---|---|---|---|---|---|---|---|
| Question | Group | Mean Rating (SD) | Strongly Agree (1), % | Disagree (2), % | Neutral or No Opinion (3), % | Agree (4), % | Strongly Agree (5), % |
| 1. I feel satisfied with the overall service | Intensive | 4.71 (0.48) | 0 | 0 | 0 | 28.5 | 71.5 |
| | Standard | 4.71 (0.48) | 0 | 0 | 0 | 28.5 | 71.5 |
| | COMP | $P = 1.00$ | | | | | |
| 2. I felt well informed about my voice | Intensive | 4.85 (0.37) | 0 | 0 | 0 | 14.3 | 85.7 |
| | Standard | 4.74 (0.48) | 0 | 0 | 0 | 28.5 | 71.5 |
| | COMP | $P = 0.710$ | | | | | |
| 3. Voice Tx improved my voice overall | Intensive | 4.57 (0.53) | 0 | 0 | 0 | 42.8 | 57.2 |
| | Standard | 4.42 (0.53) | 0 | 0 | 0 | 57.2 | 42.8 |
| | COMP | $P = 0.710$ | | | | | |
| 4. I found it easy to make time for Tx | Intensive | 4.42 (0.53) | 0 | 0 | 0 | 57.2 | 42.8 |
| | Standard | 4.28 (0.48) | 0 | 0 | 0 | 71.5 | 28.5 |
| | COMP | $P = 0.710$ | | | | | |
| 5. It was easy to get to the hospital for Tx | Intensive | 4.42 (0.53) | 0 | 0 | 0 | 57.2 | 42.8 |
| | Standard | 4.28 (0.75) | 0 | 0 | 14.2 | 42.9 | 42.9 |
| | COMP | $P = 0.805$ | | | | | |
| 6. I was motivated to attend Tx | Intensive | 4.85 (0.37) | 0 | 0 | 0 | 14.3 | 85.7 |
| | Standard | 4.71 (0.48) | 0 | 0 | 0 | 28.67 | 71.4 |
| | COMP | $P = 0.710$ | | | | | |
| 7. It was easy to cope with Tx frequency | Intensive | 4.85 (0.37) | 0 | 0 | 0 | 14.3 | 85.7 |
| | Standard | 4.71 (0.48) | 0 | 0 | 0 | 28.67 | 71.4 |
| | COMP | $P = 0.710$ | | | | | |
| 8. I was able to do recommended home practice | Intensive | 4.28 (0.48) | 0 | 0 | 0 | 71.5 | 28.5 |
| | Standard | 3.71 (0.75) | 0 | 0 | 14.3 | 85.7 | 0 |
| | COMP | $P = 0.259$ | | | | | |
| 9. I received an adequate amount of Tx | Intensive | 4.43 (0.78) | 0 | 0 | 0 | 28.5 | 57.2 |
| | Standard | 3.42 (0.97) | 0 | 28.67 | 0 | 71.4 | 0 |
| | COMP | $P = 0.073$ | | | | | |
| 10. I will use techniques learnt in real life in the future | Intensive | 4.42 (0.53) | 0 | 0 | 0 | 57.2 | 42.8 |
| | Standard | 4.85 (0.37) | 0 | 0 | 0 | 14.3 | 85.7 |
| | COMP | $P = 0.209$ | | | | | |
| 11. I would recommend this Tx to someone else | Intensive | 4.85 (0.37) | 0 | 0 | 0 | 14.3 | 85.7 |
| | Standard | 4.85 (0.37) | 0 | 0 | 0 | 14.3 | 85.7 |
| | COMP | $P = 1.00$ | | | | | |

*Notes:* COMP = comparison between groups using Mann-Whitney *U* test.

outcomes and well-being in individuals with functional voice disorders and investigate the clinical feasibility of the intensive treatment model in comparison with standard treatment, in relation to client satisfaction, attendance, and compliance.

### Functional outcomes and well-being

Participants in the intensive group were found to report significantly reduced voice handicap ratings (ie, VHI) after treatment. Individual improvements to well-being (ie, AusTOMs—well-being and VHI—emotional subscale) were also found after both treatments, although not reaching statistical significance. The present study was the first to our knowledge that has compared the impact of intensive voice treatment with standard or traditional nonintensive models in functional dysphonia. As no significant differences were found between groups for the functional and well-being outcomes, the present study highlights the potential clinical value of using an intensive treatment model as a service delivery option which may result in comparable, if not greater, improvements with voice handicap and subsequent well-being in individuals with functional dysphonia.

