Voice Therapy

Number: 0646

Policy

*Please see amendment for Pennsylvania Medicaid at the end of this CPB.*

Note: Voice therapy is subject to any benefit limitations and exclusions applicable to speech therapy. See CPB 0243 - Speech Therapy.

I. Aetna considers voice therapy medically necessary to restore the ability of the member to produce speech sounds from the larynx for any of the following indications:

A. Following surgery or traumatic injury to the vocal cords; or
B. Following treatment for laryngeal (glottic) carcinoma; or
C. Paradoxical vocal cord motion; or
D. Spastic (spasmodic) dysphonia; or
E. Vocal cord nodules; or
F. Vocal cord paralysis.

II. Aetna considers voice therapy not medically necessary for any of the following indications:

A. Essential voice tremor; or
B. Improvement of voice quality; or
C. Laryngeal hyperadduction; or
D. Laryngitis; or
E. Muscle tension dysphonia (functional dysphonia); or
F. Occupational or recreational purposes (e.g., public speaking, singing, etc.); or
G. Supraglottic vocal hyperfunction.

III. Aetna considers resonant voice therapy (e.g., Lessac-Madsen resonant voice therapy, and Lessac Y-Buzz) experimental and investigational because its effectiveness has not been established.

Note: Megaphones or amplifiers (e.g., ChatterVox, Mega Mite Megaphone) may be of use in the absence of illness or injury and therefore do not meet Aetna's definition of covered durable medical equipment.

Note: An electronic artificial larynx (artificial voice box) that is used by laryngectomized individuals and persons with a permanently inoperative larynx is covered as a prosthetic. See "Note" regarding electronic speech aids accompanying CPB 0437 - Speech Generating Devices. See also CPB 0560 - Voice Prosthesis for Voice Rehabilitation Following Total Laryngectomy.

Note: Voice therapy for male-to-female transgender individuals to feminize the voice or for female-to-male transgender individuals to masculinize the voice is considered cosmetic. See also CPB 0615 - Gender Reassignment Surgery.

Background
Vocal cord paralysis is a voice disorder that occurs when one or both of the vocal cords (or vocal folds) do not open or close properly (NIDCD, 1999). Vocal cord paralysis is a common disorder, and symptoms can range from mild to life threatening. Someone who has vocal cord paralysis often has difficulty swallowing and coughing because food or liquids slip into the trachea and lungs. This happens because the paralyzed cord or cords remain open, leaving the airway passage and the lungs unprotected.

Vocal cord paralysis may be caused by head trauma, a
neurological insult such as a stroke, a neck injury, lung or thyroid cancer, a tumor pressing on a nerve, or a viral infection (NIDCD, 1999). In older people, vocal cord paralysis is a common problem affecting voice production. People with certain neurological conditions, such as multiple sclerosis or Parkinson’s disease, or people who have had a stroke may experience vocal cord paralysis. In many cases, however, the cause is unknown.

People who have vocal cord paralysis experience abnormal voice changes, changes in voice quality, and discomfort from vocal straining (NIDCD, 1999). For example, if only 1 vocal cord is damaged, the voice is usually hoarse or breathy. Changes in voice quality, such as loss of volume or pitch, may also be noticeable. Damage to both vocal cords, although rare, usually causes people to have difficulty breathing because the air passage to the trachea is blocked.

Vocal cord paralysis is usually diagnosed by an otolaryngologist (NIDCD, 1999). Noting the symptoms the patient has experienced, the otolaryngologist will ask how and when the voice problems started in order to help determine their cause. Next, the otolaryngologist listens carefully to the patient’s voice to identify breathiness or harshness. Then, using an endoscope, the otolaryngologist looks directly into the throat at the vocal cords. A speech-language pathologist may also use an acoustic spectrograph, an instrument that measures voice frequency and clarity, to study the patient’s voice and document its strengths and weaknesses.

There are several methods for treating vocal cord paralysis, among them surgery and voice therapy. In some cases, the voice returns without treatment during the first year after damage (NIDCD, 1999). For that reason, doctors often delay corrective surgery for at least 1 year to be sure the voice does not recover spontaneously. During this time, the suggested treatment is usually voice therapy, which may involve exercises to strengthen the vocal cords or improve breath control during speech. Sometimes, a speech-language pathologist must teach patients to talk in different ways. For instance, the therapist might suggest that the patient speak more slowly or consciously open the
mouth wider when speaking.

Surgery involves adding bulk to the paralyzed vocal cord or changing its position (NIDCD, 1999). To add bulk, an otolaryngologist injects a substance, commonly Teflon, into the paralyzed cord. Other substances currently used are collagen, silicone, and body fat. The added bulk reduces the space between the vocal cords so the non-paralyzed cord can make closer contact with the paralyzed cord and thus improve the voice.

Sometimes an operation that permanently shifts a paralyzed cord closer to the center of the airway may improve the voice (NIDCD, 1999). Again, this operation allows the non-paralyzed cord to make better contact with the paralyzed cord. Adding bulk to the vocal cord or shifting its position can improve both voice and swallowing. After these operations, patients may also undergo voice therapy, which often helps to fine-tune the voice.

Treating people who have 2 paralyzed vocal cords may involve performing a surgical procedure called a tracheotomy to help breathing (NIDCD, 1999). In a tracheotomy, an incision is made in the front of the patient's neck and a breathing tube (tracheotomy tube) is inserted through a hole, called a stoma, into the trachea. Rather than breathing through the nose and mouth, the patient now breathes through the tube. Following surgery, the patient may need therapy with a speech-language pathologist to learn how to care for the breathing tube properly and how to reuse the voice.

