

COMMUNICATION & SWALLOW



Parkinson Society
British Columbia

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CONTENTS

Canadian Guidelines on Parkinson’s Disease.....	4
Overview of the Communication and Swallow Booklet.....	5
Communication and Swallowing Fast facts.....	6
Overview of Parkinson’s Disease.....	7
<i>Common Symptoms</i>	7
<i>Neurological Basis for Communication and Swallow Difficulty</i>	7
<i>Structure and Function of the Larynx</i>	8
The Role of a Speech-Language Pathologist.....	9
Communication.....	10
<i>What is a Communication Evaluation?</i>	11
<i>Speech Therapy for Hypokinetic Dysarthria</i>	11
<i>Technology</i>	13
Swallow.....	14
<i>Drooling</i>	14
<i>What is a Swallowing Evaluation?</i>	14
<i>Speech Therapy for Dysphagia</i>	15
<i>Technology</i>	16
Additional Information.....	17
<i>Nutritional Risk Factors</i>	17
<i>Hearing</i>	17
<i>Body Language</i>	18
<i>Medication Effects on Communication and Swallow</i>	19
Appendix A.....	20
<i>PART A</i>	20
<i>PART B</i>	21
<i>PART C</i>	22
Appendix B.....	24
Appendix C.....	25
Glossary.....	30
References.....	32
NOTES.....	33

CANADIAN GUIDELINES ON PARKINSON'S DISEASE

The Canadian Guidelines on Parkinson's disease are published by national Parkinson's specialists for healthcare professionals. If you are interested in obtaining the complete guidelines contact PSBC at 1-800-668-3330.

The focus on non-pharmacologic methods of treatment is emerging. Provision of education and valid information is essential to empower both patients and families in actively participating in disease management (Grimes et al., 2012).

Speech and language therapy is essential to the quality of life for people with Parkinson's (PwP) disease. Hypophonia, weak or soft voice, is a common problem resulting in social withdrawal and the misperception of cognitive decline for PwP. Speech-Language therapy can improve communication.

Assessment of swallowing safety is crucial. Speech-language pathologists (SLPs) in conjunction with clinical nutritionists make important contributions to the patient care team. Their involvement can result in identifying causes for weight loss, reduce the risk of aspiration* and help maintain weight.

According to the Canadian Guidelines on Parkinson's Disease, speech and language therapy should be available for PwP. Particular consideration should be given to:

- Improvement of vocal loudness, including speech therapy programs, such as the Lee Silverman Voice Treatment® (LSVT®).
- Ensuring an effective means of communication is maintained throughout the course of the disease, including use of assistive technologies.
- Review and management to support safety and efficiency of swallowing, and to minimize the risk of aspiration.

OVERVIEW OF THE COMMUNICATION AND SWALLOW BOOKLET

This booklet focuses on communication and swallow challenges faced by PwP. This booklet is intended to complement Parkinson Society British Columbia's (PSBC) Communication and Swallow Workshops, which are interactive and participatory in format. It can also be referred to as a stand-alone resource. PwP at all stages are welcomed to use this resource, including those who currently do not experience communication and swallow symptoms but wish to be proactive with their treatment.

Those individuals seeking more information about communication and swallow challenges should consult a Speech-language pathologist (SLP) in their community. To find a SLP trained in LSVT® LOUD near you, contact PSBC at 1-800-668-3330 or visit the LSVT® Global website at www.lsvtglobal.com.

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Editorial Statement:

The information and exercises in this booklet are not intended to take the place of professional consultation with a Speech-Language Pathologist (SLP) or your health care team. Information for this booklet was taken from the PSBC Communication and Swallow Workshops, from the American Parkinson Disease Association (APDA, 2010) Speaking Effectively resource (<http://www.apdaparkinson.org/resources-support/download-publications>), and Lee Silverman Voice Treatment® resource.

COMMUNICATION AND SWALLOWING FAST FACTS

1. A Speech-language pathologist (SLP) is an important member of your healthcare team to help support and maintain quality of life in the areas of communication and swallowing.
2. Communication and swallow difficulties can occur at any phase of Parkinson's disease (PD) and may even be early symptoms.
3. Up to 90% of people with Parkinson's disease (PwP) worldwide will have trouble with communication most typically characterized by low vocal volume.
4. The trouble communicating specific to PD is called hypokinetic dysarthria which can include low volume, decreased rate of speech, hoarseness, speech sound problems and voice tremor.
5. Lee Silverman Voice Treatment® is the gold standard for speech therapy for PwP.
6. Most PwP will have difficulty with some aspect of swallowing, at varying levels of severity.
7. Those with PD should have a baseline swallow study, also known as a modified barium swallow (MBS) study, which is a video X-ray of swallowing performed by a qualified SLP and radiologist.
8. Safe swallowing recommendations, any changes to food texture or any form of swallowing exercise, should be made by a SLP after participating in a MBS.
9. There are no medications specifically for communication or swallowing difficulties but you may see improvement when your medication is optimized.
10. It is best to address communication and swallowing early to work on a plan to maintain quality of life.

OVERVIEW OF PARKINSON'S DISEASE

Parkinson's disease (PD) is the second most common neuro-degenerative disorder after Alzheimer's disease and affects both motor and non-motor functioning. PD is a progressive neurological disorder resulting from the loss of dopamine (chemical messenger) in a part of the brain called the substantia nigra. As dopamine continues to decrease, muscle movements become slower and more rigid, tremors can develop and reflexes become more impaired contributing to a loss of balance.

Common Symptoms

PD manifests itself through a wide spectrum of symptoms. While there are many potential challenges, keep in mind that the disease is unique to every individual.

Below is a list of the common motor and non-motor symptoms experienced by PwP. This list is not exhaustive.

Motor Symptoms

- Resting tremor
- Rigidity
- Slowness of movement (bradykinesia)
- Balance and postural impairment
- Softened voice (hypophonia)
- Difficulty swallowing (dysphagia)

Non-Motor Symptoms

- Reduced facial expression (hypomimia)
- Sleep disturbances
- Constipation
- Fatigue
- Changes in mood (depression and/or anxiety)

Neurological Basis for Communication and Swallow Difficulty

The symptoms of PD can affect respiration (breathing), phonation (voice production), resonance (richness of voice) and articulation (clarity of speech). Disruptions to breathing, voice, speech and swallowing characteristics are caused by movements of muscles, which are slower, less accurate, weaker or difficult to coordinate with other movements (Matsuo & Palmer, 2008). The muscles of the lips, tongue, throat, larynx* (voice box) and lungs may all be affected. The primary result of these changes in muscle performance includes imprecise articulation and rapid speech rate with progressive acceleration and short rushes of speech, reduced stress of syllables, reduced loudness and a hoarse, tremulous and monotone voice (Matsuo & Palmer, 2008).

