

Parkinson Disease (Speech)

Indexing Metadata/Description

- › **Title/condition:** Parkinson Disease (Speech)
- › **Synonyms:** Paralysis agitans (speech); PD (speech)
- › **Anatomical location/body part affected:** In Parkinson disease disruption of the production and transport of dopamine in the basal ganglia^(1,2) leads to a wide variety of physical symptoms. The five speech subsystems typically affected by Parkinson disease are respiration, phonation, articulation, resonance, and prosody⁽³⁾
- › **Area(s) of specialty:** Adult neurological disorders
- › **Description:** Parkinson disease is a chronic, degenerative disease of the nervous system⁽⁴⁾
- › **ICD-9 codes**
 - 332.0 idiopathic Parkinson's disease, primary
 - 332.1 Parkinson's disease, secondary
- › **ICD-10 codes**
 - G20 Parkinson's disease (including hemiparkinsonism, paralysis agitans, and parkinsonism or Parkinson's disease)
 - NOS
 - Idiopathic
 - Primary
 - G21 secondary parkinsonism
 - G21.0 malignant neuroleptic syndrome
 - G21.1 other drug-induced secondary parkinsonism
 - G21.2 secondary parkinsonism due to other external agents
 - G21.3 postencephalitic parkinsonism
 - G21.8 other secondary parkinsonism
 - G21.9 secondary parkinsonism, unspecified
- › **G-Codes**
 - **Motor Speech G-code set**
 - G8999, Motor speech functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals
 - G9186, Motor speech functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
 - G9158, Motor speech functional limitation, discharge status at discharge from therapy/end of reporting on limitation
 - **Spoken Language Comprehension G-code set**
 - G9159, Spoken language comprehension functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals
 - G9160, Spoken language comprehension functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
 - G9161, Spoken language comprehension functional limitation, discharge status at discharge from therapy/end of reporting on limitation
 - **Spoken Language Expressive G-code set**
 - G9162, Spoken language expression functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals

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- G9163, Spoken language expression functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
- G9164, Spoken language expression functional limitation, discharge status at discharge from therapy/end of reporting on limitation
- **Attention G-code set**
 - G9165, Attention functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals
 - G9166, Attention functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
 - G9167, Attention functional limitation, discharge status at discharge from therapy/end of reporting on limitation
- **Memory G-code set**
 - G9168, Memory functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals
 - G9169, Memory functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
 - G9170, Memory functional limitation, discharge status at discharge from therapy/end of reporting on limitation
- **Voice G-code set**
 - G9171, Voice functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals
 - G9172, Voice functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
 - G9173, Voice functional limitation, discharge status at discharge from therapy/end of reporting on limitation
- **Other Speech Language Pathology G-code set**
 - G9174, Other speech language pathology functional limitation, current status at time of initial therapy treatment/episode outset and reporting intervals
 - G9175, Other speech language pathology functional limitation, projected goal status at initial therapy treatment/outset and at discharge from therapy
 - G9176, Other speech language pathology functional limitation, discharge status at discharge from therapy/end of reporting on limitation

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G-code Modifier	Impairment Limitation Restriction
CH	0 percent impaired, limited or restricted
CI	At least 1 percent but less than 20 percent impaired, limited or restricted
CJ	At least 20 percent but less than 40 percent impaired, limited or restricted
CK	At least 40 percent but less than 60 percent impaired, limited or restricted
CL	At least 60 percent but less than 80 percent impaired, limited or restricted
CM	At least 80 percent but less than 100 percent impaired, limited or restricted
CN	100 percent impaired, limited or restricted
Source: http://www.cms.gov	

- > **Reimbursement:** No specific issues or information regarding reimbursement have been identified
- > **Presentation/signs and symptoms:** The signs and symptoms of Parkinson disease typically present asymmetrically in the initial stages^(4,5) and worsen as the disease progresses
 - Physical symptoms^(2,5,6,7)
 - Resting hand tremor^(4,5,6)
 - Occurs at 4-6 Hz
 - Appears as a “pill-rolling” motion of the hand
 - Often an initial symptom
 - Tremor decreases when purposeful motion is initiated
 - Akinesia (reduced initiation of movement)

- Ataxia
- Bradykinesia (slow movements)
- Sialorrhea (excessive salivation; often leads to drooling)
- Gait abnormalities
- Hypokinesia (decreased bodily movements)
- Hypomimia (decreased facial expression; can affect the patient’s ability to communicate/be accurately understood)
- Rigidity (increased muscle tone)
- Stooped and unstable posture
- Skin seborrhea (dermatitis)
- Cognitive symptoms^(1,2,5,6,7)
 - Decline in intellectual functioning
 - Dementia
 - Decreased working memory
 - Depression
 - Difficulty learning procedural tasks
 - Difficulty processing information (bradyphrenia)
- Speech/language/swallowing symptoms^(2,5,6,7)
 - Hypokinetic dysarthria (for information on assessment and treatment of hypokinetic dysarthria, see *Clinical Review... Dysarthria, Hypokinetic*; Accession Number: 5000010058)
 - Hypophonic speech (soft with poor articulation)
 - Difficulty pronouncing lengthy, multisyllabic words⁽⁷⁾
 - Monotone speech
 - Palilalia (repetition of one’s own words)⁽⁸⁾
 - Rate abnormalities^(8,9)
 - Festinating speech (steadily increasing rate)⁽⁸⁾
 - Abnormally slow or abnormally fast rate of speech
 - Abnormal vocal quality
 - Decreased vocal fold compression⁽⁷⁾
 - Hoarse
 - Breathy
 - Patients with Parkinson disease often have difficulty processing sensory information, which makes it difficult for them to judge the volume (loudness) of their own voice⁽⁶⁰⁾
 - For additional information on assessment and treatment of voice disorders, see the series of Clinical Reviews on this topic
 - Especially in the late stages of the disease, a patient with Parkinson disease might experience dysphagia involving any or all of the swallowing stages^(2,4) usually resulting from poor control of oropharyngeal muscles and muscles involved in mastication⁽⁴⁾ (for information on assessment and treatment of dysphagia in patients with Parkinson disease, see *Clinical Review... Dysphagia: Parkinson's Disease*; Accession Number: 5000010718)
- Patients may also experience other symptoms, including:^(2,5,6,7)
 - Gastrointestinal dysfunction
 - Micrographia (abnormally small, cramped handwriting)
 - Pain⁽¹⁰⁾
 - Paresthesias (sensations of tingling, numbness, burning on the skin)
 - Sleep disturbances⁽¹⁰⁾

