

# Dysarthria and Dysphonia Assessment and Treatment and Special Considerations for Progressive Diseases

TIFFANY TURNER, MS, CCC-SLP, BCS-S

1

## Introduction

Tiffany Turner, MS, CCC-SLP, BCS-S

Board certified specialist in swallowing and swallowing disorders (in 2017)

Graduated from Oklahoma State University for undergrad and graduate school

Started Swallowing and Neurological Rehabilitation, an outpatient regional swallowing and voice center, in 2014

Serve at a monthly multidisciplinary ALS/ MD clinic through the Muscular Dystrophy Association

Trained endoscopist offering FEES swallow studies and videostrobe diagnostics and specialized swallowing and voice treatment

Teach CEU courses and publish therapy materials.... Website: [www.tulsasnr.com](http://www.tulsasnr.com)

2

## Basic Terms/ Definitions

---

Motor Speech Disorders:

**DYSARTHRIA**- slurred or unclear speech due to imprecise articulation or impaired vocal fold movement **related to an underlying neurological cause**. Errors will be **consistent**. E.g., A certain sound may be slurred, but it will always be slurred and will sound the same each time.

**APRAXIA**- a **motor planning disorder**. The connection between the brain and the articulators is damaged, so the incorrect sounds come out. Errors are often inconsistent unlike with dysarthria. Attempts at a particular sound **may sound different each time**.

---

Motor speech disorders should NOT be confused with **APHASIA** or **DYSPHONIA**.

**APHASIA** is a LANGUAGE disorder (although it can co-occur with dysarthria or apraxia and commonly does).

**DYSPHONIA**- **an impairment of the VOICE** that involves a pathology of the vocal folds themselves instead of an underlying neurological cause. E.g., vocal nodules, polyps on the vocal folds, vocal fold bowing, muscle tension dysphonia, etc. Something is structurally wrong.

3

## Dysarthria

---

OVERVIEW OF SUBTYPES AND GENERAL TREATMENT APPROACHES

4

## Dysarthria

Caused by an underlying neurological deficit/ motor neuron damage versus an anatomical or physiological issue with the voice

There are several different presentations depending on the subtype of dysarthria.

- Flaccid
- Spastic
- Hypokinetic
- Hyperkinetic- quick
- Hyperkinetic- slow
- Ataxic
- Mixed

5

## Hypokinetic Dysarthria

Hypokinetic – ‘hypo’ means reduced, ‘kinetic’ means movement

Location of Damage	Central nervous system damage to the extrapyramidal system
How it Sounds	Slurred, breathy, and harsh with <b>LOW VOLUME</b> as the main characteristic. We will commonly hear volume decrease throughout a sentence or utterance.
Progressive Etiologies	Parkinson's, PSP, dystonia, cerebellar disease
Static Etiologies	Drug induced, TBI

*\*\*Hypokinetic dysarthria is the hallmark of Parkinson's disease and is the most common type of dysarthria we see clinically at my practice.*

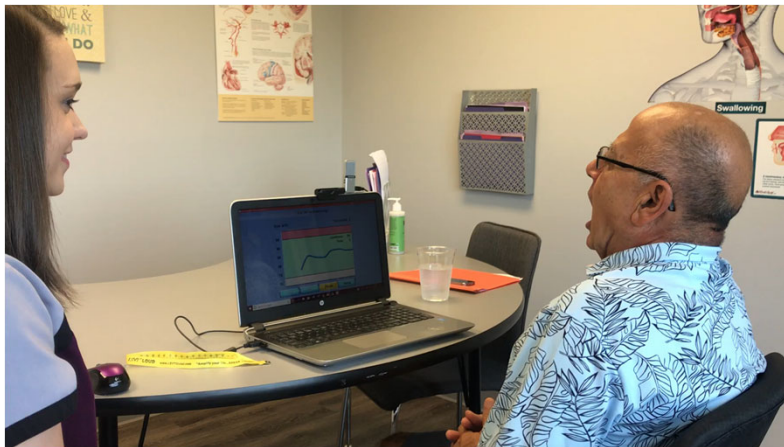
6

## Hypokinetic Dysarthria Cont'd

Physiology	The vocal folds tend to appear bowed on videostroboscopy in these patients and aren't meeting all the way at midline during vibration (allowing air to escape) resulting in that hallmark BREATHY and HARSH voice quality with low volume.
Typical Treatment Targets	Usually, the main goals are to improve <b>volume, breath support, and speech intelligibility</b> . A specialized program for Parkinson's/hypokinetic dysarthria such as LSVT LOUD or SpeakOut is ideal if trained (both require certification through a CEU course). Treatment often involves vocal function exercises (sustained phonation trials with focus on stable volume and good quality and pitch glides high and low). Sometimes vocal adduction exercises are needed pending imaging findings. We may also need to work on any secondary muscle tension which may have developed from straining over time due to underlying vocal fold bowing.