Vocal cord nodules (singer's nodules) are small, hard, callus like growths that usually appear singly on the vocal cord (Merck, 1997). Nodules consist of condensations of hyaline connective tissue in the lamina propria at the junction of the anterior 1/3 and posterior 2/3 of the free edges of the true vocal cords. Vocal cord polyps are small, soft growths that usually appear singly on a vocal cord. They are most often caused by vocal abuse or long-term exposure to irritants, such as chemical fumes or cigarette smoke.
Vocal cord nodules are caused by chronic voice abuse, such as yelling, shouting, or using an unnaturally low frequency (Merck, 1997). Chronic infections caused by allergies and inhalation of irritants, such as cigarette smoke, may also produce these lesions. Hoarseness and a breathy voice result. Carcinoma should be excluded by biopsy.

Treatment for nodules that do not resolve with voice therapy involves surgical removal of the nodules at direct laryngoscopy and correction of the underlying voice abuse. Vocal nodules in children usually regress with voice therapy alone.

If nothing is done to change vocal abuse habits, vocal cord nodules can last a lifetime, and may even recur after surgical removal. With proper voice training with a certified therapist, nodules can disappear with 6 to 10 voice therapy sessions over 6 to 12 weeks. With rest, some vocal cord polyps will go away on their own within a few weeks. Most, however, will require surgical removal.

Speech therapists use a variety of techniques to restore a patient's ability to produce speech, including:

- Patients are instructed in voice modification and relative voice rest. At its most extreme, relative voice rest involves an initial period of between 4 and 7 days using the voice no more than 15 mins in each 24-hr period. It is normally undertaken with speech therapist supervision, once its advantages and disadvantages have been explored with the patient.

- Patients are instructed to minimizing voice use. This involves speaking no more than is absolutely necessary. Patients are taught to be succinct when speaking, to avoid any loud use of the voice, to keep phone calls brief and to avoid all non-speech voice use (throat clearing, coughing, “voiced” sneezing, crying, “voiced” laughing, and odd sound-effects).

- Patients are told to avoid any “voice abuse” practices identified by the speech therapist. Patients are instructed to avoid or modify internal (bodily and psychological) and external (environmental) voice-damaging environments as much as possible.
Patients are instructed in how to engage in a short warm-up period of controlled, soft vocal exercises before using the voice. Patients may also be advised, where appropriate, to keep a supply of drinking water handy, and to massage under their chin if their mouth becomes dry.

Patients are taught good voice production techniques. Patients may be instructed in optimal breathing patterns, to speak more slowly, to articulate clearly, to speak at a comfortable pitch and loudness level, to use pitch change rather than volume change for emphasis, to monitor their posture, to avoid monotone delivery, and to be aware of muscle tension.

Patients may be advised to avoid speaking when they are ill or tired. Dehydration, fatigue and other general medical conditions have an effect on the mucosa covering the vocal cords, potentially altering lubrication and vocal efficiency.

Laryngitis due to viral infection usually resolves within 1 to 3 weeks. Laryngitis due to vocal abuse will generally go away on its own in a few days with voice rest.

Functional voice disorders are characterized by the presence of vocal symptoms without anatomical laryngeal abnormality. Muscle tension dysphonia (MTD) is the most common disorder in this category.

Van Houtte et al (2013) stated that muscle tension dysphonia (MTD) is a clinical and diagnostic term describing a spectrum of disturbed vocal fold behavior caused by increased tension of the (para)laryngeal musculature. Recent knowledge introduced MTD as a bridge between functional and organic disorders. These researchers addressed the causal and contributing factors of MTD and evaluated the different treatment options. They searched MEDLINE (PubMed, 1950 to 2009) and CENTRAL (The Cochrane Library, Issue 2, 2009). Studies were included if they reviewed the classification of functional dysphonia or the pathophysiology of MTD. Etiology and pathophysiology of MTD and circumlaryngeal manual therapy (CMT) were obligatory based on reviews and prospective cohort studies because randomized controlled trials (RCTs) are non-existing. Concerning the
treatment options of voice therapy and vocal hygiene, selection was based on RCTs and systematic reviews. Etiological factors can be categorized into 3 new subgroups: (i) psychological and/or personality factors, (ii) vocal misuse and abuse, and (iii) compensation for underlying disease. The effective treatment options for MTD are (i) indirect therapy: vocal hygiene and patient education; (ii) direct therapy: voice therapy and CMT; (iii) medical treatment; and (iv) surgery for secondary organic lesions. The authors concluded that MTD is the pathological condition in which an excessive tension of the (para)laryngeal musculature, caused by a diverse number of etiological factors, leads to a disturbed voice. Etiological factors range from psychological/personality disorders and vocal misuse/abuse to compensatory vocal habits in case of laryngopharyngeal reflux, upper airway infections, and organic lesions. MTD needs to be approached in a multi-disciplinary setting where close cooperation between a laryngologist and a speech language pathologist is possible.

Roy et al (2005) reported on the prevalence of voice disorders from a questionnaire of 1,326 adults in Iowa and Utah. The authors reported a lifetime prevalence of a voice disorder of 29.9 %, with 6.6 % of participants reporting a current voice disorder. Risk factors for chronic voice disorders included sex (women), age (40 to 59 years), voice use patterns and demands, esophageal reflux, chemical exposures, and frequent cold/sinus infections. However, tobacco or alcohol use did not independently increase the odds of reporting of a chronic voice disorder. Altman et al (2005) reported on a retrospective chart review of 150 patients with MTD seen at a single referral center over 30-month period. The authors stated that significant factors in patient history believed to contribute to abnormal voice production were gastroesophageal reflux in 49 %, high stress levels in 18%, excessive amounts of voice use in 63%, and excessive loudness demands on voice use in 23 %. Otolaryngologic evaluation was performed in 82 % of patients, in whom lesions, significant vocal fold edema, or paralysis/paresis was identified in 52.3 %. Speech pathology assessment revealed poor breath support, inappropriately low pitch, and visible cervical neck tension in the majority of patients. Inappropriate intensity was observed in 23.3
Morrison et al (1983) stated that 100 out of 500 consecutive patients seen at the Voice Clinic of the University of British Columbia exhibited features of muscle tension dysphonia. The authors stated that muscular tension dysphonia is commonly seen in young and middle aged females, and is manifest by excess tension in the paralaryngeal and suprahypoid muscles, an open posterior glottic chink, larynx rise, and frequently mucosal changes on the vocal cords.