Causes, Pathogenesis, & Risk Factors

› Causes

- Parkinson disease is believed to be caused by a combination of genetic and environmental factors^(1,5)

- Secondary (acquired) parkinsonism, which is similar to Parkinson disease, can be caused by encephalitis, repeated head trauma, use of neuroleptic and antipsychotic drugs, toxins (e.g., carbon monoxide), cerebrovascular disease, or structural brain lesions^(1,5)
- › **Pathogenesis:** Parkinson disease occurs as a consequence of a progressive loss of dopaminergic neurons in the substantia nigra, neostriatum, and globus pallidus. This results in a central dopaminergic deficiency with a relative excess of acetylcholine, which subsequently produces the outward symptoms of the disease⁽¹⁰⁾
 - Initial symptoms of Parkinson disease usually present asymmetrically and often include complaints of a resting tremor⁽⁵⁾ or pain.⁽²⁾ Parkinson disease progresses slowly, typically over the course of 10-15 years, leading to disability^(5,10)
- › **Risk factors:** It is believed that Parkinson disease is caused by a combination of environmental and genetic factors.^(1,5) Risk factors include:
 - Exposure to pesticides and herbicides⁽¹⁾
 - Rural living⁽¹⁾
 - Heredity (slightly increased risk in having one or more close relatives with Parkinson disease)
 - Drinking well water⁽¹⁾
 - Age
 - Most cases of Parkinson disease are diagnosed between the ages of 45 and 65⁽⁶⁾

Overall Contraindications/Precautions

- › See specific **Contraindications/precautions to examination** and **Contraindications/precautions** under Assessment/Plan of Care

Examination

- › **Contraindications/precautions to examination**
 - Patients with suspected Parkinson disease should be referred to a neurologist for initial diagnosis
 - As Parkinson disease progresses, patients usually require safety monitoring or assistance when walking and climbing stairs⁽⁵⁾
 - Swallowing safety should be periodically reevaluated due to the progressive nature of Parkinson disease. Patients with dysphagia may be receiving inadequate nutrition, and this may lead to significant weight loss, fatigue, and exhaustion^(2,10)
 - Due to the potential for impaired intellectual functioning and/or poor speech production, it is recommended that a patient's family and/or caregiver be involved in the assessment process
- › **History**
 - **History of present illness/injury**
 - Mechanism of injury or etiology of illness**
 - When was the patient diagnosed with Parkinson disease? What were the patient's initial symptoms and how have these symptoms progressed (either improved or worsened) since the time of diagnosis?
 - Course of treatment**
 - **Medical management:** Pharmacotherapy is not typically needed in the early stages of Parkinson disease⁽⁶⁾
 - As the disease progresses, pharmacotherapy in patients with Parkinson disease will vary according to symptoms and may include six classes of medications:^(4,10,11)
 - Anticholinergics^(4,11)
 - Antivirals⁽⁴⁾
 - Dopamine replacement^(4,10,11)
 - Dopamine agonists^(4,10,11)
 - Monoamine oxidase type B (MAO-B) inhibitors^(4,11)
 - Catechol-O-methyl transferase (COMT) inhibitors^(4,11)
 - Surgical management, considered for patients severely disabled by the disease, may include pallidal and subthalamic deep brain stimulation (DBS)^(5,4,11,12,13,14,15,16,17)

- DBS can affect speech production, sometimes reducing speech intelligibility; studies report both positive and negative effects of DBS on speech production in patients with Parkinson disease^(12,13,14,15,16,17,61,62)
- One-sided thalamotomy or pallidotomy may be performed in significant cases^(4,6,18)
 - Pallidotomy permanently damages the overactive globus pallidus to reduce the symptoms of Parkinson disease; thalamotomy damages part of the thalamus to block abnormal brain activity from getting to the muscles and causing tremor
- Patients with severe dysphagia may be unable to take in food orally and therefore require the placement of a feeding tube⁽⁴⁾
- **Medications for current illness/injury:** Determine what medications the patient's physician has prescribed and if they are being taken. The drug levodopa is typically prescribed for the treatment of Parkinson disease, and chronic use of this drug is associated with the "on-off" phenomenon.⁽¹⁾ The on-off phenomenon is characterized by a fluctuating response to medical treatment in which patients vacillate between periods of mobility and immobility⁽¹⁾
- Medications prescribed to patients with Parkinson disease depend on current symptoms but may include the following:^(5,6,11)
 - Carbidopa, levodopa, and carbidopa/levodopa (Sinemet)
 - A combination of levodopa, carbidopa, and entacapone (marketed under the name Stalevo)
 - Ropinirole, pramipexole, bromocriptine, selegiline, rasagiline, amantadine (Symmetrel)
 - Trihexyphenidyl (Artane)
 - Benztropine (Cogentin)
- **Diagnostic tests completed:** Review all diagnostic tests that have been completed to date. Although there are no tests used to diagnose Parkinson disease, it is important to note the results of any neurological testing that has been done. A diagnosis is made by a physician based on medical history and clinical examination involving observation over time.⁽²⁾ In 2013, a task force was convened by the European Federation of Neurological Societies (EFNS) subcommittee on movement disorders to systematically review literature on diagnostic measures for Parkinson disease and reported that the diagnosis must be made largely based on clinical features.⁽⁵⁶⁾ The task force recommended the use of neuroimaging studies as well as genetic and olfactory tests primarily to rule out other causes of presenting symptoms.⁽⁵⁶⁾ Assessment of neuropsychological functioning was also recommended for patients with known or suspected Parkinson disease, to include a history from a reliable caregiver, a brief assessment of cognition, and screening for rapid eye movement (REM) sleep behavior disorder (RBD) and evidence of psychosis or depression⁽⁵⁶⁾
- **Home remedies/alternative therapies:** Document any use of home remedies (including environmental modifications) or alternative therapies (e.g., acupuncture) and whether or not they help
- **Previous therapy:** Document whether patient has had speech, occupational, or physical therapy for this or other conditions and what specific treatments were helpful or not helpful
- **Aggravating/easing factors:** Signs and symptoms of Parkinson disease can fluctuate based upon the patient's medication cycle.^(2,19) Authors of a literature review published in 2000 concluded that speech therapy combined with appropriate pharmacologic intervention was the most effective means of improving speech and voice skills in patients with Parkinson disease.⁽³⁾ Document times and situations when the patient's speech is more or less intelligible (e.g., during phone conversations)
 - Dopaminergic medications may or may not directly impact speech symptoms; effects vary greatly among individual patients⁽¹⁹⁾
- **Body chart:** Use body chart to document location and nature of symptoms
- **Nature of symptoms:** Document nature of symptoms reported by the patient and/or family; specific speech-related symptoms observed in patients with Parkinson disease may include the following:
 - Difficulty producing stop consonants due to decreased oral closure⁽²⁰⁾
 - Vowel production inaccuracies due to slowed movement of the articulators⁽²⁰⁾
 - Poor breath support during speech; running out of air while speaking⁽²¹⁾
 - Abnormal vocal quality (e.g., breathy, hoarse)⁽²²⁾
- **Rating of symptoms:** Use a visual analog scale (VAS) or 0-10 scale to assess symptoms at their best, at their worst, and at the moment (specifically address if pain is present now and how much)