Many of the same muscles that are used to produce voice and speech are also used for eating and swallowing. Most PwP will report problems in this area. Practical suggestions for ways to improve eating ease, swallowing safety and quality of life are also included in this booklet. Excessive saliva production, drooling and hearing impairment are also concerns for many PwP. These problems can have an effect on communication* and swallow abilities. Practical ways of dealing with them will also be discussed (Rosen & Simpson, 2008).

Structure and Function of the Larynx

The structure of the larynx or voice box includes cartilage, bone, ligaments and muscle. Cartilage includes: thyroid cartilage (commonly referred to as the Adam's apple), cricoid cartilage and the arytenoid complex (made up of 3 separate cartilages.) There is one bone in the larynx, the hyoid bone. It is our only floating bone and suspends the larynx between the base of the tongue and thyroid cartilage. It does not have another bone attachment, or joint, but rather is suspended by muscles from above and below.

We have two vocal folds which are made of layers of cells, ligaments, and muscles. They sit horizontally in the larynx from the thyroid cartilage in front to the arytenoid complex in the back. The vocal folds, move (open, close and vibrate) via joints created by the cartilage and muscle attachments. The larynx is innervated (supplied with nerves for movement and sensation) by the superior laryngeal nerve and the recurrent laryngeal nerve branches of cranial nerve X (vagus). The vagus nerve also innervates (sends messages to) the esophagus, which can cause some confusion in sensory messages related to swallowing.

The larynx has four primary functions: respiration (breathing), airway protection when swallowing or coughing, fixation (for lifting, pushing and pulling), and voice production.

It is best to address communication and swallowing early to work on a plan to maintain quality of life.

THE ROLE OF A SPEECH-LANGUAGE PATHOLOGIST

Speech-language pathologists (SLPs) are healthcare professionals trained to evaluate and treat individuals with speech, voice, language, and swallowing problems. A SLP has a graduate degree and is registered by the College of Speech and Hearing Health Professionals of British Columbia ([CSHHPBC](#)).

The SLP is the professional who will provide detailed information about the changes in communication and swallow as PD changes over time. The SLP will be able to offer solutions and treatment for improving speech, voice and swallowing to help maintain quality of life.

Finding a Speech-Language Pathologist

In BC, local hospitals, rehabilitation centres and movement disorder clinics employ SLPs to provide both inpatient and outpatient services. In addition, many SLPs have private practices.

The CSHHPBC website will help you locate a SLP in specific geographic areas (<http://www.cshhpbc.org/docs/directorybycity.pdf>). You can also contact the College at 604-568-1568. BC Association of Speech/Language Pathologists and Audiologists (BCASLPA), the provincial Speech and Hearing Association, also has a Find a Professional resource (<http://www.bcaslpa.ca/public/find-a-professional/>). If you live outside British Columbia, contact your speech language pathology regulatory agency (College) or professional association.

To find a SLP trained in LSVT® LOUD near you, contact PSBC at 1-800-668-3330 or visit the LSVT® Global website at www.lsvtglobal.com.

A Speech-language pathologist (SLP) is an important member of your healthcare team to help support and maintain quality of life in the areas of communication and swallowing.

COMMUNICATION

How Do I Know if My Communication and Swallowing is Changing?

The Radboud Oral Motor Inventory for Parkinson's disease (ROMP) is a self-evaluation tool to evaluate perceived problems with speech, swallowing and saliva control in patients with PD or atypical Parkinsonism. This can be used to identify initial concerns or monitor any changes. Share your results with your physician and health care team to help facilitate support in the areas identified as troublesome. You can complete the ROMP every 6 months to a year, or anytime you think you have experienced changes in drooling, communication or swallowing. We recommend keeping previously completed copies for comparison. Please refer to your responses on the ROMP Questionnaire to help increase your awareness of any difficulties with communication and speech (see Appendix A).

Communication and swallow difficulties can occur at any phase of Parkinson's disease (PD) and may even be early symptoms.

Our ability to communicate allows us to express our emotions, socialize, work, and at a very basic level; have our wants and needs met. Wants and needs include expressions such as "I'm hungry, I'm tired, I need the doctor, I have pain, I love you." As many as 90% of PwPs world-wide have disordered communication. Oftentimes PwP indicate that they cannot be heard or that they have a hard time speaking over crowd noise. Family members or a partner may complain that the PwP is not speaking loud enough. This can lead to frustration during communication interaction. The difficulties that PwP have with vocal loudness have been well studied. Low vocal loudness level means that the vocal output is softer than normal (see Appendix B – LSVT® Vocal Loudness Picture).

The term used to describe difficulty with communication in PD is hypokinetic dysarthria*. Dysarthria* is a collective term used to refer to the impaired production of speech due to disturbances in the muscular control of the voice and speech mechanism. Hypokinetic means reduced movement. Therefore, hypokinetic dysarthria is reduced movement of the muscles used for voice and speech production. The structure that produces voice and speech, and allows for safe swallowing, is not broken in PwP. The message from the brain has been altered due to the breakdown in the motor cortex. When the message to the system is strong enough and "big" enough, the structure will respond in a more functional way.

Up to 90% of people with Parkinson's disease (PwP) worldwide will have trouble with communication most typically characterized by low vocal volume.

Symptoms of Hypokinetic Dysarthria Include:

- Low vocal volume
- Hoarseness
- Changes in speech rate (faster or slower)
- Inaccurate articulation

Less Obvious Symptoms That May Indicate Changes in Communication:

- Increased need to repeat
- Decreased desire to socialize
- Decreased participation in conversation
- Not talking on the phone
- Less effective in the workplace for tasks requiring communication

Cognition and PD

Mild Cognitive Impairment (MCI), “degree of cognitive impairment not normal for age,” has been reported to occur in approximately 25% of PD patients while Parkinson Disease Dementia (PDD) has been suggested to occur in approximately 40% of people with increased risk over the progression of the disease, 83% after 20 years.

MCI in PwP has been described to include “slowed processing, difficulty with multi-tasking or planning, decreased attention and concentration, and word finding disturbances.” PDD has been described primarily as an impairment that does not have to include memory issues but rather greater impairment in non-memory cognitive domains such as executive function, attention, and visuospatial function. PD-MCI can be a risk factor for PDD however, research continues evolve on risk factors and progression of MCI (Goldman and Litvan, 2011).

Generally, MCI can be thought of as a notable impairment that has not interfered with daily activities while PDD has been identified as cognitive dysfunction that impairs ability to participate in daily activities. Exercise has been noted to have an effect on MCI, however research continues into exercise benefits for PDD (Jensen, et al., 2015).

The PwP should report any cognitive concerns to their health care team. Medication and other medical changes should be considered and addressed as possible contributors to change in cognition.

What is a Communication Evaluation?