Much of the literature on muscle tension dysphonia has focused on examining differences between affected persons and normal controls. Zheng et al (2012) reported on differences in a variety of aerodynamic parameters in persons with MTD and normal controls. Lowell et al (2012) reported on x-ray measures of the hyoid and larynx in persons diagnosed with MTD and normal controls. There is inconsistent evidence for differences in surface EMG measures between persons affected with MTD and normal controls (van Houtte et al, 2011; Hocevar-Boltezar et al, 1998). In a prospective control-blinded, cross-sectional study of 51 patients with functional dysphonia and 52 non-dysphonic controls, Sama et al (2001) found that the laryngoscopy features commonly associated with functional dysphonia are frequently prevalent in the non-dysphonic population and fail to distinguish patients with functional dysphonia from normal subjects.

Nguyen et al (2009) reported on differences in presenting symptoms of MTD in Vietnamese-speaking teachers compared to the typical symptoms in English-speaking persons, suggesting a potential contribution of linguistic-specific factors and teacher-specific factors to the presentation of MTD. Rubin et al (2007) reported that an ear-nose and throat surgeon identified certain patterns of musculoskeletal abnormalities in 26 voice professionals with voice disorders, including a high held larynx, a shortening or contraction of the stylohyoid and sternocleidomastoid muscles, and a weak deep flexor mechanism. The authors noted that the correlation proved to be excellent among the subgroup of patients who were performers, but only fair-to-good among the other voice professionals. The
investigators stated that, in this small group, most patients seemed to improve with physiotherapy, although it was not clear that these improvements could be attributed to physiotherapy, as the patients concurrently received other treatments.

Kooijman et al (2005) reported on observed relationships between extrinsic laryngeal muscular hypertonicity and deviant body posture on the one hand and voice handicap and voice quality on the other hand in 25 teachers with persistent voice complaints and a history of voice-related absenteeism. The authors state that muscular tension and body posture should be assessed in persons presenting with voice disorders.

Other literature has focused on differences between persons with MTD and adductor spasmodic dysphonia (ADSD). Patel et al (2011) reported on differences in vibratory characteristics between persons with MTD and persons with ADSD. In a case-control study, Houtz et al (2010) reported spectral noise differences between females with MTD and ADSD, but not for men. Roy et al (2008) reported on differences in phonatory breaks between persons with ADSD and persons with MTD. Angsuwarangsee and Morrison (2002) reported on findings on palpation of extrinsic laryngeal muscles in muscle misuse dysphonia (MMD) with or without gastroesophageal reflux. Sapienza et al (2000) reported on differences in acoustic phonatory events in patients with ADSD and MTD. Higgins et al (1999) reported significant differences in mean phonatory air flow in subjects with ADSD, MTD, and normal subjects, and very large intersubject variation in mean phonatory air flow for both subjects with ADSD and MTD. Roy (2010) stated that differences between MTD and ADSD have been identified during fiberoptic laryngoscopy, phonatory airflow measurement, acoustic analysis, and variable sign expression based upon phonatory task. He reported, however, that "no single diagnostic test currently exists that reliably distinguishes the two disorders."

Some of the literature on voice therapy focuses on the use of laryngeal manipulation in the diagnosis and treatment of voice disorders (e.g., Roy et al, 1996; Rubin et al, 2000). Roy et al (1996) stated that excessive activity of the extralaryngeal muscles
affects laryngeal function and contributes to a spectrum of interrelated symptoms and syndromes including muscle tension dysphonia and spasmodic dysphonia. The authors explained that manual laryngeal musculoskeletal tension reduction techniques are used in the diagnosis and management of laryngeal hyperfunction syndromes. The authors explained that manual technique consists of focal palpation to determine (i) extent of laryngeal elevation, (ii) focal tenderness, (iii) voice effect of applying downward pressure over the superior border of the thyroid lamina, and (iv) extent of sustained voice improvement following circum-laryngeal massage.

Roy (2003) stated that while voice therapy by an experienced speech-language pathologist remains an effective short-term treatment for functional dysphonia (FD) in the majority of cases, but less is known regarding the long-term fate of such intervention. The author stated that poorly regulated activity of the intrinsic and extrinsic laryngeal muscles is cited as the proximal cause of functional dysphonia, but the origin of this dysregulated laryngeal muscle activity has not been fully elucidated. The author stated that several causes have been cited as contributing to this imbalanced muscle tension. Roy stated, however, that recent research evidence points to specific personality traits as important contributors to its development and maintenance. Roy stated that further research is needed to better understand the pathogenesis of functional dysphonia, and factors contributing to its successful management.

Many of the studies of report on patients before and after therapy, but lack a control group (e.g., Stepp et al, 2011; Lee and Son, 2005; Birkent et al, 2004). Other evidence voice therapy in muscle tension dysphonia consists of case reports (Roy et al, 1996).

Stepp et al (2011) found that relative fundamental frequency (RFF) surrounding a voiceless consonant in patients with hyperfunctionally related voice disorders increased towards patterns of healthy normal individuals following a course of voice therapy. Pre- and post-therapy measurements of RFF were compared in 16 subjects undergoing voice therapy for voice
disorders associated with vocal hyperfunction. The authors reported that a 2-way analysis of variance showed a statistically significant effect of both cycle of vibration near the consonant and therapy phase (pre- versus post-). A post-hoc paired Student's t-test showed that posttherapy RFF measurements were significantly higher (more typical) than pretherapy measurements. Limitations of this study include its small size, lack of control group, limited followup, and use of intermediate endpoints.