- **Pattern of symptoms:** Document and monitor if changes in a patient's L-dopa level or medication cycle affects his or her speech production⁽²³⁾
- **Sleep disturbance:** Document number of wakings per night or pattern of sleeping during the day.^(1,10) Sleep disorders such as RBD are common in patients with Parkinson disease⁽¹⁾
- **Other symptoms:** Document other symptoms patient may be experiencing that could exacerbate the condition and/or symptoms that could be indicative of a need to refer to physician, including but not limited to:
 - Bowel/bladder/sexual dysfunction⁽¹⁰⁾
 - Constipation⁽¹⁰⁾
 - Depression⁽¹⁰⁾
 - Dizziness
 - Dyskinesias (abnormal movements of the head, trunk, neck, and limbs)⁽¹⁰⁾
 - Falls⁽¹⁰⁾
 - Hiccups⁽¹⁰⁾
 - Nausea/vomiting⁽¹⁰⁾
 - Pain⁽¹⁰⁾
 - Patients with Parkinson disease typically experience pain throughout the body⁽¹⁰⁾
 - Causes of pain include musculoskeletal pain, cramps, positioning/immobility, areas of pressure, dyskinetic pain, radicular pain, poor sleeping, osteoarthritis, and/or psychological causes⁽¹⁰⁾
 - Pressure ulcers⁽¹⁰⁾
- **Respiratory status:** Note use of supplemental oxygen, mechanical ventilator, etc.
 - Patients with Parkinson disease often present with the following respiratory deficits:
 - Larger than normal abdominal volume excursions⁽²¹⁾
 - Use of a greater percentage of vital capacity per syllable than age-matched controls⁽²¹⁾
 - Use of the abdomen rather than the rib cage to increase lung volume⁽²¹⁾
 - Variable respiratory patterns⁽²¹⁾
 - **Psychosocial status:** Document the patient's psychosocial status.⁽²⁴⁾ Depression and anxiety have been found to be the most common psychiatric disorders in patients with PD. Depression has been reported to be present in 40% of patients with PD⁽⁵²⁾
 - Psychotic symptoms are common in patients with Parkinson disease⁽¹⁰⁾
 - These symptoms can be side effects of dopaminergic medications⁽¹⁰⁾
 - Hallucinations and confusion are associated with long-term use of levodopa⁽⁴⁾
 - Has the patient ever been diagnosed with anxiety, depression, bipolar disorder, or another mental health diagnosis?
 - Depression is common in patients with Parkinson disease^(2,5,6,7)
 - How does the patient relate to his or her surroundings? Is the patient overly emotional, anxious, fearful, etc.?
 - Patients with Parkinson disease may experience social withdrawal as a result of their outward symptoms⁽²⁴⁾
 - If there are concerns regarding the patient's psychosocial status and he or she is not currently under the care of a psychiatrist or other mental health professional, a referral for further workup may be appropriate
- **Hearing:** Note patient's hearing abilities
 - Does the patient require frequent repetition of questions?
 - Does the patient speak loudly even in close, quiet conversational environments?
 - If the patient appears to have impaired hearing abilities, refer to audiology for further workup
- **Barriers to learning**
 - **Are there any barriers to learning? Yes __ No __**
 - **If Yes, describe _____**

- **Medical history**

- **Past medical history**

- **Previous history of same/similar diagnosis:** Ask about any preexisting speech or language disorders. Ask about any preexisting psychiatric disturbances. Note that before any type of surgery is performed, preexisting psychiatric disturbances should be managed⁽¹⁾
 - **Comorbid diagnoses:** Ask patient about other problems, including diabetes, cancer, heart disease, complications of pregnancy, psychiatric disorders (including depression), orthopedic disorders, hearing loss, etc.
 - **Medications previously prescribed:** Obtain a comprehensive list of medications prescribed and/or being taken (including over-the-counter drugs)
 - **Other symptoms:** Ask patient about other symptoms he or she may be experiencing

- **Social/occupational history**

- **Patient's goals:** Document what the patient and his or her family (and/or caregiver) hope to accomplish with therapy and in general
 - **Functional limitations/assistance with ADLs/adaptive equipment:** Obtain information on adaptive equipment the patient is using, such as wheelchairs, walkers, hearing aids, or glasses
 - Ask patient and family members about the effect of patient's speech, language, and swallowing skills on participation in social and occupational activities
 - **Living environment:** Obtain information on the patient's family and a description of the patient's living environment⁽²⁾
 - Obtain information on family culture and language(s) used in the home
 - Identify if there are barriers to independent communication in the home or community

- › **Relevant tests and measures: (While tests and measures are listed in alphabetical order, sequencing should be appropriate to patient medical condition, functional status, and setting)**

- **Arousal, attention, cognition (including memory, problem solving):** Patients with Parkinson disease often develop cognitive impairments over the course of the disease, including impaired attention, memory skills, executive functioning, and fatigue ^(2,5,6,7,24,25)

- Refer to psychological and cognitive evaluations to assist in informing course of treatment and providing a prognosis for therapy
 - Obtain family input on patient's memory and problem-solving skills
 - The Mini-Mental State Examination (MMSE) is an appropriate assessment tool to screen for arousal, attention, and other cognitive deficits^(8,26)
 - The MMSE assesses overall cognitive impairment; sections include Orientation to Time, Orientation to Place, Registration, Attention and Calculation, Recall, Naming, Repetition, Comprehension, Reading, Writing, and Drawing⁽²⁶⁾