A communication evaluation takes place with a speech-language pathologist. Information regarding your current concerns and medical history will be gathered and discussed. Baseline data on your communication abilities, speech and voice, will be collected and used to determine treatment plan and outcome measures. Cognitive screening or full cognitive evaluation may also be administered. Because the treatment for hypokinetic dysarthria is “voice” therapy (or Behaviour Therapy), it is important to also evaluate the vocal folds* prior to treatment. This can be done by an ear, nose and throat (ENT) specialist or qualified speech-language pathologist (SLP).

Speech Therapy for Hypokinetic Dysarthria

The most widely used program shown to have positive outcomes for PwP is the Lee Silverman Voice Treatment® (LSVT®) program. SLPs, Lorraine O. Ramig, Ph.D., CCC-SLP and Carolyn Mead, M.A., CCC-SLP, developed this program in 1987. It was named for the patient who was the inspiration for this creative approach to speech therapy. LSVT® is an intensive behavioral treatment program that requires a PwP to engage in 16 60-minute therapy sessions in one month. The primary goal of the technique is to improve vocal loudness. In addition, as a result of the therapy, improvements in speech, fluency, breath support, lip movement and facial expression have also been well documented. There is evidence that LSVT® has resulted in improvement of the oral phase of swallowing related to lip strength, drooling, chewing and manipulating food. Outcome studies have shown carryover of progress up to 2 years (Ramig et al., 2001; Ramid, Fox & Sapir, 2004). As each individual’s experience with PD is different, outcomes may vary from researched outcomes. An established relationship with a SLP will help extend the benefit of the LSVT® program.

The trouble communicating specific to PD is called hypokinetic dysarthria which can include low volume, decreased rate of speech, hoarseness, speech sound problems and voice tremor.

The LSVT® Program Consists of Five Essential Concepts

- Concept 1: Focuses on the VOICE. This concept works on helping the vocal folds close better, reinforces the idea of “THINKING LOUD/THINKING SHOUT” and attempts to train the speech to be as clear as possible.
- Concept 2: Focuses on HIGH EFFORT with emphasis on vocal and physical effort. This focus on effort is thought to override the muscles’ lack of movement and slowness of movement to new effort levels – particularly as the disease progresses. The clinician helps the person with PD scale the effort needed to perform the tasks during therapy.
- Concept 3: Sixteen sessions are done on an individual basis for a period of one month. This provides daily opportunity to practice, and over the 16 sessions, allows the degree of vocal effort to be increased. It helps maintain a certain level of motivation and accountability. It also provides adequate time for the skill(s) to be learned and transferred to other environments such as home or work. Finally, it allows the speech pathologist to document any fluctuations in the patient’s performance.
- Concept 4: Focuses on defining what the patient “knows” and “accepts” about the amount of effort needed to consistently increase vocal loudness to a level that is within normal limits. The relationship between increased vocal effort and vocal output is then established. Those with PD often have problems knowing how loud their voice is.
- Concept 5: Focuses on quantification. The key is to motivate the patient and provide feedback about the improvement or the need for more improvement. During this phase all five concepts are integrated and all focus on high effort voice used daily.

See *Exercises for Speech Practice* (Appendix B) for some functional words, phrases and sentences to use at home to practice projecting vocal loudness.

The LSVT® daily voice exercises are introduced as part of the PSBC Communication and Swallow Workshop. While you will be able to perform these exercises, carryover of increased vocal loudness to all daily activities can be better improved by participating in a formal LSVT® program with a certified LSVT® SLP.

Technology

The LSVT Companion® is a commercial product designed to facilitate your treatment, increase treatment accessibility and encourage treatment maintenance with at home use. Use of the LSVT Companion® by the SLP can decrease the need for direct 1:1 therapy sessions by up to 50% with the same results as 16 individual sessions (Halpern et al., 2012). This was developed by LSVT® Global to increase access to LSVT® while decreasing the burden of intensive treatment. Ask your SLP if they have the LSVT® Companion.

Current technology allows for individuals to independently monitor loudness. There are several apps that can help the PwP work on voice and communication. Some apps are listed below. To find one that is right for you, work with your SLP. The following is not a comprehensive list.

Voice Applications

- Speak Up for Parkinson's
- Voice-O-Meter
- iParkinson's
- Delayed Auditory Feedback
- Speech-Easy

Alternative Methods of Communication

There are other types of devices that are used when a person's ability to communicate orally becomes very limited. These are augmentative or assistive devices. The devices can be used in addition to continued efforts at speech improvement or by themselves. Some systems are quite simple and inexpensive, while others are complex and more expensive.

- *Writing*: This is the most common way to communicate without speech. Keep writing materials accessible at all times. These could include paper and pencil, clipboard, small chalkboard with chalk and eraser or a magic slate (found in toy departments). When writing or printing, concentrate on keeping the letters large and well-spaced.
- *Pointing Systems*: This includes items such as a large board, notebook, binder or photo album with pictures of family, friends and commonly used items. Alphabet boards or notebooks with words for frequently needed items organized into categories are other helpful pointing systems.
- *Electronic/Computer Systems*: These are the most sophisticated augmentative systems and may consist of a keyboard, display screen and printer. Many are portable. Size of keyboard and display/printer varies.

A qualified speech-language pathologist can perform an augmentative/assistive device evaluation to determine what system is most appropriate. Before purchasing a device, consult with a SLP.

Other Options for Keeping Voice Strong

- Acting Lessons
- Community Choirs
- Community Theatre
- Group speech therapy opportunities (contact PSBC for a list of BC providers)
- Singing Lessons

SWALLOW

The term that is used for swallowing dysfunction is dysphagia*. It is common for PwP to report difficulty with chewing and swallowing. The physical changes in the muscles used for communication can also affect the ability to chew and swallow safely (Tjaden, 2008). Swallowing disorders can present themselves in many forms that may not be readily identified as a swallowing problem. The primary problems reported are:

- Food “sticking” in the throat
- Coughing or choking on food or liquid
- Difficulty in swallowing pills
- Difficulty initiating swallowing

Less obvious swallowing symptoms that can be encountered include:

- Slow rate of eating
- Fatigue during eating
- Unexplained weight loss
- Change in dietary habits
- Recurrent pneumonia
- Nasal regurgitation

Most PwP will have difficulty with some aspect of swallowing, at varying levels of severity.

Please refer to your questions on the ROMP Questionnaire to help increase your awareness of any difficulties swallowing.

Drooling

Poor control of saliva is known as sialorrhea. Problems encountered with drooling may be due to the fact that swallowing is less frequent or there is a delay in the ability to trigger the swallowing process. There are both medical and behavioural management for drooling. Close communication with a primary care physician or neurologist and SLP is recommended. Drooling can be a sign of a swallowing disorder in PwP.

