Introduction

Up to 90% of people with Parkinson’s Disease (PD) experience speech and voice changes (“Speech Therapy and Parkinson’s,” n.d.; Logemann et al., 1978; Sapir, 2014; Schalling et al., 2017). Hypokinetik dysarthria is a typical form of motor speech dysfunction in PD. Features of hypokinetik dysarthria have been widely described (e.g., Chiu & Neel, 2020; Darley et al., 1969; Gibbins et al., 2017) and include:

- **Prosody**: reduced stress, inappropriate silences, increased rate in segments, increased overall speaking rate, monopitch (prosody/phonation), monoloudness (prosody/respiration/phonation)

- **Articulation**: imprecise consonants, repeated phonemes, variable rate (articulation/prosody), short rushes of speech (articulation/prosody)

- **Phonation**: harsh voice quality, breathy voice, low pitch

There are standardized, evidence-based programs available to the Speech-Language Pathologist (SLP). These include Lee Silverman Voice Therapy (LSVT LOUD®) (Ramig et al., 2018) and Speak OUT!® (parkinsonvoiceproject.org (n.d.) SPEAK OUT!® Training. https://www.parkinsonvoiceproject.org/SPEAKOUT!Training) by the Parkinson’s Voice Project (Behrman et al., 2020). The purpose of this resource is to provide SLPs with the basic information needed to provide treatment of dysarthria in patients with Parkinson’s Disease when these protocols are not accessible to the SLP. This resource does not provide a full review of each element of the treatment process, nor does it replicate commercial treatment protocols. Instead, it applies motor speech therapy foundations to people with Parkinson’s Disease using resources such as *Motor speech disorders: Substrates, differential diagnosis, and management* (Duffy, 2019).

Why do People with Parkinson’s Disease Sound the Way They Do?

- Vocal fold bowing, commonly seen in people with Parkinson’s Disease (Blumin et al., 2004), results in a breathy voice with reduced intensity.

- Reduced amplitude: People with PD tend to speak with smaller jaw and tongue movements, which have been shown to correlate to a reduction in speech intelligibility (Kearney et al., 2017). Reduced vocal intensity is also a hallmark feature of Parkinson’s Disease (Chiu & Neel, 2020). This reduction in amplitude is why PD-related treatments typically focus on increasing the amount of movement and effort the individual makes.

- Impaired somatosensory function results in patients feeling as if they are shouting or exerting more significant physical effort to speak at normal intensity, thus reducing their awareness of the severity of their speech impairment (Hammer & Barlow, 2010).
Quick Start Guide to Treating Dysarthria Associated with Parkinson's Disease

Basic Treatment Materials
- Sound pressure meter to measure vocal intensity
- Recorders for biofeedback (audio and video)
- Person-centered materials (What are the patient’s needs and interests?)
- Stopwatch for sustained phonation tasks
- Tuner or app for measuring fundamental frequency
- Expiratory Muscle Strength Training (EMST) device (optional)

Common Approaches to Speech Therapy

Two standardized treatment approaches include LSVT LOUD® and Speak OUT®. Both of these approaches require specialized training and implementation. Similarities in service delivery include emphasizing vocal intensity and training patients to recalibrate their perception of how loud or soft they are speaking. A comparison of the two is below.

<table>
<thead>
<tr>
<th>Feature</th>
<th>LSVT LOUD® Details</th>
<th>Speak OUT® Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>Developer</td>
<td>LSVT Global</td>
<td>Parkinson's Voice Project</td>
</tr>
<tr>
<td>Recent Evidence</td>
<td>Bryans et al., 2020</td>
<td>Behrman et al., 2020</td>
</tr>
<tr>
<td>Telehealth Option</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Certification</td>
<td>Initial 12-hour course; 2-hour renewal every other year</td>
<td>Initial Refresher</td>
</tr>
<tr>
<td>Frequency</td>
<td>*4x/week</td>
<td>3x/week</td>
</tr>
<tr>
<td>Intensity</td>
<td>*4 weeks (16 visits) 60-minute visits</td>
<td>4 weeks (12 visits) 40-minute visits</td>
</tr>
<tr>
<td>Cue</td>
<td>“Loud”</td>
<td>“Intent”</td>
</tr>
<tr>
<td>Hierarchy</td>
<td>Progression from single word tasks to conversation tasks</td>
<td>Progression from single word tasks to conversation tasks.</td>
</tr>
<tr>
<td>Support Materials</td>
<td>Webinars, hierarchy materials in the provider section of the website.</td>
<td>Workbook with exercises and materials provided to the patient.</td>
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<tr>
<td>Programs for “Graduates”</td>
<td>LSVT LOUD for LIFE®</td>
<td>The LOUD Crowd®</td>
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</table>

*People with idiopathic PD may be candidates for LSVT-X (Extended), which has an intensity and frequency of 60-minute sessions two times per week for eight weeks (Spielman et al., 2007).
Subsystem-Based Tasks

*Source: American Speech-Language-Hearing Association Practice Portal (n.d.) unless otherwise stated*