The present study's finding of significantly reduced voice handicap as measured by the VHI supports previous research by Fischer et al,[26] which revealed significantly reduced emotional and social handicap scores for participants with functional dysphonia after intensive treatment. Interestingly, although Fischer et al found significant posttreatment improvements for participants reporting a moderate voice handicap, participants reporting a severe voice handicap showed minimal change after treatment. The authors proposed that these individuals possibly required longer rehabilitation phases to influence environmental or contextual factors, which may have been contributing to their voice disorder. In similarity to the findings

**TABLE 6.**
**Themes From Satisfaction Questionnaire**

| Questionnaire Item | Intensive (Total Respondents, n = 7) | Standard (Total Respondents, n = 7) |
|---|---|---|
| What participants liked most about the treatment | Technique<br>"made me aware of what I had to do to project my voice more clearly" (partic. 1)<br>"learning technique to help my voice" (partic. 3)<br>"good modelling for me to follow" (partic. 17)<br>Supportive staff<br>"It was easy to do because I had a wonderful teacher" (partic. 16)<br>"helpful people, encouraging" (partic. 17)<br>"lovely speech therapists" (partic. 11)<br>Treatment outcome<br>"the quality of my voice" (partic. 9)<br>Education<br>"speech therapists … were dedicated to ensuring I was well-informed re my condition and why we were doing the vocal exercises" (partic. 11)<br>Intensity<br>"I liked the frequency—ensuring that my learning the new techniques was improving daily. This was very motivating to keep practising and trying hard to put time into the exercises." (partic. 10) | Technique<br>"The instruction was adapted to my specific circumstances. ie, music teacher in a hectic high school." (partic. 6)<br>"treatment was easy to do and practice myself at home" (partic. 8)<br>"The relaxation exercises are good for releasing tension. I enjoyed the forward resonance activities." (partic. 13)<br>Supportive staff<br>"… fabulous encouragement from SP and non-judgmental attitude" (partic. 4)<br>"SP was very professional, positive, motivating" (partic. 6)<br>"SP was wonderful … took time to answer my questions and make therapy relevant to my situation" (partic.14).<br>Treatment outcome<br>"finding that I could really make a difference by applying the exercises" (partic. 2)<br>Education<br>"Education about the anatomy, explanation about the specific disorder, learning and moving forward with techniques about my disorder" (partic. 4)<br>"When I asked questions I was given concise answers and/or demonstration of the concepts." (partic. 7) |
| What participants did not like | Total respondents: n = 1*<br>Difficulty of transfer<br>"I found it difficult to go back to glottal stroke after learning simultaneous onset. Just a note this it would have been good to be clear that long term I would be using both (may have been my misunderstanding)" (partic. 10) | Total respondents: n = 4*<br>Homework<br>"my part—not performing well when little practice of home exercises. Although this was an incentive to do the exercises" (partic. 4)<br>Not enough therapy<br>"Would have likes to do more with twang and breathing" (partic. 6)<br>"I think I require a little more treatment in order to be completely satisfied. There is a couple of things that could be improved" (partic. 7)<br>Fatigue<br>"Sometimes I found it tiring at the end of the working day" (partic. 14). |
| Suggestions for improvement | Total respondents: n = 1*<br>Real life transfer<br>"More time spent on integrating into real life. Ideally, I feel that another week of this intensive support would have been fantastic whilst integrating singing and getting back to speaking for an hour at a time with clients. Thanks so much. It was great!" (partic. 10) | Total respondents: n = 2*<br>Additional practice opportunities<br>"Saturday morning clinic" (partic. 4)<br>"Possible a DVD that you could take home whereby a person demonstrates the exercises or concept—that enables you to have an image as well as vocal coaching." (partic. 7) |

*Abbreviations:* partic., participant; SP, speech pathologist; DVD, digital video disc.
* All other participants indicated "nil" or nothing relevant for this response.

by Fischer et al, the two participants in the intensive group who reported a severe handicap according to the VHI (being between 57 and 65 points for the total VHI score[30]) also showed minimal change to their total VHI score immediately after treatment. Interestingly, both these individuals showed a more notable improvement on this measure at follow-up.