What is a Swallowing Evaluation?

A swallowing evaluation takes place with a qualified SLP. Information regarding your current concerns and medical history will be gathered and discussed. The SLP may ask you to eat and drink to make initial observations. The gold standard instrumental evaluation is referred to as a Modified Barium Swallow* (MBS). This exam includes a “video x-ray”, or Video-fluoroscopy, performed by a qualified SLP and radiologist to detect the specific location and characteristics of problems in the swallowing mechanism.

During the MBS, you will be asked to eat and drink various consistencies (pudding, water, milk, cookies, barium pill, or specific food items that give you difficulty when eating). The x-ray video will be taken during the chewing and swallowing process. The SLP and radiologist will assess the video and comment on the structure and function of the swallowing mechanism as well as any aspiration or risk for aspiration. All phases of swallowing, oral, pharyngeal and esophageal, can be assessed in the MBS.

Fiberoptic Endoscopic Evaluation of Swallowing (FEES*) is another type of instrumental test that can be performed by a qualified SLP. It is a procedure that allows for the direct viewing of the pharynx and larynx with the swallowing of liquids and solids. A very thin flexible fiberoptic tube will be passed through the nasal passage. It is connected to a camera and light source, and allows for video and sound recording. The SLP will evaluate the pharyngeal phase of swallowing and document evidence of aspiration or risk for aspiration. The FEES is an appropriate follow-up procedure to the MBS.

The CSHHPBC requires Advanced Competency Certification in the following areas related to communication and swallowing: flexible endoscopic evaluation of voice, flexible endoscopic evaluation of swallowing and Modified Barium Swallow (MBS). Only a SLP with the appropriate advanced competency may perform these evaluations.

Those with PD should have a baseline swallow study, also known as a modified barium swallow (MBS) study, which is a video X-ray of swallowing performed by a qualified SLP and radiologist.

Speech Therapy for Dysphagia

Following a complete swallowing evaluation, an intervention program is established for the PwP and family support members. Recommendations may include both compensatory* strategies and rehabilitative* strategies (Ashford et al., 2009; Tjaden, 2008).

Because severity and extent of swallowing difficulty vary significantly among PwP, compensatory or rehabilitative strategies should not be tried by individuals without the recommendation and training by a SLP following full instrumental evaluation.

Compensatory Strategies

- Airway protection maneuvers (effortful swallow, double swallow, supraglottic maneuver)
- Altering foods/fluids
- Dietary modifications (safest, least invasive diet consistencies)
- Feeding/eating modifications (adaptive utensils, bolus size, eating rate, order of liquid and solid boluses*, eating environment)
- Increasing bolus sensory input
- Oral health
- Saliva/drooling management
- Supervised/assisted feeding
- Verbal prompting to swallow/re-swallow

Rehabilitative Strategies

- Active Range of Motion (ROM) for jaw, lips, tongue
- Effortful swallow for PwP with reduced posterior movement of the tongue base
- Airway protection techniques:
 - Double swallow followed by a cough
 - Supraglottic swallow for PwP that aspirate during the swallow
- Shaker or head lift exercise to maximize upper esophageal opening
- Effortful pitch glide
- LSVT®
- Expiratory Muscle Strength Trainer-150

Safe swallowing recommendations, any changes to food texture or any form of swallowing exercise, should be made by a SLP after participating in a MBS.

ADDITIONAL INFORMATION

Nutritional Risk Factors

When a person is sick or suffering from a debilitating disease process it changes his/her ability to accomplish tasks, which appear easy to a healthy person. PwP are often sedentary, their activity levels drop and the energy for eating can diminish. The drop in energy can lead to a lack of desire to prepare foods, thus reducing the amount of food eaten and the nutritional value. This, along with difficulty chewing foods and swallowing them, can lead to a substantial reduction in weight. Coupled with possible dietary restrictions due to medication use and/or other drug side effects such as nausea, vomiting and constipation, this can place the PwP at high-risk for malnutrition.

Nutritional Suggestions

- Eat a balanced diet, including all food groups.
- Consume sufficient calories to maintain weight.
- Consume adequate fiber and fluids to avoid constipation.
- Take vitamin D and calcium to prevent osteoporosis.
- Reduce protein to minimum daily allowance and eat during the evening meal.

A registered Dietician can help you identify individual risk factors. Find a registered Dietician on the [Dietitians of Canada website](#).

Hearing

Hearing problems are not directly caused by PD but certainly are associated with aging. Hearing loss can be experienced by the PwP and/or affect the spouse or caregiver of the person with PD. Statistics Canada reported that 47% of adults aged 60-79 years were more likely to experience hearing loss compared to younger adults (Statistics Canada, Hearing Loss of Canadians, 2012-2013). Projections indicate that this number and percentage will grow as baby boomers age and increasing noise pollution continues to take its toll. Hearing loss affects everyone that needs to interact with the hearing impaired individual. Poor hearing seriously interferes with communications and when compounded with the difficulties that a PwP already has with their speaking, it can significantly diminish the quality of communication interaction.

The most common type of hearing loss that occurs with age is called a sensorineural hearing loss. A sensorineural hearing loss is caused by damage to the inner ear and/or the auditory nerve. Noise, certain medications, as well as age can contribute to this permanent hearing loss. Most sensorineural hearing losses can be treated effectively with hearing aids. If you suspect a hearing loss or are the spouse or caregiver of a PwP, seek a professional consultation with an [audiologist](#)*. An audiologist is a professional who specializes in hearing evaluation and treatment.

The techniques below will be helpful when communicating with someone who has difficulty hearing:

- Always let the listener see the face of the speaker.
- A distance of three to six feet between speaker and listener is best.
- Do not speak to a person who has difficulty hearing from another room. Get his or her attention before you start to speak.
- Don't try to communicate in a noisy environment. Turn off the radio or the TV or go to a quiet place for conversation.
- Don't shout. Raise your voice's volume a little and speak clearly.
- Never talk directly into a hearing impaired person's ear.
- Keep the rate of speech slow.
- Repeat the message, if needed. If the person with hearing impairment does not appear to understand what is being said, rephrase the statement rather than simply repeating the misunderstood words.
- Above all, treat the person with hearing impairment as an adult *with respect*.

Body Language

Not all communication takes place with speech and words. People also communicate with each other by their body language and gestures. Facial masking, or lack of facial expression that is common in those with PD, is a result of rigidity and reduced range of movement in the muscles of the face. Some friends and family members report that the listener who displays no facial expression does not seem interested in their conversation. Facial expressions, as well as other nonverbal gestures, contribute to and enhance the communication process. We can use facial expressions, head movements, hand and arm gestures, and body posture and body position to clarify or add to what we are saying.