- Typically, dementia occurs in the late stages of Parkinson disease.⁽¹⁾ If a patient who has been diagnosed with Parkinson disease exhibits signs of dementia early in the course of the disease, the patient should undergo workup for dementia with Lewy bodies (DLB). For additional information on dementia, see the series of Clinical Reviews on this topic

- **Assistive and adaptive devices:** Note if patient wears hearing aids or glasses and determine if hearing aids are in working order. Note safety issues related to ambulation. Note use of wheelchair or other assistive devices used for mobility

- **Speech and language examination**

- **Speech**

- Articulation: Patients with Parkinson disease typically exhibit hypokinetic dysarthria, which is marked by poor articulation due to rigidity, bradykinesia, and tremor leading to decreased speech intelligibility.^(2,27) For information on assessment and treatment of hypokinetic dysarthria, see *Clinical Review... Dysarthria, Hypokinetic*, referenced above
 - Articulation can be assessed using a formal articulation test or by collecting and analyzing a speech sample
 - In a study conducted in the United States, researchers compared the articulatory-acoustic vowel space (AAVS) of speech samples from 12 patients with Parkinson disease to that of 10 healthy controls. AAVS is used as a measure of articulatory range of motion in a continuous speech sample. AAVS was found to be significantly lower in the sample of patients with Parkinson disease compared to the healthy controls⁽⁵⁹⁾
 - In a study conducted in Australia comparing lingual kinematics of 10 patients with Parkinson disease (5 with hypokinetic dysarthria, 5 without) to those of 6 healthy controls, researchers found that even those patients who did not have dysarthria exhibited significant differences in lingual movements compared to healthy controls. Researchers reported the following findings:

- The patients with Parkinson disease who had dysarthria exhibited significantly prolonged lingual movement duration in syllable repetition tasks in the approach phase of /ka/ and approach and release phases of /ta/ compared to patients with Parkinson disease without dysarthria⁽⁵⁷⁾
- The patients with Parkinson disease who had dysarthria exhibited significantly reduced maximum deceleration of lingual movement in the approach phase of /ta/ syllable repetition compared to patients with Parkinson disease without dysarthria⁽⁵⁷⁾
- The patients with Parkinson disease who had dysarthria had significantly prolonged duration as well as significantly increased range of lingual movement in both approach and release phases during rapid /ta/ and /ka/ syllable repetition tasks and exhibited significantly increased speed measures during rapid syllable repetition compared to healthy controls⁽⁵⁷⁾
- The patients with Parkinson disease without dysarthria exhibited significantly increased distance of lingual movement during rapid /ta/ and /ka/ syllable repetition tasks in both approach and release phases, significantly prolonged duration of lingual movement in release phases of /ta/ and /ka/, and primarily increased speed measures during rapid syllable repetition compared to the healthy controls⁽⁵⁷⁾
- Assessment of Intelligibility of Dysarthric Speech⁽²⁸⁾
 - May be used to assess intelligibility if culturally and linguistically appropriate
 - In order to assess speech rate, the therapist can have the patient count from 1 to 20
 - Beginning numbers may be well articulated, but rapid rate increase may appear mid-way through with last numbers slurred into what sounds like one long word⁽⁷⁾
- Prosody: Patients with Parkinson disease may present with monopitch, monoloudness, and reduced speaking stress; perceptual observations of abnormal prosody should be made^(27,29)
- Speech rate: Patients with Parkinson disease typically exhibit abnormally fast or abnormally slow rates of speech that decrease speech intelligibility; perceptual observations during structured and unstructured speaking tasks should be made to evaluate an individual's speech rate
 - Patients with Parkinson disease may have difficulty moving articulators quickly during diadochokinetic tasks⁽²⁰⁾
- **Language:** Assess patient's expressive and receptive language abilities with informal and/or formal tests as appropriate
 - Language deficits are not commonly associated with Parkinson disease; however, subtle changes may occur⁽¹¹⁾
 - Patients with Parkinson disease may have difficulty comprehending complicated and/or higher-level spoken language, including complex syntax, inferences, and metaphors⁽¹¹⁾
- **Voice**
 - Phonation: Patients with Parkinson disease commonly exhibit a hoarse, breathy, or inaudible voice that can decrease speech intelligibility⁽²⁷⁾
 - Perceptual observations of abnormal vocal qualities should be made and described⁽²²⁾
 - Sensory kinesthesia problems make it difficult for patients to correctly perceive the volume of their own voice⁽²²⁾
 - Rating scales also exist that can be used to capture voice quality. Types of rating scales include categorical, equal-appearing interval, visual analog, and direct magnitude estimation⁽³⁰⁾
 - Another way to evaluate voice characteristics is through the collection and analysis of a patient's speech (acoustic analysis)
 - Laryngeal function may be assessed through videoendoscopic studies⁽²²⁾
 - Resonance: Patients with Parkinson disease may present with hypernasality; perceptual observations of abnormal nasality should be made
 - Vocal volume: Patients with Parkinson disease often have reduced volume/loudness.⁽²⁾ Document vocal volume as a measure of decibels (dB) with a sound pressure level (SPL) meter
 - In a study conducted in Canada with 30 participants with Parkinson disease, researchers assessed the effect of background noise on self-adjustment of vocal volume compared to that of healthy controls⁽⁵⁸⁾
 - The Lombard effect, first described in 1911, is a phenomenon in which people will subconsciously increase their vocal volume in the presence of background noise and when the background noise ceases, the volume decreases. Researchers sought to determine if people with hypophonia related to Parkinson disease react in a similar manner in the presence of background noise⁽⁵⁸⁾

- First, researchers calculated both maximal and habitual vocal intensity during conversation without background noise. Next, researchers presented five different intensities of multispeaker background noise (50, 55, 60, 65, and 70 dB SPL) during conversation and calculated changes in vocal intensity⁽⁵⁸⁾
- Researchers found that the maximal vocal intensity of the participants with Parkinson disease was 10 dB SPL less than that of the control participants; habitual vocal intensity was 5 dB SPL less than control group.⁽⁵⁸⁾ Although the participants with Parkinson disease did demonstrate the Lombard effect in a similar manner to the controls, the vocal intensity level across all levels of background noise was 5 dB SPL less than the control participants⁽⁵⁸⁾
- **Fluency:** Assess fluency and stuttering; patients with Parkinson disease may present with acquired stuttering.⁽¹⁷⁾ For additional information on assessment and treatment of acquired stuttering, see *Clinical Review...Stuttering: Neurogenic*; CINAHL Topic ID # T709167
- **Reading and writing:** Assess patient's reading and writing abilities; patients with Parkinson disease often have micrographia (abnormally small or cramped handwriting)^(2,5)
- **Oral structure and oral motor function:** Patients with Parkinson disease often exhibit motor planning deficits that can affect oral-motor movements. Assess for strength, ROM, and ability to perform coordinated movements. Tremor is sometimes present in the mouth and lips of patients with Parkinson disease.⁽⁶⁾ Patients with Parkinson disease are at increased risk for oral disease (e.g., gingivitis) as a result of both physical and cognitive changes associated with Parkinson disease.⁽⁵³⁾ Because of motor impairment in Parkinson disease (e.g., bradykinesia, tremors, dyskinesia), patients often have less effective oral care routines, experience biting of the tongue and cheek, and break teeth or cut their lips during falls.⁽⁵³⁾ Xerostomia is a common side effect of medications prescribed for Parkinson disease that can lead to increased oral infections, degeneration of tooth enamel, difficulty talking and chewing, and problems fitting dentures.⁽⁵³⁾ Although xerostomia is common in Parkinson disease, drooling and sialorrhea are also frequently encountered problems. Drooling typically results from reduced spontaneous saliva swallowing, reduced lip closure at rest, and forward leaning head/neck posture.⁽⁵³⁾ Saliva associated with sialorrhea is usually described as being thick and rope-like.⁽⁵³⁾ If the patient exhibits difficulty managing saliva, complete a swallow examination, discussed below
- **Respiration:** Patients with Parkinson disease may display reduced vital capacity due to restricted range of motion and rigidity. Reduced vital capacity may lead to reduced air expenditure during respiration, decreased voice volume,⁽²⁾ reduced pitch,⁽³¹⁾ and short rushes of speech.⁽²²⁾ Assess effects of respiration on speech production, including length of sustained phonation as well as ability to successfully coordinate respiration and phonation
- **Special tests specific to diagnosis**
 - Although instrumental measures are sometimes used to obtain precise measurements on respiratory functioning, phonatory function, and articulator movements, such precise measures and/or instrumentation are often unavailable
 - Occasionally, these measures may be included as part of a patient's medical history after having been obtained as part of a previous medical exam⁽³¹⁾
 - Much of a speech evaluation may rely on information gained through the observation of a patient's breathing patterns, loudness levels, and variability and phonation
- **Swallow examination:** Patients with Parkinson disease become increasingly at risk for developing eating and swallowing difficulties as the disease progresses.^(4,10) Eating and swallowing safety should be continually monitored using bedside swallow studies or modified barium swallow studies as appropriate (for information on assessment and treatment of dysphagia in patients with Parkinson disease, see *Clinical Review... Dysphagia: Parkinson's Disease*; Accession Number: 5000010718)

Assessment/Plan of Care

› **Contraindications/precautions**

- **Only those contraindications/precautions applicable to this diagnosis are mentioned below, including with regards to modalities. Rehabilitation professionals should always use their professional judgment**
- **Patients with this diagnosis are at risk for falls; follow facility protocols for fall prevention and post fall prevention instructions at bedside, if inpatient. Ensure that patient and family/caregivers are aware of the potential for falls and educated about fall prevention strategies. Discharge criteria should include independence with fall prevention strategies**
 - Increased cognitive-linguistic load can increase the fall risk in patients with Parkinson disease^(32,33)

- Patients should be sitting in a chair or laying on a bed during speech therapy treatment sessions to help reduce overall fall risk
- If it is planned that a patient will participate in the Lee Silverman Voice Treatment (LSVT LOUD; formerly called LSVT) program, he or she must undergo a laryngeal examination to rule out the presence of vocal nodules, gastroesophageal reflux disease (GERD), laryngeal cancer, or any other pathology of the larynx before beginning treatment⁽²²⁾
 - An SLP must be trained and certified in LSVT LOUD prior to treating patients with this specific protocol⁽²²⁾
- Swallowing safety must be carefully monitored and continually evaluated to ensure there is minimal risk of aspiration
- › **Diagnosis/need for treatment:** A patient with Parkinson disease is appropriate for speech therapy if the disease process has resulted in decreased speech intelligibility, impaired voice/phonation, and/or other impairments of communication. Guidelines published by the Canadian Neurological Sciences Federation state that speech therapy should be available for patients with Parkinson disease for the purpose of increasing vocal loudness and pitch range through LSVT LOUD and for speech intelligibility strategy training.⁽⁵⁴⁾ Additionally, speech therapy is essential to ensure that a patient with Parkinson disease has effective means of communication throughout the course of the disease, which might include the use of augmentative and alternative communication (AAC)⁽⁵⁴⁾
- › **Rule out:** Other laryngeal pathologies^(22,34)
- › **Prognosis:** Although some forms of treatment have shown promise with respect to symptom management, it is expected that a patient’s condition will deteriorate overall as the disease progresses
- › **Referral to other disciplines:** Treatment should consist of a team approach, including but not limited to the patient’s physician, neurologist, nurse, SLP, physical therapist (PT), occupational therapist (OT), and nutritionist^(7,35)
 - Referral to palliative care may be appropriate for pain and symptom management⁽¹⁰⁾
- › **Treatment summary:** Hypokinetic dysarthria is commonly associated with Parkinson disease.⁽¹¹⁾ Traditional speech therapy for patients with hypokinetic dysarthria has addressed issues of rate, articulation, and prosody. However, the results of traditional intervention have been insignificant and difficult to maintain in individuals with Parkinson disease.^(22,34,36) Currently, the best evidence-based practice treatment for hypokinetic dysarthria in patients with Parkinson disease is the LSVT LOUD program.^(22,34,37,38,39) Authors of a systematic review reported a paucity of evidence comparing speech language therapy to no intervention/placebo for patients with Parkinson disease.⁽⁵⁵⁾ In this review, authors found 3 randomized controlled trials that compared speech intervention to no intervention; however, all studies used different means of treatment (one trial investigated LSVT LOUD) and different outcome measures, so the authors were unable to support or refute the effectiveness of speech therapy for patients with Parkinson disease.⁽⁵⁵⁾ In a survey of speech-language therapists (SLTs) in the United Kingdom, the majority of SLTs reported using LSVT LOUD as treatment for patients with Parkinson disease, but not as the exclusive treatment technique.⁽⁴⁰⁾ Additional treatment techniques used by the surveyed SLTs included swallowing therapy, language therapy, and counseling for psychosocial issues.⁽⁴⁰⁾ LSVT LOUD and other current treatment methods are described below:
 - LSVT LOUD, a treatment method used in patients with Parkinson disease, is an intervention program focusing primarily on the disordered voice symptomatic of Parkinson disease^(22,34,37,38,39)
 - LSVT LOUD has been the subject of numerous research studies supporting its positive benefit on phonation, increasing sound pressure levels, and improving articulation^(22,34,37,38,39)
 - In LSVT LOUD, patients are taught to “think loud, think shout”^(22,34)
 - The five concepts of LSVT LOUD are:⁽²²⁾
 - Focus on voice (phonation)
 - Improve a patient’s perception of effort expended during speech tasks
 - Require patient to expend high levels of effort during therapy sessions
 - Provide intensive treatment (4 times a week for 16 sessions over 1 month)
 - Quantify treatment-related changes
 - In a randomized controlled trial conducted in the United States, researchers sought to determine the impact of LSVT LOUD on vocal loudness as measured by SPL in a group of subjects with idiopathic Parkinson disease⁽³⁴⁾
 - All subjects with Parkinson disease also presented with hypokinetic dysarthria⁽³⁴⁾

- The researchers compared pre- and posttreatment voice SPL in the treated group with the voice SPL during the same time period in two control groups: individuals with idiopathic Parkinson disease who were not treated with LSVT LOUD and healthy, age-matched peers⁽³⁴⁾
- Voice and speech tasks that were compared included sustained vowel phonation, a reading of the “Rainbow Passage,” speaking a short monologue, and describing a picture⁽³⁴⁾
- Measurements were taken just prior to treatment, immediately after treatment, and 6 months post treatment⁽³⁴⁾
- The voice SPL of the subjects treated with LSVT LOUD increased from baseline to posttreatment by an average of 8 dB and from baseline to the 6-month follow-up by an average of 6 dB⁽³⁴⁾
 - These changes were both statistically significant and perceptibly audible⁽³⁴⁾
 - No significant changes in voice SPL were noted in either of the control groups during the time corresponding to the treatment and follow-up⁽³⁴⁾
- The researchers concluded that these findings, along with those from other studies, provided support for the efficacy of the LSVT LOUD as a treatment for hypokinetic dysarthria in patients with Parkinson disease⁽³⁴⁾
- In a study conducted in Australia, 30 subjects with Parkinson disease received LSVT LOUD
 - One group of subjects was postsurgical intervention (pallidotomy and/or thalamotomy); the other group was without surgical intervention⁽¹⁸⁾
 - Both groups showed significant improvement on measures of speech intelligibility and SPL in sustained phonation and reading following LSVT LOUD⁽¹⁸⁾
 - The study results also revealed that patients with Parkinson disease who had not received surgery showed increased maximum effort tongue pressures after treatment. Patients who had surgery did not show increases in maximum tongue pressure measures or endurance⁽¹⁸⁾
- In a study conducted in England, 11 patients with Parkinson disease received LSVT LOUD
 - All patients were severely impaired⁽³⁷⁾
 - All achieved an increase in vocal volume of at least 7 dB in conversation as well as an overall improvement in speech intelligibility⁽³⁷⁾
- LSVT LOUD-Extended Version⁽⁴¹⁾
 - Subjects received LSVT LOUD-Extended Version, a therapy program similar to LSVT LOUD except that it was administered twice a week (rather than 4 times) over a period of 8 weeks (rather than 4) and requires significantly greater participation in a home program⁽⁴¹⁾
 - Twelve participants showed significant improvements in vocal SPL and were perceived as having improved speech following treatment
 - Patients believed their speech was still clear after a 6-month period⁽⁴¹⁾
- LSVT LOUD vs. respiratory treatment program⁽³⁸⁾
 - In a randomized controlled trial conducted in the United States, 35 patients with idiopathic Parkinson disease were randomly assigned to one of two treatment groups⁽³⁸⁾
 - Subjects received either LSVT LOUD or a respiratory treatment program (RET)⁽³⁸⁾
 - Both treatments included four 50-minute sessions for 4 weeks involving the patient working at maximum effort while receiving cues and sensory feedback during speaking tasks⁽³⁸⁾
 - Subjects were recorded within 3 days prior to treatment and 12 months after treatment⁽³⁸⁾
 - Listeners rated subjects’ speech recordings according to voice quality and loudness⁽³⁸⁾
 - Individuals receiving LSVT LOUD showed significant improvements in loudness and speech quality that were maintained at 12 months after treatment⁽³⁸⁾
 - Those receiving RET did not show statistically significant improvements in loudness or quality 12 months posttreatment⁽³⁸⁾
- In another randomized controlled trial conducted in the United States, 43 individuals were divided into three groups: one without Parkinson disease, one with Parkinson disease receiving LSVT LOUD, and one with Parkinson disease that did not receive treatment⁽⁴²⁾