The finding of a greater improvement at follow-up compared with posttreatment was also evident for the intensive group's mean total VHI score, however not for the standard group. This trend is consistent with previous research that has revealed progressive improvements to voice handicap after six and 12 months after treatment, irrespective of whether independent practice was completed and was speculated that individuals may have progressively learnt how to better self-manage their voice in real-life situations.[36] In the present study, the more pronounced (and clinically significant) improvements at follow-up that were not evident immediately after treatment may indicate that motor learning may have continued to occur after treatment and reinforced certain behaviors taught during the treatment period in the absence of active rehabilitation.[37] The fact that this same effect was not found following standard therapy in the present research may indicate that the intensive treatment schedule potentially enhanced motor learning and provided greater opportunity for the individual to consolidate the learnt vocal techniques and vocal hygiene behaviors day-to-day resulting in a reduced overall voice handicap and improved well-being. Indeed, one of the participants in the intensive group commented in the satisfaction questionnaire that the frequency of therapy ensured that her learning of the new techniques was improving daily. In contrast, four participants in the standard therapy group reported in the posttreatment satisfaction questionnaire that they either wanted more therapy or additional practice opportunities, possibly suggesting that they did not feel that they had "mastered" learning the vocal techniques they were taught. No participants in the intensive group made any comments of this nature in their questionnaires. Although not evaluated in this study, it is also possible that other factors, such as personality, motivation, and/or personal resilience/support, may have also impacted on the improvements reported at follow-up.

Anecdotal feedback from the treating clinician also supported the notion of enhanced learning in the intensive group and found learning of taught vocal behaviors was generally quicker in the intensive group, whereby progression through the hierarchy of treatment techniques and carryover could occur more efficiently. Contrastingly, the treating clinician reported that for participants in the standard group, a greater amount of time was generally spent revising acquisition of basic vocal strategies from the previous week, being the "prepractice" phase of intervention. In regards to motor learning principles, prepractice is the phase of intervention whereby "the client acquires a basic knowledge of what the task is and how to perform it through conscious and focused attention of the movement"[20 p.29]. Practice is the phase of intervention involving learning (including maintenance and generalization) through improving the proficiency and accuracy of the desired movement or task.[20,38] It could be argued then that in comparison with the intensive group, the standard group treatment sessions involved greater time being spent in the prepractice phase of intervention as opposed to the practice phase, therefore likely impacting on the rate of learning and generalization. As this clinician feedback was anecdotal, future research that quantifies the precise proportion of time allocated during intervention to practice and prepractice phases may be useful.

The present findings may provide preliminary evidence investigating practice distribution (ie, distributed vs massed practice) on learning and generalization for individuals with functional voice disorders. Although a number of studies involving nonspeech motor tasks have investigated the impact of practice distribution on learning, apart from a study comparing practice schedules of the LSVT-LOUD in PD,[39] limited research has explored the effect of practice distribution in speech or voice.[38,40] Indeed, Roy cautions against interventions "over-dosing" on voice therapy because of the risk of damage to laryngeal tissues until further research is undertaken. The positive outcomes of the intensive treatment in the present study, with no adverse effects being documented to participants voice function, may stimulate further larger scale research exploring the impact of intensive versus nonintensive practice in people with functional dysphonia to further define optimal dose-response relationships.

## Organizational outcomes

The present study not only demonstrated the benefit of intensive therapy at an individual level to voice handicap and well-being after intensive therapy but also the potential benefit to service providers and clinicians as a result of increased client attendance. Significantly increased client attendance in the intensive group may potentially reduce the emotional frustration for clinicians associated with cancellations[14] and may also increase cost efficiency of health services provided to the public.[13] In addition, greater adherence to treatment schedules may also result in improved patient outcomes, as found by Verdolini-Martson et al[19] The present study revealed that approximately 25% of the sessions in the standard group resulted in cancellations, being consistent with previous research reporting high nonattendance for clients receiving traditional voice therapy.[11] As most public health clinic funding is attributed to the activity or number of clients seen, continued use of models which yield this proportion of nonattendance may potentially result in reduced productivity of a service in comparison with the more intensive model over time.