Using body language in communication can be a special challenge to PwP because of facial masking, slowness of body movements and rigidity of muscles. Practice body language and gestures and then make a point of using them when you are talking.

Practice and remember the following:

- *Eye contact* is probably the most important type of non-spoken communication. Always make eye contact when you are talking. Making eye contact shows that you are interested in communicating and in the listener.
- Practice exaggerating *facial expressions*. What does the face feel and look like when expressing emotions such as happiness, sadness, worry or concern? Practice these facial expressions: raise the eyebrows, wrinkle the forehead, open the eyes widely, squint the eyes, smile broadly, purse the lips. Use these movements of facial muscles when talking.
- Keep the *lips closed* when listening. Having lips closed indicates concentration and attention.
- Use *body posture* to show feelings when talking. Leaning slightly forward in the chair shows interest; leaning back in the chair may show that a state of relaxation and comfort. Leaning back and breaking eye contact can show that a lack of interest in communicating or that the communication should stop.
- Use *gestures* to add to the spoken message. Shrug the shoulders, clasp the hands, turn the head, raise the arms.
- Simply *pointing* to what is being talked about can be effective ways to add to the spoken message.

Medication Effects on Communication and Swallow

While medications are the primary tool for management of PD, the effects of these pharmacological agents on speech, voice and swallowing deficits have been difficult to measure. Additionally, there are some side effects of PD medications that may negatively impact voice, speech and swallowing functions. It is of extreme importance that a PwP recognizes the cycle of their medication in terms of “on” and “off” effects that accompany the cycles of medication regimen.

***There are no medications specifically for communication or swallowing difficulties
but you may see improvement when your medication is optimized.***

Helpful Strategies

- Be aware of the ‘on’ cycle of PD medications as the voice, speech and swallowing will be at its peak performance.
- Avoid too much vocal communication when tired or fatigued, or during the ‘off’ cycle of the PD medications.
- Schedule important phone calls and other conversational interaction during the ‘on’ cycle of the medication regimen.
- Take time to rest between multiple phone calls and important communication interactions.

Although PD medications do not directly improve communication or swallowing difficulties, it is generally understood that when your medications is optimized, voice, speech and swallowing will be better.

APPENDIX A

Radboud Oral Motor Inventory for Parkinson Disease Participant Self Evaluation

PART A

Speech

My voice nowadays:

- a) My voice sounds normal.
- b) My voice sounds a bit softer or hoarser than it used to be.
- c) My voice is clearly softer or hoarser.
- d) My voice is very soft or hoarse.
- e) My voice can hardly be heard.

My ability to speak to familiar people:

- a) Familiar people find me intelligible as normal; I do not have to repeat.
- b) For familiar people, I am sometimes less intelligible when I am tired or do not pay attention.
- c) For familiar people, I am frequently less intelligible; I have to repeat multiple times.
- d) For familiar people, I am very often unintelligible, especially when I am tired.
- e) For familiar people, I am usually unintelligible, also when I repeat.

My ability to speak to strange people:

- a) Strange people find me intelligible as normal; I do not have to repeat.
- b) For strange people, I am sometimes less intelligible when I am tired or do not pay attention.
- c) For strange people, I am frequently less intelligible; I have to repeat multiple times.
- d) For strange people, I am very often unintelligible, especially when I am tired.
- e) For strange people, I am usually unintelligible, also when I repeat.

The use of my telephone:

- a) Using the telephone is no problem for me at all.
- b) I use my telephone as I used to do, but I need to pay more attention than before.
- c) I have to repeat regularly when I am on the telephone.
- d) I am reluctant to use the telephone because people do not understand me.
- e) Using the telephone is impossible for me because my speech is inadequate.

When I start to talk:

- a) I can say what I want to say as easy as I used to.
- b) I sometimes have to think a bit longer than I used to.
- c) I need more time or easily forget what I wanted to say.
- d) I need help to formulate my thoughts.
- e) I usually do not know what to say and prefer to stay silent.

Having a conversation in a group:

- a) I can take part in conversations as always.
- b) I can take part in a conversation, but I need to pay more attention.
- c) I can take part in a conversation only when others take into account that I need more time.
- d) I can take part in a conversation only when familiar people assist me.
- e) I feel left out because I cannot take part.

How bothered are you as a result of your difficulty speaking?

- a) I have no difficulty speaking.
- b) My difficulty speaking bothers me a little.
- c) I am bothered by my difficulty speaking, but it is not my priority concern.
- d) My difficulty speaking bothers me a lot because it is very limiting.
- e) Difficulty speaking is the worst aspect of my disease.

PART B

Swallowing

How many times do you choke when eating or drinking?

- a) I do not choke at all or not more than I used to.
- b) I choke about once a week.
- c) I choke almost daily.
- d) I choke about 3 times a day or during every meal.
- e) I choke more than 3 times a day or multiple times during meals.

Are you limited during drinking?

- a) I can drink liquids as easily as I used to.
- b) I can easily drink liquids, but I choke a little easier than I used to.
- c) I can drink safely only when I concentrate on it.
- d) To drink safely, I need to use a special cup or technique.
- e) I can drink safely only when I take thickened liquids.

Are you limited during eating?

- a) I can eat as easily as I used to.
- b) I can eat everything, but it takes me longer than before.
- c) I have to avoid tough or hard solid foods (meat, peanuts, etc.).
- d) I can eat only soft or easy chewable food.
- e) I have to use supplemental or non-oral feeding.

Do you have difficulty swallowing pills?

- a) I take my pills just like I used to.
- b) I have a little more difficulty swallowing my pills than I used to.
- c) I can take my pills only with applesauce or using a specific technique.
- d) Swallowing my pills is a struggle nowadays.
- e) I cannot swallow pills anymore and need another way of taking medication.

Does your swallowing difficulty limit your dining with others?

- a) Eating with others is no problem for me at all.
- b) I dine and drink with others, but I have to take my swallowing difficulty into account.
- c) I prefer eating in the presence of familiar people in familiar places.
- d) I eat only at home and in the presence of familiar people.
- e) I can eat only at home and with the assistance of a skillful caregiver.

Are you concerned about your difficulty swallowing?

- a) I do not experience difficulty.
- b) I have some difficulty swallowing, but I am not concerned about it.
- c) I am a little concerned about my difficulty swallowing.
- d) I am becoming more concerned about my difficulty swallowing.
- e) I am very much concerned about my difficulty swallowing.

How bothered are you as a result of your difficulty swallowing?

- a) I have no difficulty swallowing.
- b) My difficulty swallowing bothers me a little.
- c) I am bothered by my difficulty swallowing, but it is not my priority concern.
- d) My difficulty swallowing bothers me a lot because it is very limiting.
- e) My difficulty swallowing is the worst aspect of my disease.

PART C

Saliva

Do you experience loss of saliva from your mouth during the day?