- Patients with Parkinson disease were randomly assigned to the treatment and nontreatment groups⁽⁴²⁾
- Data were gathered pre and post treatment⁽⁴²⁾
 - Pretreatment data were taken just before treatment began and posttreatment data were taken immediately after treatment concluded⁽⁴²⁾
 - Results indicated moderate to large improvements in vowel production only in the group of subjects with Parkinson disease receiving treatment⁽⁴²⁾
 - This group's vowel production was rated as better following treatment⁽⁴²⁾
- LSVT LOUD vs. respiratory effort therapy⁽³⁹⁾
 - In a randomized, controlled trial conducted in the United States, 20 individuals with idiopathic Parkinson disease exhibiting at least moderate breathiness and hoarseness were divided into two treatment groups⁽³⁹⁾
 - One group received LSVT LOUD, the other received RET⁽³⁹⁾
 - Subjects were recorded within 3 days before and after therapy⁽³⁹⁾
 - Statistically significant improvements in breathiness and hoarseness were obtained for the group receiving LSVT LOUD, while no statistically significant changes were observed in the group receiving RET⁽³⁹⁾
- Group LSVT LOUD
 - A group of researchers in the United States examined the feasibility of group LSVT LOUD for individuals with Parkinson disease⁽⁴³⁾
 - Fifteen individuals with Parkinson disease participated in the group; an LSVT LOUD-certified SLP led the group with the assistance of 2 graduate clinicians⁽⁴³⁾
 - The group met for a 90-minute session one time per week for 8 consecutive weeks; each week the participants were given homework assignments and asked to keep a log of time spent doing the homework⁽⁴³⁾
 - At the conclusion of the study, statistically significant group increases in vocal intensity, maximum pitch, and pitch range were found⁽⁴³⁾
 - Additionally, the participants and clinicians provided feedback⁽⁴³⁾
 - Participants enjoyed the group and found it beneficial⁽⁴³⁾
 - Clinicians thought that most but not all LSVT LOUD therapy tasks could be completed successfully in a group setting⁽⁴³⁾
- Remote LSVT LOUD
 - An increasing number of studies are examining the effectiveness and feasibility of LSVT LOUD when delivered remotely via webcam and finding positive outcomes^(44,45,46)
 - In a study conducted in the United States of 3 patients with idiopathic Parkinson disease with mild-moderate hypokinetic dysarthria (and stable medication regimens), LSVT LOUD was delivered via webcam⁽⁴⁴⁾
 - Patients had the necessary equipment within their homes prior to the study, including a computer with Microsoft Windows operating system, a webcam with a headset and microphone, a broadband Internet connection and e-mail to communicate with the speech therapist⁽⁴⁴⁾
 - Skype (a peer-to-peer Internet telephony network) was used for the therapy sessions⁽⁴⁴⁾
 - Each subject completed 16 sessions of LSVT LOUD and weekly homework sheets⁽⁴⁴⁾
 - Initial session was completed in person with the therapist in the home to ensure the patients had the proper computer set up⁽⁴⁴⁾
 - Measurements of pitch and voice duration were taken before and after treatment⁽⁴⁴⁾
 - Researchers found significant improvements in SPL immediately after therapy and 2 months after; the gains achieved in this remote LSVT LOUD program were comparable to those achieved in prior LSVT LOUD studies in which the sessions took place face-to-face⁽⁴⁴⁾
 - Authors of a case study from Australia also assessed the effectiveness of a remote LSVT LOUD program in a patient with idiopathic Parkinson disease⁽⁴⁵⁾
 - The patient received LSVT LOUD treatment from a certified SLP at home via videoconferencing software and a webcam four times per week for 1 hour per session for a duration of 4 weeks⁽⁴⁵⁾

- Following treatment, the posttreatment measures were completed and the patient's voice SPL increased 6.13 dB in sustained phonation, 12.28 dB in reading tasks, and 11.32 dB in a monologue; duration of phonation increased 4 seconds⁽⁴⁵⁾
- Additionally, the patient rated the video and audio quality as excellent and reported that he was "very satisfied" with the treatment overall⁽⁴⁵⁾
- Breathing and/or oral-motor exercises⁽³⁶⁾
 - In a case study involving 3 patients receiving therapy focused on breathing and oral-motor exercises, researchers found inconsistent improvement documented through subjective observation⁽³⁶⁾
 - Breathing exercises including raising arms above the shoulders, extending arms forward from the body at a 90° angle, and simulated flying action⁽³⁶⁾
 - Tongue, jaw, and lip exercises, syllable production practice ("lah"), jaw opening and closing exercises focusing on production of "e" and "ah," word level production drills, practicing phonetic sentences and phrases, oral reading of poetry and prose, conversational level practice⁽³⁶⁾
 - Classes ran 20 to 30 minutes 3 times per week⁽³⁶⁾
 - No measurable outcomes were reported⁽³⁶⁾
- Pitch Limiting Voice Treatment (PLVT)⁽⁴⁷⁾
 - In a study of PLVT conducted in the Netherlands, 32 subjects received one 30-minute session of PLVT⁽⁴⁷⁾
 - PLVT included instructions to speak "loud and low" and performance following these instructions were compared to performance following instructions to "think loud, think shout"⁽⁴⁷⁾
 - Effects on pitch were measured immediately following intervention with no follow-up to confirm maintenance of skills⁽⁴⁷⁾
 - Following PLVT session, a rise in vocal pitch was prevented in sustained vowel phonation and short passage reading tasks
 - Rise in vocal pitch was not prevented in task involving reciting the months of the year⁽⁴⁷⁾
- Voice and Choral Singing Treatment (VCST)⁽⁴⁸⁾
 - In a pilot study conducted in Italy with a test-retest noncontrolled design, researchers assessed the effect of VCST on 20 patients with Parkinson disease⁽⁴⁸⁾
 - The patients underwent 20 hours of speech therapy (two sessions of 1 hour every week), as well as 26 hours of choral singing (one session of 2 hours every week)⁽⁴⁸⁾
 - Both types of instruction were provided by the speech therapist⁽⁴⁸⁾
 - Speech therapy consisted of training in the following:⁽⁴⁸⁾
 - Oro-facial-neck-shoulders muscular relaxation exercises
 - Respiratory exercises
 - Laryngeal exercises
 - Oral and facial strengthening exercises
 - Prosodic exercises
 - The speech therapy tasks were not meant to improve the patients' speech, but rather to prepare them for the choral singing tasks⁽⁴⁸⁾
 - The choral singing treatment was based on rhythmic popular and liturgical chants simplified for beginner level⁽⁴⁸⁾
 - Songs were accompanied by a piano⁽⁴⁸⁾
 - SLP provided visual and proprioceptive cues related to the rhythm of the music⁽⁴⁸⁾
 - The pre- and posttreatment assessment included neurological and otolaryngological evaluation, voice and speech acoustic analysis, auditory quality of voice analysis, and respiratory function evaluation that were carried out within 2 weeks before and after completion of VCST⁽⁴⁸⁾
 - Significant differences following VCST were noted in functional residual capacity, maximum inspiratory pressure, maximum expiratory pressure, maximum duration of sustained vowel phonation, and prosody while reading a passage⁽⁴⁸⁾

- In a study conducted in England, researchers examined the effect of group singing lessons on the Frenchay Dysarthria score of patients with Parkinson disease⁽⁴⁹⁾
 - Seventeen individuals with Parkinson disease participated in a 2-hour group singing lesson every 2 weeks over the course of 2 years⁽⁴⁹⁾
 - Singing lessons focused on posture, good breathing techniques, producing good singing tone, and singing with clear diction⁽⁴⁹⁾
 - Prior to the start of the singing lessons and every 6 months after, an SLT assessed the patients with the Frenchay Dysarthria Assessment⁽⁴⁹⁾
 - At the conclusion of the study, significant improvements were seen in laryngeal pitch, laryngeal volume, laryngeal speech, and drooling⁽⁴⁹⁾
- Biofeedback: use of wearable biofeedback devices and delayed auditory feedback systems has been studied with mixed results^(8,50,51)
 - Authors of a single-subject case study from the United States reported increases in vocal loudness up to 20 weeks posttreatment⁽⁵⁰⁾
 - In a study conducted in the United Kingdom, variable increases in vocal loudness and intelligibility were found after 11 patients with Parkinson disease were given pocket-sized delayed auditory feedback speech aids to wear⁽⁵¹⁾
 - In a study conducted in the United States involving 9 patients with idiopathic Parkinson disease and moderate-severely impaired speech characterized by hesitations and palilalia, altered auditory feedback was used to improve speech intelligibility⁽⁸⁾
 - The auditory feedback was delivered through a commercially available device⁽⁸⁾
 - The subjects heard their own speech signals altered in two ways:
 - With a time delay (delayed auditory feedback) between 50 and 220 ms⁽⁸⁾
 - With a shift in pitch frequency (up 500 Hz)⁽⁸⁾
 - Each subject produced 2 baseline speech samples, 2 placebo speech samples, and 2 samples with the altered auditory feedback⁽⁸⁾
 - Listeners rated speech intelligibility for each speech sample⁽⁸⁾
 - With the altered auditory feedback, the speech intelligibility appeared improved for monologue tasks, but not for reading tasks⁽⁸⁾

Problem	Goal	Intervention	Expected Progression	Home Program
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Decreased breath control and poor speech intelligibility ^(8,18,36,37,48)	Increase breath control and improve speech articulation ^(18,36,37,48)	<p><u>LSVT LOUD</u></p> <p><u>LSVT LOUD-Extended Version</u></p> <p><u>Breathing and oral motor exercises</u></p> <p><u>Altered auditory feedback</u></p> <p><u>VCST</u></p> <p><i>(See Treatment summary, above)</i></p>	Speech practice progresses from single sound productions through word level, sentence and phrase level, oral reading, and conversational level practice	In LSVT LOUD-Extended Version, home program consists of 5-10 minutes of home practice on treatment days; two sessions of home practice (for a total of 20-30 minutes) on nontreatment days ⁽⁴¹⁾
Decreased vocal intensity ^(22,34,37,38,50,51)	Increase vocal intensity ^(22,34,37,38,50,51)	<p><u>LSVT LOUD</u></p> <p><u>LSVT LOUD-Extended Version</u></p> <p><u>Biofeedback</u></p> <p><i>(See Treatment summary, above)</i></p>	Speech practice progresses from single sound productions through word level, sentence and phrase level, oral reading, and conversational level practice	In LSVT LOUD-Extended Version, home program consists of 5-10 minutes of home practice on treatment days; two sessions of home practice (for a total of 20-30 minutes) on nontreatment days ⁽⁴¹⁾
Hoarse and breathy vocal quality ⁽³⁹⁾	Decrease hoarse and breathy vocal quality ⁽³⁹⁾	<p><u>LSVT LOUD</u></p> <p><u>LSVT LOUD-Extended Version</u></p> <p><i>(See Treatment summary, above)</i></p>	Speech practice progresses from single sound productions through word level, sentence and phrase level, oral reading, and conversational level practice	In LSVT LOUD-Extended Version, home program consists of 5-10 minutes of home practice on treatment days; two sessions of home practice (for a total of 20–30 minutes) on non-treatment days ⁽⁴¹⁾
High-pitched, strained, pressed, or screaming sounding voice ⁽⁴⁷⁾	Improve loudness without increasing vocal pitch or laryngeal muscle tone ⁽⁴⁷⁾	<p><u>PLVT</u></p> <p><i>See Treatment summary, above</i></p>	Speech practice progresses from single sustained phonation productions through word level, sentence and phrase level, oral reading, and conversational level practice	No home program component

Dysphagia affecting oral preparatory, oral, pharyngeal, and/or esophageal phases ⁽²⁾	Improve swallowing safety ⁽²²⁾ while providing adequate nutrition	Therapeutic strategies Varies according to swallow evaluation results and stage of swallow affected by Parkinson disease (for information on assessment and treatment of dysphagia in patients with Parkinson disease, see <i>Clinical Review... Dysphagia: Parkinson's Disease</i> ; Accession Number: 5000010718)	Variable depending on stages of swallow affected and specific goals	Variable depending on stages of swallow affected and specific goals
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Desired Outcomes/Outcome Measures

- › Desired outcomes of speech therapy for patients with Parkinson disease includes:
 - Improved speech articulation
 - Increased vocal loudness
 - Improved ability to independently monitor speech loudness levels
 - Improved vocal quality (e.g., appropriate pitch, decreased hoarseness)
 - Effective means of communication
- › Outcome measures
 - Reevaluation of speech and language skills, including tests from the initial evaluation
 - SPL (measures vocal loudness)^(22,34)
 - Quality of life assessments

Maintenance or Prevention

- › Research studies have documented maintenance of acquired skills up to 12 months following the LSVT LOUD program⁽³⁸⁾
- › Therapy provision and goals depend on the stage of Parkinson disease (early, middle, or late), but a patient's condition can be expected to deteriorate as the disease progresses^(2,10)

Patient Education

- › Patient and family education can address numerous topics related to Parkinson disease, including coping skills, self-management skills, and information on community resources available to patients with Parkinson disease⁽³⁾
- › Educational information for patients, caregivers, and treating professionals is available online from the National Parkinson Foundation, <http://www.parkinson.org/>
- › Information about support groups is available from The Michael J. Fox Foundation for Parkinson's Research, <https://www.michaeljfox.org/understanding-parkinsons/living-with-pd/topic.php?support-groups>
- › "Support for Care Partners, Family and Friends" is available from the Parkinson's Disease Foundation, http://www.pdf.org/caregiving_fam_issues

Coding Matrix

References are rated using the following codes, listed in order of strength:

M Published meta-analysis	RV Published review of the literature	PP Policies, procedures, protocols
SR Published systematic or integrative literature review	RU Published research utilization report	X Practice exemplars, stories, opinions
RCT Published research (randomized controlled trial)	QI Published quality improvement report	GI General or background information/texts/reports
R Published research (not randomized controlled trial)	L Legislation	U Unpublished research, reviews, poster presentations or other such materials
C Case histories, case studies	PGR Published government report	CP Conference proceedings, abstracts, presentation
G Published guidelines	PFR Published funded report	

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