Reasons for the improved adherence in the intensive service compared with the standard service were not clearly defined by the results of the satisfaction questionnaire as both groups did not report any difference in overall satisfaction, the convenience of coming to therapy, or motivation, which have previously been reported to have an impact on treatment attendance.[14] Previous research has revealed that individuals most likely to attend therapy were female, younger, employed, with fewer laryngeal diagnoses and medical problems, a less severe voice disorder, and lower VHI scores at the start of therapy.[13] Consistent with these findings, the two participants who withdrew from the standard therapy were both female, not currently employed, and had extensive coexisting medical complaints. Severity was however disparate between the two participants, with one exhibiting a severe voice disorder and

the other demonstrating a mild impairment. It should be noted however that participant 1 who was randomly allocated to the intensive group was also female, not currently employed, with extensive medical problems, and a high VHI score but showed excellent adherence to treatment. Because of the small participant numbers in the present research, further research is therefore needed before any conclusions can be drawn regarding individual characteristics (ie, severity, age, etc.) and response and compliance to treatment.

### Limitations and future directions

Certain limitations of the research can also be identified which may assist in designing future investigations in the area. First, being a pilot study, a small sample size was used, with a high degree of variability between participants. Future research with larger participant numbers may allow for more powerful statistical analysis to be performed, possibly detecting further outcomes which may able to be more readily generalized to other individuals with functional dysphonia. Larger participant numbers would also facilitate a more reliable investigation into which individual factors (eg, ENT diagnosis, age, gender, time after onset, other personal factors) may lead to more positive outcomes following intensive therapy. The authors also acknowledge that the decision to use a blocked randomization procedure for the last three participants in the study may have been a potential bias in the study design. However, considering the pilot nature of the data, it was felt that even numbers for participant groups were more useful for this phase of research.

Another important limitation of the study was that because of the individualized nature of treatment, participants received different treatment techniques. Although catering therapy to target the individual's unique profile of voice impairment is representative of what is performed clinically, it is not definitive whether the success of treatment was related to the type of treatment technique participants received (ie, ingredient of treatment) or the dosage (ie, intensive vs standard). To investigate more purely the impact of intensity or motor learning principles (ie, massed vs distributed practice) on treatment outcomes, future research may wish to standardize the treatment received between individuals. Because of the reduced participant attendance, individuals in the standard group also received significantly less treatment hours overall than the intensive group. If possible, future research may also include standardizing the hours of therapy received within each group to eliminate any potential bias.

The authors also acknowledge that the internal validity of the VHI has been questioned by certain authors, including the validity of individual subtests versus using the total score.[6,13,14] Although functional and well-being outcomes provide valuable information on the effects of treatment, future research should also involve the investigation of other objective parameters including perceptual and acoustic findings to further evaluate treatment effects.

## CONCLUSION

For an alternative model of care to be deemed successful, it should be considered a success from the perspective of both the client and the health care provider and the clinician.[41] The present research revealed that from a client's perspective, participants in the intensive group showed high satisfaction and significantly reduced voice handicap after treatment. From a health care provider/clinician perspective, significantly higher attendance for the intensive model was also found compared with the standard model, leading to potentially greater clinician satisfaction. In light of these findings, clinicians and service providers may therefore wish to consider trialing the implementation of intensive models (ie, eight sessions a week for 2 weeks) on an individual basis for clients with functional dysphonia. It is advised that implementation of such service delivery models is carried out within a research framework until further larger scale research is undertaken.