- a) I do not lose saliva during the day and do not feel accumulation of saliva in my mouth.
- b) I do not lose saliva, but I feel accumulation of saliva in my mouth.
- c) I lose some saliva in the corners of my mouth or on my chin.
- d) I lose saliva on my clothes.
- e) I lose saliva on my clothes, but also on books or on the floor.

How often do you experience increased amounts or loss of saliva?

- a) Less than once a day.
- b) Occasionally: on average, once or twice a day.
- c) Frequently: 2 to 5 times a day.
- d) Very often: 6 to 10 times a day.
- e) Almost constantly.

Do you experience loss of saliva during the night?

- a) I do not experience loss of saliva during the night at all.
- b) My pillow sometimes gets wet during the night.
- c) My pillow regularly gets wet during the night.
- d) My pillow always gets wet during the night.
- e) Every night my pillow and other bedclothes get wet.

Does your (loss of) saliva impair your eating and drinking?

- a) No, my (loss of) saliva does not impair my eating or drinking.
- b) Yes, my (loss of) saliva occasionally impairs my eating or drinking.
- c) Yes, my (loss of) saliva frequently impairs my eating or drinking.
- d) Yes, my (loss of) saliva very often impairs my eating or drinking.
- e) Yes, my (loss of) saliva always impairs my eating or drinking.

Does your (loss of) saliva impair your speech?

- a) No, my (loss of) saliva does not impair my speech.
- b) Yes, my (loss of) saliva occasionally impairs my speech.
- c) Yes, my (loss of) saliva frequently impairs my speech.
- d) Yes, my (loss of) saliva very often impairs my speech.
- e) Yes, my (loss of) saliva always impairs my speech.

What do you have to do to remove saliva?

- a) I do not have to remove saliva.
- b) I always carry a handkerchief to remove possible saliva.
- c) I use 1 or 2 handkerchiefs to remove some saliva daily
- d) I need more than 2 handkerchiefs to remove saliva daily.
- e) I need to remove saliva so frequently that I always keep tissues near me or use a towel to protect my clothes.

Does the loss of saliva limit you in contacts with others?

- a) My loss of saliva does not limit me in contacts with others.
- b) I have to pay attention, but that does not bother me.
- c) I have to pay more attention because I know that others could see me losing saliva.
- d) I try to avoid contact when I know that I lose saliva.
- e) I notice that others avoid having contact with me because I lose saliva.

Does your loss of saliva limit you in doing activities inside or outside your home (work, hobbies)?

- a) My (loss of) saliva does not limit me in activities.
- b) I have to pay attention when I am busy, but that does not bother me.
- c) I have to pay more attention, which is rather effortful.
- d) My loss of saliva limits me in being active.

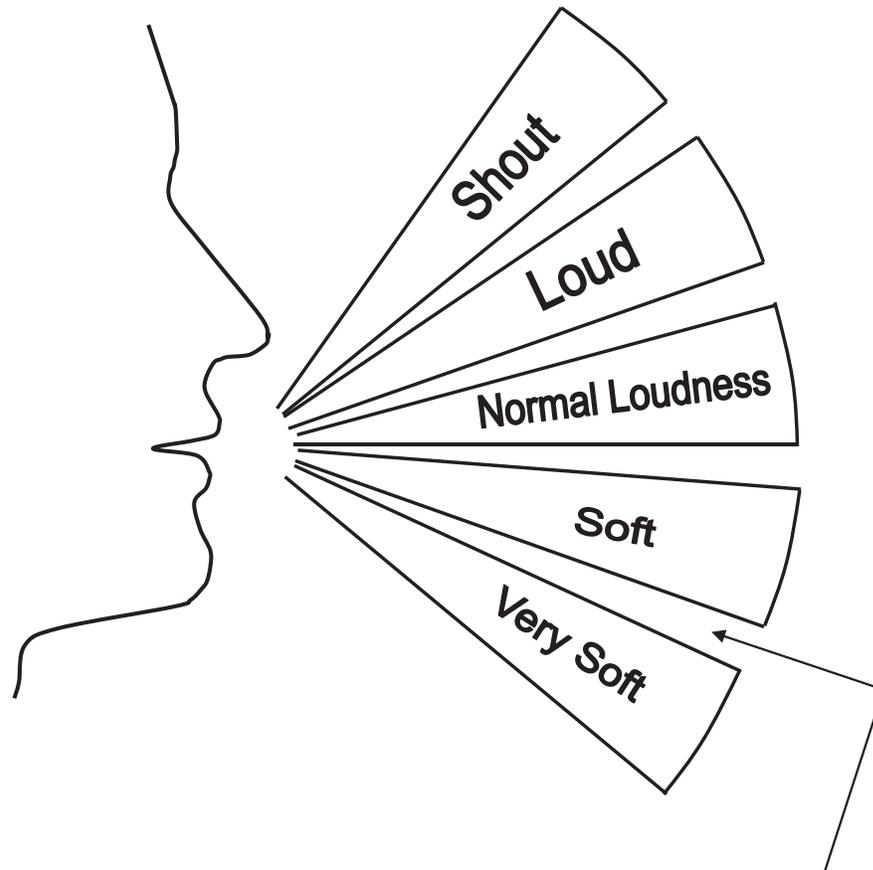
How bothered are you as a result of your (loss of) saliva?

- a) I hardly notice loss of saliva.
- b) Feeling more saliva or losing it bothers me a little.
- c) I am bothered by my loss of saliva, but it is not my priority concern.
- d) My loss of saliva bothers me a lot because it is very limiting.
- e) Due to my loss of saliva, important activities are no longer possible for me.
- f) Losing saliva is the worst aspect of my disease.

(Kalf et al., 2011)

APPENDIX B

RELATIVE VOCAL LOUDNESS LEVEL OF AN INDIVIDUAL WITH PARKINSON DISEASE



(Adapted from Carolyn Mead Bonitati, 1987)

Vocal loudness level
of an individual with
Parkinson disease

As a result of Parkinson disease you will need to use more **vocal effort** to have a voice within normal loudness limits.

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APPENDIX C

A LSVT® resource

Exercises for Speech Practice

Voice exercises should be done with LSVT® Concepts 1 and 2 in mind (page 12). THINK LOUD and high effort. It is OK to feel tired after voice exercises as if you have taken your vocal folds to the gym. Voice exercises should never hurt, cause soreness or feel uncomfortable. If you experience any discomfort, discontinue the exercises and pursue evaluation with a SLP.

Practicing LOUD will feel strange to the PwP. As a PwP, you should feel like you are shouting. This is due to deficits in sensory proprioception* in PD. By achieving the sensation of shouting you will be helping your vocal loudness return to average loudness levels (See LSVT® Loudness picture, Appendix B).