7

## Sustained Phonation Exercise- Patient Demo



8

## Pitch Glide High- Patient Exercise Demo



9

## Pitch Glide Low- Patient Exercise Demo



10

## Hyperkinetic Dysarthria

Hyperkinetic= 'hyper' means increased, 'kinetic' means movement

Both quick and slow forms of extra movements can occur. Chorea= quick, random, involuntary movements (e.g., Huntington's disease). Athetosis= slow, writhing, involuntary movements (E.g., Cerebral palsy)

Location of Damage	Central nervous system damage to the extrapyramidal system
How it Sounds	Speech rate, pitch, and volume will vary significantly
Progressive Etiologies	Huntington's Disease, Essential Tremor
Static Etiologies	Infection, Tourette's syndrome, CVA, tumor, cerebral palsy (athetoid), tardive dyskinesia
Typical Treatment Targets	Working on intonation/word stress/speech naturalness, volume control, and breath grouping.

11

## Flaccid Dysarthria

Flaccid= weak, limp muscles

Location of Damage	Peripheral nervous system damage (not directly in the brain or spinal cord-somewhere in the periphery... e.g., nerve damage).
How it Sounds	Breathy voice quality, labored respiration, hypernasality, slow rate
Progressive Etiologies	Myasthenia Gravis, muscular dystrophy, ALS
Static Etiologies	Trauma, Surgical Injury, CVA, Bell's Palsy
Typical Treatment Targets	Use of portable amplifier to help with volume projection, vocal fold medialization/ injections by ENT (if post-surgical injury or due to static etiology, not appropriate for most progressive diagnoses), teaching energy conservation techniques, training on AAC, medical management (e.g., MG meds)

12

## Spastic Dysarthria

Spastic= <u>increased tone, spasms</u>	
Location of Damage	Central nervous system damage (damage to the upper motor neuron). The 'inhibitor' that usually inhibits extra muscle activity is impaired, so we now have spasticity.
How it Sounds	Strain-strangled and harsh voice, mono-pitch and volume, imprecise consonants, hypernasality, slow rate
Progressive Etiologies	ALS, MS, PSP
Static Etiologies	Cerebral palsy, Trauma, CVA
Typical Treatment Targets	Teaching over-articulation to increase intelligibility, breath grouping, training on AAC possibly

13

## Mixed Dysarthria- Flaccid/ Spastic ; ALS

Mixed dysarthrias can consist of characteristics of any of the dysarthria types but are often flaccid and spastic. Usually, mixed dysarthria is associated with ALS since most other conditions don't involve both upper and lower motor neuron involvement.	
Location of Damage	Multiple. For flaccid/spastic mixed, there is both central nervous system and peripheral nervous system damage.
How it Sounds	BREATHY quality (flaccidity due to limp, weak muscles) <b>and</b> SLURRING/HARSHNESS (due to spasticity)
Typical Treatment Targets	AAC intervention (earlier versus later for progressive dx). Voice banking if we see them early enough in disease progression.

\*\*Lingual fasciculations are common with flaccid and mixed dysarthria/ ALS....If you ever see fasciculations and the patient has no known diagnosis that would cause this, a stat neuro referral is necessary!

14

## Voice & Message Banking/ AAC with ALS

### Voice banking:

- Recording a large sample of the patient's voice that is then analyzed with a special software to create a synthetic version of the person's voice that approximates their natural speaking voice
- Can be used to generate spontaneous messages that haven't been pre-recorded
- Modeltalker is one commonly used program. TobiiDynavox has one too, and there are several others.
- A relative with a similar sounding voice can record for the patient if the voice is already too dysarthric.

### Message banking:

- Involves recording and storing words, phrases, sentences, and meaningful expressions in the patient's actual voice
- These messages can be played back later on a communication app or device exactly word-for-word in the patient's voice.

AAC low tech options work well at first for some patients who are still able to use their hands well.

- Boogie boards, dry erase boards, tablets/phones with text to speech apps, communication books or boards

High tech AAC is usually needed at some point, often with eye gaze in the later stages, as eye movement is one of the later remaining motor movements in most patients with ALS even once all other fine motor skills have been lost. Keep this in mind when selecting a device before the patient has lost fine motor skills (probably want to choose a device with capability to add eye gaze later when needed).