**APPENDIX 1.**
**Individual and Group Mean Results of VHI Questionnaire**

| | | Functional | | | Physical | | | Emotional | | | Total | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Partic. | Pre | Post | FU | Pre | Post | FU | Pre | Post | FU | Pre | Post | FU |
| Intensive | 1 | 12 | 8 | 1* | 27 | 14* | 6 | 16 | 2* | 2* | 55 | 24* | 9* |
| | 3 | 12 | 4 | 4* | 17 | 14 | 13 | 7 | 0 | 0 | 26 | 18 | 17 |
| | 9 | 9 | 6 | 8 | 23 | 14* | 14 | 6 | 4 | 12 | 38 | 24 | 34 |
| | 10 | 23 | 21 | 17 | 25 | 21 | 19 | 19 | 21 | 17 | 67 | 63 | 53 |
| | 11 | 14 | 10 | 2* | 22 | 17 | 3 | 14 | 3* | 0* | 50 | 30* | 5* |
| | 16 | 2 | 3 | 2 | 29 | 16* | 15 | 9 | 2 | 2 | 40 | 21* | 19* |
| | 17 | 16 | 21 | 13 | 30 | 27 | 22* | 22 | 20 | 15 | 68 | 68 | 50* |
| Standard | 2 | 5 | 3 | 0 | 16 | 11 | 10 | 2 | 9 | 0 | 23 | 23 | 10 |
| | 4 | 18 | 16 | 14 | 23 | 21 | 20 | 22 | 18 | 17 | 63 | 55 | 51 |
| | 6 | 11 | 2* | 2* | 15 | 12 | 11 | 6 | 1 | 1 | 32 | 15 | 14 |
| | 7 | 21 | 2* | 5* | 29 | 12* | 9* | 22 | 3* | 5 | 72 | 17* | 19* |
| | 8 | 6 | 12 | 13 | 17 | 19 | 19 | 11 | 11 | 4 | 34 | 42 | 36 |
| | 13 | 2 | 4 | | 29 | 15* | | 2 | 2 | | 24 | 21 | |
| | 14 | 0 | 0 | | 15 | 5* | | 3 | 0 | | 18 | 5 | |

*Abbreviations:* partic., participant; FU, follow-up.
* Clinically significant change.

**APPENDIX 2.**
**Individual Results of AusTOMs**

| | | Impairment | | | Activity | | | Participation | | | Well-being | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Group | Partic. | Pre | Post | FU | Pre | Post | FU | Pre | Post | FU | Pre | Post | FU |
| Intensive | 1 | 3 | 3 | 3.5✓ | 4 | 4 | 4 | 4 | 5✓ | 5✓ | 4 | 5✓ | 5✓ |
| | 3 | 4 | 4 | 5✓ | 4 | 5✓ | 5✓ | 5 | 5 | 5 | 4 | 5✓ | 5✓ |
| | 9 | 4 | 4 | n/a | 4 | 4 | n/a | 4 | 5✓ | n/a | 3.5 | 5✓ | n/a |
| | 10 | 4 | 4.5✓ | 4.5✓ | 3 | 4✓ | 4✓ | 3 | 4✓ | 4✓ | 4 | 4 | 4 |
| | 11 | 3 | 3 | 4.5✓ | 3 | 4✓ | 5✓ | 4 | 4 | 5✓ | 3 | 5✓ | 5✓ |
| | 16 | 3 | 4✓ | 4 | 4 | 5✓ | 5✓ | 4 | 5✓ | 5✓ | 4 | 5✓ | 5✓ |
| | 17 | 4 | 4 | 4 | 4 | 4 | 4 | 5 | 4 | 4 | 4 | 4 | 4 |
| Standard | 2 | 3 | 4✓ | 4 | 4 | 5✓ | 5✓ | 4 | 5✓ | 5✓ | 4 | 4 | 5✓ |
| | 4 | 4 | 4 | 4 | 3 | 5✓ | 5✓ | 4 | 5✓ | 5✓ | 3 | 4✓ | 4✓ |
| | 6 | 4 | 4 | 4.5✓ | 4 | 4 | 5✓ | 3.5 | 5✓ | 5✓ | 3.5 | 5✓ | 5✓ |
| | 7 | 4.5 | 5✓ | 5✓ | 4 | 5✓ | 5✓ | 3.5 | 4✓ | 5✓ | 2 | 5✓ | 5✓ |
| | 8 | 3 | 4✓ | 4.5✓ | 5 | 4 | 5 | 5 | 5 | 5 | 5 | 5 | 5 |
| | 13 | 3 | 4.5✓ | n/a | 2 | 5✓ | n/a | 3 | 5✓ | n/a | 4 | 5✓ | n/a |
| | 14 | 3 | 4.5✓ | n/a | 3 | 5✓ | n/a | 4 | 5✓ | n/a | 4 | 5✓ | n/a |

*Abbreviations:* partic., participant; FU, follow-up; ✓, improvement from pretreatment; n/a, not available.

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