Integrating family members or friends into your speech therapy is an important part of the therapy process. Having this type of support makes it easier to carry over the therapeutic strategies from a treatment session to daily activities. Also, family and friends can lend a hand by reminding you when the voice is not loud enough or clear enough. Sometimes a simple hand gesture can be a reminder to increase the loudness. These helpful reminders can help motivate a change in communication effectiveness. Below are some “homework routines” that can be completed. It’s helpful to be consistent, therefore try to choose a time of day to practice these exercises for 10 minutes without interruptions. You may wish to practice once in the morning and once in the afternoon. If you are unable to practice with a partner who can provide feedback, then try with the one of the speech apps that measure loudness (page 13). Try to achieve a loudness level approximately 10dB louder than your speaking voice without effort.

Daily LOUD Voice Exercises

Voice exercises should never cause discomfort or coughing. They should improve loudness and voice quality, and not make the voice worse. If you have any discomfort or worsening of voice, discontinue voice exercises, and pursue evaluation with a LSVT® certified clinician.

1. Say “ah” with your loud voice for as long as you can. Try to feel the same level of effort you used in the workshop. Repeat 6 times.
2. Say “ah” with your loud voice and go as high as you can; hold it for 5 seconds. Try to feel the same level of effort you used in the workshop. Repeat 6 times.
3. Say “ah” with your loud voice and go as low as you can; hold it for 5 seconds. Try to feel the same level of effort you used in the workshop. Repeat 6 times.
4. Read aloud from your list of 10 functional phrases and sentences using your loud voice that you practiced in the workshop. Repeat 3 times.

At Home Exercises

Start with the shortest speech material first, and then move to the longer and more complicated exercises. Work independently or with someone else, if possible. Read the words, phrases or sentences aloud or repeat them after someone else. It doesn’t help if the material is read silently.

- Use a recording device so progress can be listened to.
- Try to use all of the principles from this booklet when practicing.
- Make up independent speech practice material for more variety.
- Remember, the best practice is using speech!

Note: words with an asterisk (*) are defined in the Glossary.

Other activities to practice your LOUD voice:

1. Practice reading words, short phrases, sentences, and paragraphs in a loud, high-energy voice.
2. Try talking in conversation in a high-energy voice.
3. Try making phone calls to friends or family members, and be sure to use a high-energy voice. Be aware of the number of times repetition is requested.
4. While driving or riding in a car, practice saying aloud the street signs or places passed.
5. Read short books or newspaper articles out loud.
6. Read books to children or grandchildren in a loud voice.

10 Functional Phrases

These should be as close to phrases you say EVERYDAY as possible.

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____

Functional Words and Phrases

Frequently used words – family members, friends, places you like to go, hobbies, etc. Words that are familiar to you, words you say frequently.

- | | | |
|-----------|-----------|-----------|
| 1. _____ | 18. _____ | 35. _____ |
| 2. _____ | 19. _____ | 36. _____ |
| 3. _____ | 20. _____ | 37. _____ |
| 4. _____ | 21. _____ | 38. _____ |
| 5. _____ | 22. _____ | 39. _____ |
| 6. _____ | 23. _____ | 40. _____ |
| 7. _____ | 24. _____ | 41. _____ |
| 8. _____ | 25. _____ | 42. _____ |
| 9. _____ | 26. _____ | 43. _____ |
| 10. _____ | 27. _____ | 44. _____ |
| 11. _____ | 28. _____ | 45. _____ |
| 12. _____ | 29. _____ | 46. _____ |
| 13. _____ | 30. _____ | 47. _____ |
| 14. _____ | 31. _____ | 48. _____ |
| 15. _____ | 32. _____ | 49. _____ |
| 16. _____ | 33. _____ | 50. _____ |
| 17. _____ | 34. _____ | |

When reading aloud, hold paper upright, and THINK LOUD!

Hello	You're welcome	Could you get that?
Good-bye	Sure	Do you know him/her?
Good morning	I hope so	Happy Birthday!
Goodnight	No	Not too good
How are you?	Take care!	It's over there
See you later	I'm ready	Where's the paper?
Who is this?	Not today	Please go to the store
This is _____	Can you get that?	Better than before
Help me!	You're kidding?	It's time to go
Thank you	Never mind	Who's on the phone?
No thank you	Why do you ask?	I have to go to the bathroom
That's okay	Do you see it?	I am not feeling well
Very well, thanks	I'm not sure	What's on TV?

Functional Sentences

Let's go out tonight.	Did you lock the door?
How was your day?	That was so nice of you!
It was nice to meet you.	Could you turn off the T.V.?
Could you help me with this?	Are all of the windows closed?
I don't need any help.	Is the air conditioning on?
Where are you going?	What do you have to drink?
Would you like some coffee?	I'd like to order _____.
Have you met _____?	What time will you be home?
What time is it?	What's the weather like outside?
Please pass the _____.	I'm hungry. How about you?
Would you do that for me?	Turn off the lights when you come up.
Did _____ call today?	I can't find my glasses. Have you seen them?
This is my friend, _____.	I was wondering what time you would be home.
It's so good to see you!	Could you direct me to the restrooms?

Paragraphs

1. Bird watching can be a fun and rewarding hobby. All that is needed to get started is some type of bird feeder, birdseed, a window to watch from and patience. Once the birds discover your bird feeder, they pass the word along to other birds. Before long, your patio or deck can become a regular stop for the neighborhood birds. Look for chickadees, nuthatches, blue jays, sparrows and wrens in the summer. More unusual birds like goldfinches and bluebirds may also appear. In the winter enjoy the bright red of the cardinal or the black and white juncos.
2. Your library card can be your ticket to entertainment, current events and new ideas. Almost every city has a public library and there is no charge for a library card. Libraries have books about many subjects, but there are also other things at the library. These include books on cassette tapes or CDs, videotapes, large print books, music CDs or tapes and magazines. Many have free programs in the afternoon or evening about travel, hobbies or other topics of interest. Some cities also have a mobile book service, which brings the library right into your neighborhood.