Lee and Son (2005) reported on a retrospective review of the clinical records of 8 Korean male children diagnosed as having MTD, 7 of whom had bilateral vocal nodules on laryngoscopic examination. The authors reported that a few sessions of voice therapy, focusing on awareness, relaxation, respiration and easy-onset phonation to reduce the tension around the laryngeal muscles, resulted in dramatic improvement of their voice quality and pitch adjustment. Limitations of this study included its small size, retrospective nature, and lack of control group.

Rosen et al (2000) reported on a retrospective review the results of treatment of a series of 37 subjects with unilateral vocal fold paralysis (UVFP) (n = 14), muscle tension dysphonia (MTD) (n = 10), and vocal fold polyp or cyst (VFP/C) (n = 13). The majority of the UVFP group were treated with surgical vocal fold medialization followed by postoperative voice therapy. Patients with MTD were treated with voice therapy. Patients in the VFP/C group were treated with phonmicrosurgery and pre- and post-surgical voice therapy. All patients in the study were also treated with combined behavioral and medical therapy for suspected laryngopharyngeal reflux when appropriate. For patients with MTD, voice therapy consisted of 6 to 14 sessions, with an average of 8 sessions. The primary endpoint of the study was the Voice Handicap Inventory (VHI), which quantifies the patients' perception of disability due to voice difficulties. The authors found a statistically significant difference between the pre-and post-treatment VHI for the UVFP and the VFP/C groups. There was a trend toward improvement in VHI in the MTD group, but it lacked statistical significance.
Birkent et al (2004) reported on the efficacy of voice therapy techniques in 37 Turkish patients with functional dysphonia, including mutational falsetto (n = 16), vocal nodule (n = 17), and muscle-tension dysphonia (n = 4). The authors reported that 15 patients with mutational falsetto (93 %), 8 patients with vocal nodules (47 %), and all 4 patients with muscle-tension dysphonia were cured by voice therapy techniques. Limitations of this study include its small size and lack of control group.

Rubin et al (2007) found that persons presenting with voice problems frequently have musculoskeletal issues. All 26 patients with presenting voice problems were found by a physiotherapist to have musculoskeletal abnormalities. Certain patterns of musculoskeletal abnormalities were frequently encountered, including a high held larynx, a shortening or contraction of the stylohyoid and sternocleidomastoid muscles, and a weak deep flexor mechanism. The authors stated that the correlation proved to be excellent among the subgroup of performers, but only fair-to-good among the other voice professionals. The authors stated that, in this small group, most patients seemed to improve following physiotherapy, although the authors stated that "it must be noted that management was not limited to physiotherapy."

Andrews et al (1986) evaluated two methods of relaxing laryngeal musculature in 10 adults with hyperfunctional dysphonia. Subjects were matched into groups receiving either laryngeal surface EMG biofeedback or progressive relaxation, both within a graded voice training program. Assessments were conducted pre-treatment, post-treatment and at 3-month follow-up. Measures included the level of superficial laryngeal tension using an electromyogram, control of vocal fold vibration from an electrolaryngograph and an auditory evaluation using a phonation profile. Two personality questionnaires were administered and the subjects' self-rating of voice was recorded. The authors reported a significant improvement in all measures for both programs, which was maintained at 3-month follow-up, with no significant differences between the two approaches. Limitations of the study include small sample size, lack of control group, and short duration of followup.
Fex et al (1994) reported on the effectiveness of voice therapy using the accent method in 10 patients who were referred to a speech pathologist for functional voice disorders. Three of the 10 patients had bilateral nodules. The voices were analyzed acoustically before and after treatment. Of the parameters tested, pitch perturbation quotient, amplitude perturbation quotient, normalized noise energy for 1 to 4 kHz, and fundamental frequency showed significant improvement. Limitations of this study include the small sample size, lack of control group, and lack of information on the durability of treatment effects.

Kitzing and Akerlund (1993) found only weakly positive correlations between perceptual improvements in voice quality and long-time average voice spectrograms with voice therapy in 174 subjects with non-organic voice disorders (functional dysphonia).

Carling et al (1999) reported on a study where 45 patients diagnosed as having nonorganic dysphonia were assigned in rotation to 1 of 3 groups. Patients in group 1 received no treatment and acted as a control group. Patients in groups 2 and 3 received a program of indirect therapy and direct with indirect therapy, respectively. A range of qualitative and quantitative measures were carried out on all patients before and after treatment to evaluate change in voice quality over time. All patients were assessed before their treatment program began. Following the treatment period the patients were assessed a second time and then again at a review 1 month later. The difference between the first and third assessments was used to measure the degree of change. The authors reported that there was a significant difference between the 3 treatment groups in the amount of change for the voice severity, electrolaryngograph, and shimmer measurements and on ratings provided by a patient questionnaire (p < 0.05). However, other measures failed to show significant differences between the 3 groups. Limitations of this study include a suboptimal method of group assignment, failure to control the effect of contact time on outcomes, lack of data on durability of results, and the use of only one single therapist and patient selection criteria that may influence the generalizability of
the results. In addition, the study was not designed to assess which aspects of the therapy that the subjects received was most effective.

Systematic evidence reviews have cited the need for additional research into the effectiveness of voice therapy for MTD. In a systematic evidence review of voice therapy, Speyer (2008) reported that, due to the small number of published treatment outcome studies and the methodological heterogeneity among published studies, very few conclusions relative to the effectiveness of voice therapy “in general” may be drawn from the literature. From the results of his review, Speyer suggests a tendency for positive intervention outcomes to be more commonly reported for (a) very specific therapy approaches such as manual laryngeal tension reduction or the Accent method of voice therapy, and (b) for studies focusing on specific clinical populations such as mutational falsetto or vocal nodules.

Matheson (2011) reported that studies of laryngeal manual therapies for MTD have reported positive effects, "but the evidence base remains extremely small." The author concluded that "a higher level of evidence is required, including randomized controlled trials, to investigate its role in comparison with other interventions." Bos-Clark and Carding (2011) reviewed the recent literature since a 2009 Cochrane review regarding the effectiveness of voice therapy for patients with functional dysphonia. The authors found a range of articles report on the effects of voice therapy treatment for functional dysphonia, with a wide range of interventions described. The authors only one randomized controlled trials. The authors noted that, "in primary research, methodological issues persist: studies are small, and not adequately controlled." The authors noted that these more recent studies show improved standards of outcome measurement and of description of the content of voice therapy. The authors concluded: "There is a continued need for larger, methodologically sound clinical effectiveness studies. Future studies need to be replicable and generalizable in order to inform and elucidate clinical practice."

circumlaryngeal therapy (MCT) in 4 Dutch professional voice users with a persistent MTD. Subjects were evaluated before and 1 week after completion of therapy. The authors reported that all 4 subjects showed improvement in perceptual vocal quality and disability severity index (DSI) after 25 sessions of MTD. Limitations of the study include its small size, lack of control group, and lack of evidence of durability.

Van Lierde et al (2010) measured the dysphonia severity index in 10 subjects before and after treatment with 45 minutes of vocalization with abdominal breath support, followed by 45 minutes of manual circumlaryngeal therapy (MCT). The authors found no significant improvements in the dysphonia severity index before and after vocalization with abdominal breath support, and significant differences before and after MCT. Limitations of this study include its small size, pre-post design, lack of measurement of clinical outcomes, and lack of evidence on durability of treatment results.

Mathieson et al (2009) reported on the results of a "pilot study" before and after 1 week of MCT in 10 subjects with MTD. The authors reported that there was a significant reduction in average perturbation during connected speech by acoustical analysis, and a reduction in the severity and frequency of VTD (a new perceptual, self-rating scale) after treatment. Limitations of this study include its small size, lack of control group, and lack of evidence of durability of results.

In a retrospective study that the authors considered "preliminary", Roy et al (2009) documented significant changes in vowel acoustic measures after MCT in 111 women with MTD, suggesting improvement in speech articulation with MCT. Limitations of the study include its pre-post design, lack of control group, and lack of data on the durability of treatment. The same investigator group found differences in changes in both articulatory and phonatory behavior in these 111 women following MCT (Dromey et al, 2008).

Roy et al (1997) reported on the use of MCT in 25 consecutive female patients with functional dysphonia. Pre- and post-
treatment audio recordings of connected speech and sustained vowel samples were submitted to auditory-perceptual and acoustical analysis to assess the effects of a single treatment session. To complement audio recordings, subjects were interviewed in follow-up regarding the stability of treatment effects. One post-treatment measurement occurred at a mean duration of 3.6 months following initial treatment, and a second post-treatment measurement was obtained at a mean duration of 16.5 months. Pre- and post-treatment comparisons demonstrated significant voice improvements. Pre-treatment severity ratings for connected-speech samples were reduced from a mean of 5.37 to 1.91 immediately following the management session (p = 0.0001). Comparison of mean pre-treatment severity scores with each subsequent post-treatment follow-up mean revealed significant differences (p < 0.0004). No significant differences were identified when comparing among post-treatment means (post 1- versus post 2-; post 1- versus post 3-; and post 2- versus post 3-). Interviews revealed 68% of subjects reported occasional self-limiting partial recurrences, with 3/4 of relapses occurring within 2 months of completing therapy. The study was limited by small sample size and lack of control group. In addition, 9 of 25 subjects were lost to long-term followup. The authors noted: "The finding that patients responded to a single treatment session is encouraging, but a serious question lingers as to whether improvements in voice are a consequence of reduced laryngeal musculoskeletal tension or are due to factor(s) unrelated to the manual technique". The authors stated: "The absence of a nontreatment or alterative treatment control group leaves open the possibility of numerous alterative explanations for the observed treatment effects, including placebo effects, the clinician's instructions, expectations, experience, and confidence".

Roy and Hendarto (2005) found no significant changes in mean speaking fundamental frequency (SFF) after MCT in 40 women with functional dysphonia, despite subjective reports of improvement after therapy.

Roy and Leeper (1993) reported on the results of MCT in 17 patients with functional dysphonia. The effects of the therapy
regimen were analyzed using perceptual and acoustical measures of vocal function. The results of an assessment immediately after treatment indicated a significant change in the direction of "normal" vocal function in the majority of patients within one treatment session. Perceptual measures of severity were consistently more likely to be rated as normal following treatment. Acoustic measures of voice confirmed significant improvements in jitter, shimmer, and signal-to-noise ratio (SNR). Following a telephone interview procedure one week posttreatment, it was subjectively determined that of the 14 patients who were rated as demonstrating either normal voice or only the mildest dysphonic symptoms immediately following treatment, 13 patients (93%) were judged by the principal investigator to have maintained the improved vocal quality. Limitations of the study include the small sample size, lack of control group, and lack of data on durability of treatment effects.

Van Houtte et al (2011) found that results of studies of circumlaryngeal manual therapy (CMT) for MTD are "promising"; the studies were small and no randomized controlled clinical trials were conducted. "Further research is necessary to compare this treatment to voice therapy to delineate the patient group that would benefit from this therapy, establish the number of session of CMT that are necessary to maintain the improved voice quality".

In regards to a multi-dimensional protocol for assessing functional results of voice therapy, Dejonckere (2000) noted that results show that there is a large variation in the inter-individual and inter-dimensional results of the voice therapy (4 to 26 sessions) -- in the same patient, one dimension may be significantly improved while another one is significantly worsened.