15

## Ataxic Dysarthria

### Ataxia= lack of coordination

Location of Damage	Central nervous system damage to the cerebellum (which regulates rhythm, balance, etc.)
How it Sounds	Harsh vocal quality with loudness and pitch outbursts. Variable imprecise articulation. Often compared to "drunken speech." Frequent omission or distortion of sounds. Diadochokinetic rate is slow and irregular. Irregular syllable stress.
Progressive Etiologies	Friedrich's ataxia
Static Etiologies	CVA, trauma, tumor, CP, meningitis
Typical Treatment Targets	Working on speech naturalness (e.g., word stress drills, intonation), rate/rhythm of speech, etc.

16



## Another Motor Speech Disorder → Apraxia of Speech

Apraxia of speech falls under the category of motor speech disorders as well (along with dysarthria). Involves inability to control the muscles to form words.	
Overview	The message from the brain to the mouth is disrupted, so the person can't move their lips or tongue in the correct manner to make sounds. The muscles themselves are often perfectly fine (no actual weakness), but the person has trouble controlling them. This makes it difficult to initiate and sequence the sounds that make words.
How it Sounds	The hallmark is that errors are often <u>inconsistent</u> , unlike dysarthria. With apraxia, the error pattern between the brain and the articulators can vary, so the sounds that come out may be different each time when attempting the same sounds or words.
Etiologies	Acquired apraxia is often caused by strokes, brain injuries, tumors, etc. It can also co-exist with dysarthria and/or aphasia. It is very common to have some combination of apraxia, aphasia, and/or dysarthria after a stroke or brain injury. Each component should be teased out and treated accordingly.

17

Typical Treatment Targets for Acquired Apraxia	
Repetition	<u>Repetition</u> is key for retraining the motor planning patterns. Often when practicing and repeating words or phrases several times, they will improve with each repetition.
Auto Speech/ Singing	Singing/ automatic speech is often an area of strength that can be built upon in therapy. It can help to make a list of several functional phrases and putting them each to a unique rhythm, practicing them repeatedly.
Visual Cues	Modeling of the target word or phrase using over-exaggerating mouth movements that are easy for them to see and duplicate, mirror for visual biofeedback, etc.
Tactile Cues	Some patients respond to tactile cues, using a gloved hand to help them achieve lip closure, etc.

18

## Patient Recovering from Apraxia Post TBI

Car accident resulting in severe TBI with apraxia and aphasia in Feb. 2016. Left side of skull damaged. Multiple surgeries.

April 2016 (while in inpatient rehab center):

- <https://www.facebook.com/PrayforTraden/videos/581994755343143/>

Fall of 2016 (after a couple months of outpatient therapy at my clinic)

- <https://www.facebook.com/PrayforTraden/videos/583658941843391/>

Jan of 2018 (We discharged him in Oct. 2018.)

- <https://www.facebook.com/PrayforTraden/videos/724585554417395/>



Picture from his Golf Channel segment when they filmed a therapy session with him at my clinic. (The Family's Public Page: "Spreading the Love for Traden Karch" on Facebook.)

19

## Dysphonia

BASIC ASSESSMENT AND TREATMENT COMPONENTS

20

## Dysphonia/Voice Evaluation Process

---

1. Intake information/ thorough case history
2. Cranial nerve exam/ collection of clinical voice measurements
3. Imaging/videostroboscopy
4. Determine a treatment plan

21

## Case History Intake

---

### **The more details you can get, the better!**

- Review all current medical diagnoses and medication list with them. ASK LOTS OF QUESTIONS.
  - Ask about things that may seem unrelated to them so they don't mention them to you at first (ortho surgeries where they may have been intubated, auto-immune issues/RA, etc.).
- Discuss onset of the voice impairment (sudden vs. gradual).
  - E.g., acute illness led to lasting hoarseness, gradual progressive onset, symptoms come and go, etc.
- Discuss specific symptoms and changes in their voice they notice.
  - E.g., difficulty with volume projection, straining to speak, unable to vary their pitch, changes in their normal pitch
- Ask about patterns they have noticed.
  - E.g., voice is best in the morning and worsens/fatigues with use, voice is worse in the mornings upon waking, etc.
- Discuss their typical voice use patterns and vocal hygiene.
  - E.g., How do they use their voice in a typical day? Do they do lots of speaking, shouting, projecting/presenting, etc.? Do they practice good vocal hygiene (use of amplification when projecting their voice, adequate water intake, smoke/alcohol, etc.)?
- Use questionnaires when appropriate. Voice Handicap Index, etc.

22

## Clinical Evaluation/ Voice Measurements

- ❑ Cranial nerve exam (detailed info on this in dysphagia presentation)
- ❑ Max phonation time (try a few times)
- ❑ S/z Ratio to help tease out respiratory vs. laryngeal involvement
- ❑ Pitch glides high and low to measure min and max frequencies
- ❑ Conversational voice sample (assess average frequency, volume, voice quality, and other characteristics- e.g., any pitch breaks or other patterns observed)
- ❑ Trial stimulability techniques during evaluation.... E.g., Manual tx/ laryngeal massage if tension is suspected, increasing volume/ adduction exercises if known glottal gap/VF bowing etc. to see if improvements are noted with therapeutic techniques
- ❑ Collect the most accurate data you can... Some tools you may want to use depending on your setting and what you have available: SLM (\*measure accurate mouth to mic ratio each time), Apps (Voice Analyst), Praat, other software if trained (e.g., LSVT Companion Software) etc.

23

## Proceeding with Voice Imaging/ Videostroboscopy

If the patient has recent voice changes and hasn't had imaging, we almost always need laryngeal imaging before beginning voice therapy because we could be doing more harm than good otherwise.

A few exceptions to completing imaging before beginning treatment may be.... a known neuro diagnosis causing the voice impairment (e.g., PD with hypokinetic dysarthria) or a patient who has just recently been scoped by an ENT and given a specific diagnosis (e.g., vocal nodules, muscle tension etc.) where we can treat based on those findings.

Even then we would still ideally like access to videostrobe to trial some treatment techniques under imaging in a perfect world.

- Ex: A patient with PD typically has VF bowing, but sometimes they may have severe tension that has developed in compensation and needs to be treated too. Or patients with PD of course can also have a granuloma or other vocal pathology concurrently. It's best to look if possible and not just assume we know the cause for the voice changes.

24

## Videostroboscopy Procedure Overview

- The gold standard voice assessment. Involves pairing a strobe light with either a flexible (nasal) endoscope or a rigid (oral) endoscope to view vocal fold movement in slow motion to analyze the vibration patterns.
- **Different from a laryngoscopy with ENT!** Most ENTs who aren't true voice specialists (laryngologists) do only plain light endoscopy. This allows them to identify anatomical abnormalities requiring surgical intervention and gross movement issues (vocal fold paralysis etc.), but they are unable to assess vocal fold vibration without videostrobe.
- **Different from a FEES!** A FEES uses plain light endoscopy to view food/liquid being swallowed in real time. A FEES and videostrobe can, however, be competed at the same time if the endoscopist has the right equipment and training (e.g., before or after the food trials for swallowing, they can turn on a strobe light while the scope is in to view vocal fold vibration).

25

## Access to Videostrobe

- Are there any videostrobe providers in your area you could use for imaging for your voice patients?
  - Referral to Specialized Outpatient SLP (Maybe in an ENT office even)...We often do videostrobes in the clinic for other outpatient SLPs. Their patients just come into our office for the diagnostic and then we send the report and video to the treating SLP.
  - Mobile... Some mobile FEES providers offer videostrobes too. If you are in a SNF/inpatient setting, this may be a good option for you.
  - If stroboscopy with an SLP isn't possible, at the very least, research and develop a list of ENTs in your area who treat voice regularly to refer to when laryngeal imaging is needed for your patients... Try to find a laryngologist or at least some local ENTs who treat voice regularly. Not all general ENTs work much with voice patients. Keep in mind, most patients are willing to travel for a highly specialized diagnostic.

26

## Rigid Videostroboscopy



Oral endoscope paired with stroboscopy light

Great for getting high resolution videos/pictures

Usually has higher resolution compared to flexible nasal endoscopy, but can cause a gag reflex, sometimes making the exam shorter.

Obviously, the patient can't talk extensively with an oral scope in place, so these are usually quicker exams. They may consist of just a quick sustained /i/ phoneme and pitch glides high and low, for example. (They say /i/ vs. /a/ to get a better VF view, but it sounds like /a/ due to the oral scope.)

Rigid Videostrobe Procedure Example (Me Scoping Former Student Intern):

<https://www.youtube.com/watch?v=-aPJLWmQXHM>

Videostrobe Endoscopy Video Example (Me Scoping My SLP Stacy):

<https://www.youtube.com/watch?v=YUcW1s2GTmM>

27

## Flexible Videostroboscopy

Stroboscopy light paired with a flexible nasal endoscope

Typically, not quite as high resolution as a videostrobe with a rigid scope, however, the newer digital flex scopes have really great quality even with the smaller diameter camera and farther distance.

One advantage of using a flexible scope is that the patient can talk, sing, etc. with the scope in place. Singers often prefer this type of endoscopy so they can sing while the scope is in place to identify issues that only occur with their singing voice.

Can be done at the same time as a FEES during the same procedure if they have both swallowing and voice issues.

Demo of Flex Scope Procedure (Me Scoping Former Student):

<https://www.youtube.com/watch?v=lUD20xLVKnI&t=1s>

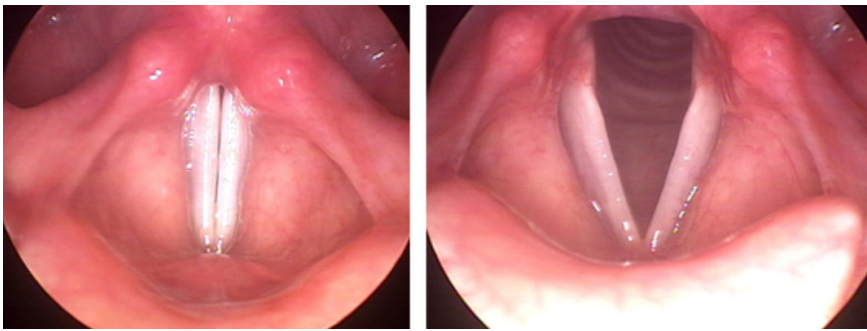
Videostrobe Flexible Nasal Endoscopy Example (From Former Patient/Singer):

<https://www.youtube.com/watch?v=S2RF-90tmGE>



28

## What does a videostrobe show?

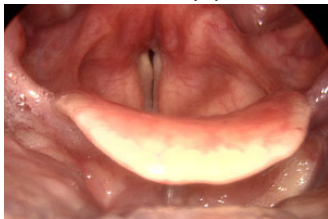


- Smoothness and straightness of free edges of VFs (normal, convex, concave, irregular, rough)
- Glottis closure (complete, anterior gap, posterior gap, hourglass, spindle/middle gap, irregular closure, incomplete closure along the length of the VFs)
- Vibration characteristics: amplitude, mucosal wave, non-vibratory portions, vertical plane approximation, supraglottic activity/ tension (both A-P and L-M)

29

## Supraglottic Compression Images

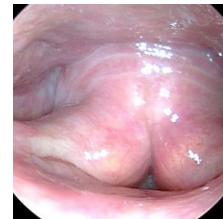
### Muscle Tension Dysphonia



Lateral-medial compression of the false VFs



Severe lateral-medial compression of the false VFs with complete plica ventricularis (meaning you can't even visualize the true VFs)



Severe anterior-posterior compression of the false VFs (epiglottis approximating arytenoids during phonation) causing plica ventricularis

30

## Referring for Medical Management

---

Again- any new hoarseness or voice issues occurring with no known cause always warrant imaging!

Some findings on imaging (e.g., some polyps, cysts, granulomas, etc.) may require surgical intervention, and implementing voice treatment prior to this could be harmful.

There could be unidentified laryngeal cancer, and again, this would warrant medical intervention before behavioral voice therapy.

31

## Overview of Voice Treatment Options

---

32



## Teaching Vocal Hygiene Guidelines

Really, these are good for everyone. But education of vocal hygiene is particularly important for patients who are healing from vocal pathologies.

- ❑ Proper voice use, limiting strain
- ❑ Avoidance of vocally abusive behaviors
- ❑ Staying hydrated
- ❑ Avoiding/limiting caffeine, smoke, alcohol etc...dehydrating to mucosa of VFs
- ❑ Using amplification and building in breaks when speaking for long periods of time or to crowds
- ❑ Managing reflux if it's a factor... Teach behavioral reflux precautions. (Taking meds as prescribed if applicable.)
- ❑ Managing allergies if applicable
- ❑ Reducing any unnecessary coughing ( want to address chronic throat clearing/ chronic coughing before it causes more problems/damage)

33

## Treatment for Laryngeal Hypo-Function

### Vocal function exercises

- Sustained /a/ or /i/ using biofeedback for measuring frequency/volume... Train them to use a louder volume if needed to achieve a good voice quality.
- Pitch glides high
- Pitch glides low
- Make sure to measure mouth to mic ratio and be consistent from session to session.

Respiratory strength training (EMST/IMST) is appropriate in some cases. It is important to have adequate training to know how to treat at the appropriate levels based on the patient's MEP and MIP. (Not a one-size-fits-all treatment.)

### Breath grouping and diaphragmatic breathing

Adduction exercises in certain cases (if there is a glottal gap that can be approximated with adduction techniques as determined under imaging). Use caution if the pt. has HTN that is unmanaged.

- Valsalva maneuver/Chair pull/ Palm Pushing ...Increasing subglottic pressure to try to help achieve VF closure. Ideally would want to try under videostrobe. These typically aren't needed for very long. It is easy to overdo them and cause laryngeal tension/ over-straining.

34

## Treatment for Laryngeal Hyper-Function

### Manual therapy/ laryngeal massage for tension treatment

- Typically involves gentle laryngeal massage downward... Trial during voice tasks. If they are very tense, their pitch will likely be very elevated (or they may even be completely or nearly aphonic). Sometimes immediately while providing gentle downward laryngeal massage, their pitch improves and/or they achieve more functional voicing..... Additional trainings to pursue for this: myofascial release/ manual therapy courses.

Teach postural techniques... relaxed posture/ not raising shoulders and tensing when speaking

Teach diaphragmatic breathing

Cervical/laryngeal stretches

- Laryngeal tension often coincides with general upper body tension... Shoulder rolls, neck stretches, etc. may help loosen things up as one component of treatment along with other voice treatments.

Easy onset, semi-occluded vocal tract techniques

- Straw phonation, humming, etc.
- Teaching them to self-monitor for a 'throaty' voice or pressure/friction at the level of the larynx when speaking

35

## Summary of General Treatment Approaches

Type of Impairment	Possible Treatments to Consider
Vocal Fold Bowing/ Incomplete Closure	<ul style="list-style-type: none"> <li>Vocal function exercises/ training to increase volume (if able to achieve better voicing with strategies...e.g., with cues to be louder, they can achieve full glottis closure)</li> <li>Respiratory training (e.g., EMST) if appropriate</li> <li>Adduction exercises (Valsalva maneuver, etc.).. Make sure there are no uncontrolled blood pressure issues. Won't work for severe gap/ paralysis.</li> <li>Refer for medical management with ENT (vocal fold injection/augmentation, medialization...e.g., for paralysis)</li> </ul>
Muscle Tension Dysphonia	<ul style="list-style-type: none"> <li>Manual therapy/ laryngeal manipulation/ massage if trained, cervical stretches, etc... Possible referral for manual therapy if not trained yourself.</li> <li>Easy onset, flow phonation, semi-occluded vocal tract (SOVT) exercises/ straw phonation, etc.</li> </ul>
Vocal Nodules/ Granulomas/ Polyps/Etc.	<ul style="list-style-type: none"> <li>Overall, trying to allow for healing and prevent reoccurrence...</li> <li>Detailed vocal hygiene education</li> <li>Reducing vocally abusive behaviors</li> <li>Teaching correct voice usage to prevent further damage</li> </ul>

36

## Key References

---

**Dysarthria Classification Resource:** Duffy, J. (2020). *Motor speech disorders: Substrates, differential diagnosis, and management* (4<sup>th</sup> ed.). Elsevier.

**Learn About LSVT LOUD for Parkinson's Disease:** <https://www.lsvtglobal.com/LSVTLoud>

**Learn About SpeakOut for Parkinson's Disease:**

<https://www.parkinsonvoiceproject.org/SPEAKOUT!Training>

**Videostrobe Rating Resource:** Poburka, B. J., Patel, R. R., & Bless, D. M. (2017). Voice-Vibratory Assessment With Laryngeal Imaging (VALI) Form: Reliability of Rating Stroboscopy and High-speed Videoendoscopy. *Journal of Voice*, 31(4). <https://doi.org/10.1016/j.jvoice.2016.12.003>

**Voice Handicap Index:**

[https://www.amc.edu/patient/amfp\\_forms/Voice\\_Handicap\\_Index\\_2015.pdf](https://www.amc.edu/patient/amfp_forms/Voice_Handicap_Index_2015.pdf)

37

## Questions/Comments...?

---

If you think of something later, you can email me at: [therapy@tulsasnr.com](mailto:therapy@tulsasnr.com). 😊

38