GLOSSARY

1. **Aspiration:** food or liquid goes through the vocal folds and into the trachea to the lungs.
2. **Audiologist:** allied health professional trained to evaluate and treat the hearing and balance systems.
3. **Basal ganglia:** a group of structures linked to the thalamus in the base of the brain and involved in coordination of movement.
4. **Communication:** the act or process of using words, sounds, signs or behaviors to express or exchange information, or to express your ideas, thoughts, feelings, etc., to someone else. (Merriam Webster).
5. **Compensatory:** reduce or offset the unpleasant effects of something, to provide or be an equivalent for.
6. **Drooling:** a problem keeping saliva in the mouth which, in PwP, can be due to decreased awareness of accumulation of saliva (decreased sensory proprioception). Drooling may also be an indicator of problems with the oral phase of swallowing. Medical terminology for drooling is sialorrhea.
7. **Dysarthria:** speech disorders resulting from disturbances in muscular control-weakness, slowness or incoordination of the speech mechanism due to damage to the central or peripheral nervous system or both. The term encompasses coexisting neurogenic disorders of several or all the basic processes of speech: respiration, phonation, resonance, articulation and prosody (Darley, 1969).
8. **Dysphagia:** medical term for symptoms of difficulty swallowing.
9. **Epiglottis:** A leaf-like piece of cartilage extending upwards from the larynx, which can close like a lid over the trachea to prevent the airway from receiving any food or liquid being swallowed.
10. **Esophagram:** A series of X-ray images of the esophagus. The X-ray pictures are taken after the patient drinks a barium solution that coats and outlines the walls of the esophagus. Also called a [barium swallow](#).
11. **Fiberoptic endoscopic evaluation of swallowing (FEES):** A procedure that allows assessment of areas surrounding the voice box and opening of the esophagus, through the use of a small flexible telescope. The telescope is passed through the nose after anesthetizing this area to minimize pain or discomfort. Once the telescope is in position, various foods are provided to eat. The speech pathologist observes and evaluates the swallowing process and makes safe swallowing recommendations.
12. **Hypokinetic dysarthria:** characterized by reduced vocal loudness, hoarseness, abnormal speaking rates, impaired intelligibility. Site of lesion – subcortical structures involving basal ganglia. Specific to Parkinson's disease and Parkinsonism.
13. **Larynx:** A tube-shaped organ in the neck that contains the vocal folds. The larynx is about 5 cm (2 in) long. It is part of the [respiratory system](#) and is located between the pharynx and the trachea. Humans use the larynx to breathe, talk and swallow.
14. **Liquid bolus:** a volume of fluid.

- 15. Lee Silverman Voice Treatment (LSVT®):** The gold standard voice therapy for communication disorders associated with Parkinson disease.
- 16. Modified barium swallow/video-fluoroscopic evaluation of swallowing:** Gold standard evaluation of swallowing. It is a radiologic examination of swallowing function that uses a special movie-type X-ray called fluoroscopy. The patient is observed swallowing various types of substances that can be seen by fluoroscopy (usually liquid barium and/or foods coated with barium) in order to evaluate his or her ability to swallow safely and effectively. Patients are often observed swallowing various consistencies and textures, ranging from thin barium to barium-coated cookies to barium pills. This exam is performed with a speech-language pathologist present.
- 17. Palate:** the roof of the mouth, separating the cavities of the nose and the mouth in vertebrates.
- 18. Penetration:** food or liquid goes into the airway and stays on or above the vocal folds.
- 19. Penetration-Aspiration Scale:** An 8 point interval scale used to describe penetration and aspiration events resulting from impaired swallowing as a result of a change in the structures or movements necessary for normal swallowing.
- 20. Rehabilitative:** to restore to a condition of good health, ability to work or the like.
- 21. Sensory proprioception:** controlled by the central nervous system, a means to keep track of and control the different parts of the body – how your brain knows what your body is doing.
- 22. Silent aspiration:** food or liquid goes into the airway and through the vocal folds to the lungs without your awareness or a sensory response (coughing).
- 23. Solid bolus:** a mass of food that has been chewed and is ready to swallow.
- 24. Speech-language pathologist (SLP):** An allied health professional trained to evaluate and treat communication and swallowing disorders across the lifespan.
- 25. Videostroboscopy:** (or stroboscopy) is a specialised examination of the vocal folds using an endoscope placed through the nose or mouth to examine the larynx (voice box) with a strobe light. This special light source allows slow motion assessment of the vibration of the vocal folds.
- 26. Vocal folds:** layer structure of epithelium, gelatinous material and muscle used to produce voice. Also muscles of respiration and 3rd level of airway protection when swallowing.

REFERENCES

- Ashford, J., McCabe, D., Wheeler-Hegland, K., Frymark, T., Mullen, R., Musson, N., & Smith Hammond, C. (2009). Evidence-based systematic review: Oropharyngeal dysphagia behavioral treatments. Part III- Impact of dysphagia treatments on populations with neurological disorders. *Journal of Rehabilitation Research and Development*, 46(2), 195-204.
- American Parkinson Disease Association. (2010). *Speaking Effectively: A Strategic Guide for Speaking and Swallowing*. American Parkinson Disease Association, Inc.
- Goldman, J. G., & Litvan, I. (2011). Mild cognitive impairment in Parkinson's disease. *Minerva medica*, 102(6), 441.
- Grimes, D., Gordon, J., Snelgrove, B., Lim-Carter, I., Fon, E., Martin, W., & Canadian, N. S. F. (2012). Canadian Guidelines on Parkinson's Disease. *The Canadian journal of neurological sciences*, 39(4 Suppl 4), S1.
- Halpern, A., Ramig, L., Matos, C., Petska-Cable, J., Spielman, J., Pogoda, J., . . . & McFarland, D. (2012). Innovative Technology for the Assisted Delivery of Intensive Voice Treatment (LSVT®LOUD) for Parkinson Disease. *American Journal of Speech-Language Pathology*, 21(4), 354-367.
- Jensen, C.S., Hasselbalch, S. G., Waldemar, G., & Simonsen, A.H. (2015). Biochemical markers of physical exercise on mild cognitive impairment and dementia: systemic review and perspectives. *Frontiers in Neurology*, 6.
- Kalf, J.G., Borm, G.F., de Swart, B.J.M., Bloem, B.R., Zwarts, M.J., & Munneke, M. (2011). Reproducibility and validity of patients-rated assessment of speech, swallowing and saliva control in Parkinson's disease. *Archives of Physical Medicine and Rehabilitation*, 92(7), 1152-1158.
- Matsuo, K., & Palmer, J. B. (2008). Anatomy and physiology of feeding and swallowing: normal and abnormal. *Physical medicine and rehabilitation clinics of North America*, 19(4), 691-707.
- Ramig L.O., Fox C., & Sapir S. (2004). Parkinson's disease: speech and voice disorders and their treatment with the Lee Silverman Voice Treatment. In *Seminars in Speech and Language*, 25(2), 169-180.
- Ramig, L.O., Sapir S., Countryman, S., Pawlas A.A., O'Brien, C., Hoehn, M., & Thompson, L.L. (2001). Intensive voice treatment® (LSVT®) for patients with Parkinson's disease: a 2 year follow up. *Journal of Neurology, Neurosurgery and Psychiatry*, 71(4), 493-498.
- Rosen, C. A., & Simpson, B. (2008). *Operative techniques in laryngology*. Springer Science & Business Media.
- Tjaden, K. (2008). Speech and swallowing in Parkinson's disease. *Topics in geriatric rehabilitation*, 24(2), 115.

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