Voice therapy has been shown to be effective in rehabilitating persons treated for early glottic carcinoma. In a randomized, controlled trial, van Gogh and colleagues (2006) evaluated the effectiveness of voice therapy in patients who experienced voice problems after receiving treatments for early glottic cancer. Of 177 patients, 6 to 120 months after treatment for early glottic carcinoma, 70 patients (40 %) suffered from voice impairment
based on a 5-item screening questionnaire. About 60% of those 70 patients were not interested in participating in the study. A total of 23 patients who were willing to participate were randomly assigned either to a voice therapy group (n = 12) or to a control group (n = 11). Multi-dimensional voice analyses (the self-reported Voice Handicap Index [VHI], acoustic and perceptual voice quality analysis, videolaryngostroboscopy, and the Voice Range Profile) were conducted twice: before and after voice therapy or with 3 months in between for the control group. Statistical analyses of the difference in scores (post-measurement minus pre-measurement) showed significant voice improvement after voice therapy on the total VHI score, percent jitter, and noise-to-harmonics ratio in the voice signal and on the perceptual rating of vocal fry. The authors concluded that voice therapy proved to be effective in patients who had voice problems after treatment for early glottic carcinoma. Improvement not only was noticed by the patients (VHI) but also was confirmed by objective voice parameters.

Paradoxical vocal fold motion is characterized as an abnormal adduction of the vocal cords during the respiratory cycle (especially during the inspiratory phase) that produces airflow obstruction at the level of the larynx (Buddiga, 2010). Paradoxical vocal cord motion frequently mimics persistent asthma. The localization of airflow obstruction to the laryngeal area is an important clinical discriminatory feature in patients with paradoxical vocal cord motion. Pulmonary function testing is the most useful tool in discriminating between paradoxical vocal cord motion and asthma. Flow-volume loops typically demonstrate inspiratory loop flattening, i.e., an inspiratory flow decrease during symptomatic periods suggestive of paradoxical vocal cord motion. The hallmark of diagnosis is noted on direct rhinolaryngoscopy; a glottic chink is present along the posterior portion of the vocal cords, while the anterior portion of the vocal cords is adducted (Buddiga, 2010). The mainstay of treatment for paradoxical vocal cord motion involves teaching the patient vocal cord relaxation techniques and breathing exercises.

Young and Blitzer (2007) noted that spasmodic dysphonia is a disabling disorder of the voice characterized primarily by
involuntary disruptions of phonation. Botulinum toxin injections of the thyroarytenoid muscles have been the treatment of choice for adductor spasmodic dysphonia (ADSD). In a case-series study, these researchers described a new technique to address the problem of compensatory or supraglottic hyper-adduction in some of these patients. A total of 4 patients with ADSD with sphincteric supraglottic contraction were seen for evaluation of botulinum toxin injection. On fiberoptic examination, it was noted that they had type I hyperadduction of the true vocal cords with a significant type III, and/or type IV hyperadduction of the supraglottis. After standard management of the thyroarytenoid muscles, the strained/strangled voice continued. On fiberoptic examination it was noted that the vocal folds were weakened, but the supraglottic hyperfunction persisted. Patients were treated by speech therapists to unload their supraglottis without success. All patients then had their oblique portion of the lateral cricoarytenoid muscles injected with botulinum toxin A through a thyrohyoid approach. This was done in the office under electromyographic control. On follow-up, all patients demonstrated improvement in the quality of their voices (as compared to thyroarytenoid injections alone). The authors described a new technique for injection of the supraglottic portion of the lateral cricoarytenoid muscles. They demonstrated this can be done safely and successfully in an office setting with electromyography control.

In a Cochrane review, Ruotsalainen et al (2007) evaluated the effectiveness of interventions to treat functional dysphonia in adults. Randomized controlled trials of interventions evaluating the effectiveness of treatments targeted at adults with functional dysphonia were included in this analysis. For work-directed interventions interrupted time series and prospective cohort studies were also eligible. Two authors independently extracted data and assessed trial quality. Meta-analysis was performed where appropriate. These investigators identified 6 RCTs including a total of 163 participants in intervention groups and 141 controls. One trial was high quality. Interventions were grouped into (i) direct voice therapy, (ii) indirect voice therapy, (iii) combination of direct and indirect voice therapy, (iv) other treatments: pharmacological treatment and vocal hygiene
instructions given by phoniatrist. No studies were found evaluating direct voice therapy on its own. One study did not show indirect voice therapy on its own to be effective when compared to no intervention. There is evidence from 3 studies for the effectiveness of a combination of direct and indirect voice therapy on self-reported vocal functioning (SMD -1.07; 95% confidence interval [CI]: -1.94 to -0.19), on observer-rated vocal functioning (WMD -13.00; 95% CI: -17.92 to -8.08) and on instrumental assessment of vocal functioning (WMD -1.20; 95% CI: -2.37 to -0.03) when compared to no intervention. The results of 1 study also show that the remedial effect remains significant for at least 14 weeks on self-reported vocal functioning (SMD -0.51; 95% CI: -0.87 to -0.14) and on observer-rated vocal functioning (Buffalo Voice Profile) (WMD -0.80; 95% CI: -1.14 to -0.46). There is also limited evidence from 1 study that the number of symptoms may remain lower for 1 year. The combined therapy with biofeedback was not shown to be more effective than combined therapy alone in 1 study nor was pharmacological treatment found to be more effective than vocal hygiene instructions given by phoniatrist in 1 study. Publication bias may have influenced the results. The authors concluded that evidence is available for the effectiveness of comprehensive voice therapy comprising both direct and indirect therapy elements. Effects are similar in patients and in teachers and student teachers screened for voice problems. Moreover, they stated that larger and methodologically better studies are needed with outcome measures that match treatment aims. Commenting on the Cochrane review, Carding (2011) has stated that, "[i]n contrast to popular opinion, the evidence base that underpins voice therapy practice remains incomplete and inconclusive".

Eastwood et al (2015) performed a systematic review of behavioral intervention for the treatment of adults with muscle tension voice disorders (MTVD). A search of 12 electronic databases and reference lists for studies published between the years 1990 to 2014 was conducted using the PRISMA guidelines. Inclusion and exclusion criteria included type of publication, participant characteristics, intervention, outcome measures and report of outcomes. Methodological quality rating scales and confidence in diagnostic scale supported the literature evaluation.
A total of 7 papers met the inclusion criteria. Significant improvement on at least 1 outcome measure was reported for all studies. Effect sizes were small-to-large. Methodological qualities of research were varied. No study explicitly reported treatment fidelity and cumulative intervention intensity could only be calculated for 2 out of 7 studies. Outcome measures were used inconsistently and less than 50 % of the measures had reported reliability values. Confidence in the accuracy of subject diagnosis on average was rated as low. Specific "active ingredients" for therapeutic change were not identified. The authors concluded that voice therapy for the treatment of MTVD is associated with positive treatment outcomes; however, there is an obvious need for systematic and high quality research designs to expand the evidence base for the behavioral treatment of MTVD.

In a randomized, blinded clinical trial, Pedrosa and colleagues (2016) evaluated the effectiveness of the Comprehensive Voice Rehabilitation Program (CVRP) compared with Vocal Function Exercises (VFEs) to treat FD. A total of 80 voice professionals presented with voice complaints for more than 6 months with a FD diagnosis were included in this study. Subjects were randomized into 2 voice treatment groups: (i) CVRP and (ii) VFE. The rehabilitation program consisted of 6 voice treatment sessions and 3 assessment sessions performed before, immediately after, and 1 month after treatment. The outcome measures were self-assessment protocols (Voice-Related Quality of Life [V-RQOL] and Voice Handicap Index [VHI]), perceptual evaluation of vocal quality, and a visual examination of the larynx, both blinded. The randomization process produced comparable groups in terms of age, gender, signs, and symptoms. Both groups had positive outcome measures. The CVRP effect size was 1.9 for the V-RQOL, 1.17 for the VHI, 0.79 for vocal perceptual evaluation, and 1.01 for larynx visual examination. The VFE effect size was 0.86 for the V-RQOL, 0.62 for the VHI, 0.48 for the vocal perceptual evaluation, and 0.51 for larynx visual examination. Only 10 % of the patients were lost over the study. The authors concluded that both treatment programs were effective; and the probability of a patient improving because of the CVRP treatment was similar to that of the VFE treatment.
The study by Pedrosa et al (2016) was not informative because both groups received active treatment. Another study employing 2 active treatment groups compared in-person versus telephonic voice therapy reported a non-significant trend in improvement in both groups and no significant difference between the groups (Rangarathnam et al, 2015). A retrospective case-series study by Craig et al (2015) found no significant difference between voice therapy with and without adjunctive physical therapy for MTD. A short-term, small sample RCT (Watts et al, 2015a) found significantly greater improvement in vocal handicap, maximum phonation time, and acoustic measures of vocal function after participants received "stretch-and-flow voice therapy" compared to participants receiving vocal hygiene education alone. The authors concluded that "additional research incorporating larger samples will be needed to confirm and further investigate these findings". Furthermore, a small prospective uncontrolled series by the same investigator group (Watts et al, 2015b) also found improvements with stretch-and-flow voice therapy.

_Resonant Voice Therapy:

Barrichelo-Lindström and Behlau (2009) examined perceptually and acoustically Lessac's Y-Buzz and sustained productions of Brazilian Portuguese habitual /i/ vowels pre- and post-training and verified the presence of formant tuning and its association with the perception of a more resonant voice. The subjects of this study were 54 acting students (23 males and 31 females) with no voice problems, distributed in 7 groups. Each group received 4 weekly sessions of training. For the pre-training recording, they were asked to sustain the vowel /i/ in a habitual mode 3 times at self-selected comfortable frequencies and intensity. After training, they repeated the habitual /i/ and also the trained Y-Buzz.; 5 voice specialists rated how resonant each sample sounded. The fundamental frequency (F(0)), the 1st 4 formant frequencies, the distance between the frequencies of F(1) and F(0) were measured, as well as the harmonic frequency (H(2)) frequency and the difference between F(1) and H(2) in the case of male voices (Praat 4.4.33, Institute of Phonetic Sciences, University of Amsterdam, The Netherlands). The trained Y-Buzz was considered more resonant than the habitual /i/ samples,
regardless the gender and demonstrated a lowering of the 4 formant frequencies. F(1) was especially lower in both groups (288 Hz for females and 285 Hz for males), statistically significant in the female group. The F(1)-F(0) difference was significantly smaller for the female Y-Buzz (52Hz), as well as F(1)-H(2) in the case of the male Y-Buzz (12Hz), suggesting formant tuning. The authors concluded that it was not possible to establish association between the perceptual grades and measures F(1)-F(0) or F(1)-H(2).

Hazlett and associates (2011) reviewed the current published available research into the impact of voice training on the vocal quality of professional voice users, and provided implications for vocal health and recommendations for further research. These investigators performed a systematic search of the literature using electronic databases and the following defined search terms: occupational voice or occupational dysphonia or voice and occupational safety and health. To obtain the comprehensive relevant literature, no studies were excluded on the basis of study design. A total of 10 studies that examined the impact of a voice training intervention on the vocal quality of professional voice users as a potential prevention strategy for voice disorders were selected for this review. The 10 studies ranged in design from observational to RCTs with mainly small sample sizes (n = 11 to 60); 9 studies showed that voice training significantly (p < 0.05) improved at least 1 voice-related measurement from the several investigated from baseline. A total of 5 studies reported that voice training significantly (p < 0.05) improved at least 1 measurement compared with no training. The authors concluded that the findings of this analysis indicated that there is no conclusive evidence that voice training improves the vocal effectiveness of professional voice users, as a result of a range of methodological limitations of the included studies. However, some studies showed that voice training significantly improved the knowledge, awareness, and quality of voice. Thus, there is a need for robust research to empirically confirm this, with implications for vocal health, and occupational safety and health policies.

Yiu and colleagues (2017) reviewed the literature on resonant
voice therapy and evaluated the level of evidence on the effectiveness of using resonant voice therapy in treating dysphonia. Refereed journal papers from 1974 to 2014 were retrieved and reviewed by 2 independent reviewers using the keywords "humming, resonance, resonant voice, semi-occluded or closed tube phonation" using available database systems. Quality of evidence was evaluated by using the Grading of Recommendations Assessment, Development and Evaluation (GRADE). A total of 13 papers met the search criteria; 9 were selected by the 2 reviewers; 2 of the papers were RCTs and the other 7 were observational studies. At least 4 types of resonant voice therapies were described. They included the Lessac-Madsen resonant voice therapy, Y-Buzz, resonance therapy and humming. The overall level of quality of evidence was graded as "moderate". The authors concluded that there were limited studies that examined the effectiveness of resonant voice therapy. Most studies were small-scale uncontrolled observational studies with the inclusion of only small samples or specific populations. They stated that there is clearly a need for more large-scale RCTs with a wider range of populations to provide further evidence on the effectiveness of resonant voice training for different populations.

CPT Codes / HCPCS Codes / ICD-10 Codes

Information in the [brackets] below has been added for clarification purposes. Codes requiring a 7th character are represented by "+".

<table>
<thead>
<tr>
<th>Other CPT codes related to the CPB:</th>
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<tbody>
<tr>
<td>31505 - 31592</td>
</tr>
<tr>
<td>Laryngoscopy and laryngoplasty procedures (therapeutic)</td>
</tr>
<tr>
<td>31611</td>
</tr>
<tr>
<td>Construction of tracheoesophageal fistula and subsequent insertion of an a laryngeal speech prosthesis (e.g., voice button, Blom-Singer prosthesis)</td>
</tr>
<tr>
<td>92507</td>
</tr>
<tr>
<td>Treatment of speech, language, voice, communication, and/or auditory processing disorder; individual [not covered for male-to-female transgender individuals to feminize the voice or female-to-male transgender individuals to masculinize the voice]</td>
</tr>
</tbody>
</table>
Treatment of speech, language, voice, communication, and/or auditory processing disorder; group, two or more individuals [not covered for male-to-female transgender individuals to feminize the voice or female-to-male transgender individuals to masculinize the voice]

Evaluation of speech fluency (eg, stuttering, cluttering)

Evaluation of speech sound production (eg, articulation, phonological process, apraxia, dysarthria) [not covered for male-to-female transgender individuals to feminize the voice or female-to-male transgender individuals to masculinize the voice]

Evaluation of speech sound production (eg, articulation, phonological process, apraxia, dysarthria); with evaluation of language comprehension and expression (eg, receptive and expressive language) [not covered for male-to-female transgender individuals to feminize the voice or female-to-male transgender individuals to masculinize the voice]

Behavioral and qualitative analysis of voice and resonance [not covered for male-to-female transgender individuals to feminize the voice or female-to-male transgender individuals to masculinize the voice]

Evaluation for use and/or fitting of voice prosthetic device to supplement oral speech

HCPCS codes not covered for indications listed in the CPB:

L8510 Voice amplifier

Other HCPCS codes related to the CPB:

G0153 Services performed by a qualified speech-language pathologist in the home health or hospice setting, each 15 minutes

L8500 Artificial larynx, any type

L8505 Artificial larynx replacement battery / accessory, any type
L8507  Tracheo-esophageal voice prosthesis, patient inserted, any type, each
L8509  Tracheo-esophageal voice prosthesis, inserted by a licensed health care provider, any type
S9128  Speech therapy, in the home, per diem
V5362  Speech screening
V5363  Language screening

**ICD-10 codes covered if selection criteria are met:**

- J38.00  Paralysis of vocal cords and larynx
- J38.02
- J38.2  Nodules of vocal cords
- S19.83X+ Other specified injuries of vocal cord

**ICD-10 codes not covered for indications listed in the CPB:**

- A15.5  Tuberculous laryngitis
- A36.2  Laryngeal diphtheria
- A52.73  Symptomatic late syphilis of other respiratory organs
- A69.1  Other Vincent's infections [Vincent's angina]
- F44.4  Conversion disorder with motor symptom or deficit [functional dysphonia]
- F64.1  Gender identity disorder in adolescences and adulthood
- G25.2  Other specified forms of tremor [voice]
- I69.020 - Sequelae of cerebrovascular disease, speech and language deficits
- I69.028
- I69.120 -
- I69.128
- I69.220 -
- I69.228
- I69.320 -
- I69.328
- I69.820 -
- I69.828
- I69.920 -
- I69.928
- J02.0  Streptococcal pharyngitis
J03.00 Acute streptococcal tonsillitis
J03.01 Acute recurrent streptococcal tonsillitis
J04.0 Acute laryngitis
J04.2 Acute laryngotracheitis
J05.0 Acute obstructive laryngitis [croup]
J06.0 Acute laryngopharyngitis
J10.1 Influenza due to other identified influenza virus with other respiratory manifestations
J11.1 Influenza due to unidentified influenza virus with other respiratory manifestations
R47.02 Dysphasia
R47.1 Dysarthria and anarthria
R47.81 - R47.89 Other speech disturbances
R49.0 - R49.9 Voice and resonance disorders
Z51.89 Encounter for other specified aftercare [occupational therapy]

The above policy is based on the following references:
4. Merck & Co., Inc. Vocal cord nodules (singer's nodules). In:


Amendment to
Aetna Clinical Policy Bulletin Number: 0646 Voice Therapy

There are no amendments for Medicaid.