- Respiration: optimize posture, expiratory muscle strength training, maximum vowel prolongation tasks
- Phonation: vocal fold adduction tasks; Phonation Resistance Training Exercise (PhoRTE), a voice therapy protocol for presbyphonia (Watts, 2016)
- Articulation: overarticulation, intelligibility exercises, rate modification techniques
- Resonance: typically not affected in PD (Logemann et al., 1978)
- Prosody: Often negatively affected by rate modification but positively affected by increased vocal effort during speech tasks (Boutsen et al., 2018)

Clear Speech

“Clear speech” refers to a behavioral approach to treating dysarthria. Cues in this method include, “Overenunciate each word,” “Speak to someone with a hearing impairment,” and “Speak clearly” (Lam & Tjaden, 2016). Research using this method with people with Parkinson's showed that cues for overenunciation tend to result in increased intelligibility and a slower rate of speech. In contrast, cues for speaking as if talking to someone with a hearing impairment tend to result in increases in loudness and prosody but less increase in intelligibility than the cues for overenunciation (Lam & Tjaden, 2016). Tjaden et al. (2014) found that cues for either clarity or loudness improved speech intelligibility compared to habitual speech, while cues for reducing rate did not. Additionally, Kearney et al. (2017) found that cues for loud and/or clear speech resulted in increased amplitude of speech muscles, thus increasing speech intelligibility.

Rate Reduction Techniques

When the articulators’ range of motion is restricted and articulation is imprecise, a speaker’s speech often appears to be excessively rapid. Rate control techniques offer improvements in intelligibility because labial movements approximate normal range when speaking rate is slowed (Caligiuri, 1989). Varying changes on intelligibility, limited carryover, and a negative impact on speech naturalness are often the result of rate control techniques (Lowitt et al., 2010; Tjaden et al., 2014; Tjaden & Wilding, 2004; Yorkston et al., 1990). These techniques include:

Training and verbal cues to reduce rate (often the targeted outcome of using external devices such as those below).
- Pacing boards, which can be low or high-tech, involve the speaker producing one word or one syllable per “space” while tapping or pointing to the space (Helm, 1979, Suzuki et al., 2013). In high-tech systems, a visual display may be set to indicate the targeted rate of speech.
- Alphabet supplementation reduces rate by requiring the patient to point to each word’s first letter while speaking (Hustad & Weismer, 2007).
- Delayed and altered auditory feedback (Brendel et al., 2004; Lowitt et al., 2010)
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**Expiratory Muscle Strength Training**

Expiratory muscle strength training (EMST) using devices such as the EMST 150 by Aspire Products (https://emst150.com/product/emst150/) may:

- Improve speech breathing in people with Parkinson's, returning lung volumes to levels more consistent with typical older adults (Darling-White & Huber, 2017).
- Result in increased loudness and sustained phonation (Tong et al., 2016).
- Further increase benefits when combined with voice therapy (Tong & Ng, 2018).
- Deliver improved vocal intensity when compared to inspiration muscle strength training (Reyes et al., 2020).
- See the three-part series, *Understanding Respiratory Muscle Strength Training (RMST)* on the Medical SLP Collective Website ("Understanding Respiratory Muscle Strength Training (RMST)," n.d.).

**External Devices as Compensatory Strategies**

- SpeechVive (speechvive.com), a wearable device, operates on the Lombard Effect. The Lombard Effect refers to the tendency to increase vocal intensity when speaking in a noisy setting. The device uses a sensor to detect when the user is beginning to speak and delivers multi-talker babble into one ear. This noise (that only the user can hear) has been shown to increase the user’s loudness (Huber et al., 2019; Stathopoulos et al., 2014) and prosody (Huber et al., 2015).
- Amplification systems such as a portable voice amplifier utilize a microphone and speaker system to amplify the speaker’s voice (Andreetta et al., 2016).
- Pacing boards can aid in improving speech intelligibility by reducing a speaker’s rate of speech. These boards can be low or high-tech (Helm, 1979; Suzuki et al., 2013).
- Delayed and altered auditory feedback devices aim to improve speech intelligibility by slowing the rate of speech. (Brendel et al., 2004; Lowitt et al., 2010).

**Social Communication**

Speech therapy must go beyond rote practice. It is essential to incorporate social aspects of communication for patient satisfaction (Yorkston et al., 2017). This can be achieved by using person-centered care approaches and ensuring that goals are focused on the patient’s life participation. Treatment techniques such as LSVT LOUD® and Speak OUT!® have been shown to improve functional communication and social participation (Behrman et al., 2020; Bryans et al., 2020).

**Masked Face**

A common characteristic of Parkinson's Disease is a masked face, or hypomimia. This can negatively impact social communication as it results in an expressionless face. Because it can affect interpersonal relationships between people with Parkinson's and their loved ones, it is a significant motor symptom of PD, which SLPs should address (Gunnery et al., 2016). Studies have shown that treatment techniques that focus on amplitude (such as LSVT LOUD) result in increased facial expression (Dumer et al., 2014).
After Therapy

Because Parkinson's Disease is a progressive neurological disorder, the effects of speech therapy are not permanent. Studies show that the effects of intensive speech therapy services last for up to 1-2 years (Ramig et al., 2001; Spielman et al., 2007; Watts, 2016). Daily practice is critical to increasing the duration of these therapeutic effects. Periodic reassessment and follow-up treatment in this population is advised.

References:


