CLINICAL REVIEW

Dysarthria, Hypokinetic

Indexing Metadata/Description

› **Title/condition:** Dysarthria, Hypokinetic
› **Synonyms:** Hypokinetic dysarthria
› **Anatomical location/body part affected:** Hypokinetic dysarthria is usually caused by lesions of the substantianigra that negatively affect the functioning of the extrapyramidal system.(1,2) This damage impairs motor planning involved in speech production
› **Area(s) of specialty**: Adult Neurological Disorders, Pediatric Genetic and/or Neurological Disorders, Voice and Voice Disorders
› **Description:** Hypokinetic dysarthria, a motor speech disorder, is a type of dysarthria. Hypokinetic dysarthria is caused by damage to the substantianigra, leading to impaired speech production.(1)Dysarthrias are classified based upon the location where damage has occurred and presenting symptoms(2)
› **ICD-10 codes:**
• R47.1 dysarthria and anarthria

(ICD codes are provided for the readers' reference, not for billing purposes)

› **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
• **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

›

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

Author
Natasha Kanapathy, MA, CCC-SLP
Cinahl Information Systems, Glendale, CA

Reviewers
Amory Cable, PhD, CCC-SLP
American Speech-Language-Hearing Association (ASHA)
Heather Wiemer, MA, CCC-SLP
Cinahl Information Systems, Glendale, CA
Rehabilitation Operations Council
Glendale Adventist Medical Center, Glendale, CA

Editor
Sharon Richman, MSPT
Cinahl Information Systems, Glendale, CA

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CM	At least 80 percent, but less than 100 percent impaired, limited, or restricted
CN	100 percent impaired, limited, or restricted
Source: https://www.cms.gov/	

› **Reimbursement:** Reimbursement for therapy will depend on insurance contract coverage; no specific issues or information regarding reimbursement have been identified

› **Presentation/signs and symptoms:** The most common feature of hypokinetic dysarthria is reduced vocal loudness, or hypophonia. Patients with hypokinetic dysarthria typically present with a harsh or hoarse vocal quality, abnormally long pauses, prolonged syllables, and reduced phonation. Rigidity, a form of hypertonia, is the motor deficit associated with hypokinetic dysarthria.[1,2,3] Speech intelligibility in a person with hypokineticdysarthria can range from mildly unintelligible to completely unintelligible. Completely unintelligible speech is known as anarthria.[1] Hypokinetic dysarthria is often seen in patients with Parkinson disease or parkinsonian-like symptoms.[1,4,5]For detailed information on hypokinetic dysarthria associated with Parkinson disease, see*Clinical Review…Parkinson Disease (Speech)*; CINAHL Topic ID Number: T708751

Causes, Pathogenesis, & Risk Factors

› **Causes:** Hypokinetic dysarthria is caused by lesions of the substantianigra that negatively affect the functioning of the extrapyramidal system.[1,2]Hypokineticdysarthria is associated primarily with Parkinson disease or parkinsonian-like symptoms. It can also be caused by antipsychotic medication or frequent blows to the head[5]

› **Pathogenesis:** Hypokinetic dysarthria is caused by lesions of the substantianigra that negatively affect the functioning of the extrapyramidal system[1,2]

› **Risk factors:** Risk factors for hypokinetic dysarthria are related to risk factors for the underlying cause of the dysarthria. Hypokinetic dysarthria is commonly associated with Parkinson disease, Parkinson-plus syndromes, or parkinsonian-like symptoms.[1,4,5]Risk factors for Parkinson disease include:

- age (increased risk as a person ages)[6,8]
- heredity (increased risk with relatives with Parkinson disease)[6,8]
- sex (men at higher risk than women)[6,8]
- exposure to toxins (e.g., long-term exposure to herbicides or pesticides)[6,8]
- history of significant head trauma[8]

Overall Contraindications/Precautions

› Precautions will vary according to the individual patient and the severity of accompanying language, cognitive, and/or motor impairments. A patient's medical records should be thoroughly reviewed prior to a speech-languageevaluation or treatment

Examination

› **Contraindications/precautions to examination:** Precautions will vary according to the individual patient and the severity of accompanying language, cognitive, and motor symptoms. A patient's medical records should be reviewed thoroughly prior to the evaluation. During the evaluation, it is of utmost importance to be aware of a patient's level of fatigue, pain tolerance, and level of frustration. A patient's culture and native language should also be considered to determine the appropriateness of examination questions and materials. Depression and anxiety are common among people with brain injury and can adversely affect test performance.[7] Speech-language pathologists (SLPs) should be knowledgeable about symptoms of depression and refer to a neuropsychologist or clinical psychologist when signs are present (e.g., loss of interest in daily activities, problems sleeping, feelings of sadness and hopelessness).[7] Patients with speech or language impairments might not be able to complete standardized tests or answer questions regarding medical history. It is recommended that the caregiver, the spouse, or a family member be involved in all assessment procedures[7]

› **History**

• **History of present illness/injury**

– **Mechanism of injury or etiology of illness:** Refer to neurological testing for site and size of lesion

– **Course of treatment**

- **Medical management:** Medical management will vary significantly depending upon the underlying cause of hypokinetic dysarthria. In patients with Parkinson disease, medical management will vary depending upon the stage of the disease.[8] Dopamine agonists might be beneficial to individuals with dysarthria associated with Parkinson disease
- **Medications for current illness/injury:** Determine what medications physician has prescribed; are they being taken? The concurrent use of multiple medications is common among older adults who have complex medical conditions, and the side effects of these medications can adversely affect cognitive and communicative functioning. Contact a pharmacist or physician regarding questions about side effects. Medications prescribed for patients with Parkinson disease include amantadine, levodopa, dopamine agonists, selective monoamine oxidase inhibitors (MAOIs), anticholinergic drugs, COMT inhibitors, and atypical antipsychotics[8]
- **Diagnostic tests completed:** Hypokinetic dysarthria is diagnosed using a variety of objective measures (e.g., speech instrumentation), standardized tests, perceptual observations or ratings, and physical examination.[4] Additionally, the evaluating or treating therapist should note the results of any neurological (MRI, CT), neuropsychological, or psychological/cognitive tests that have been completed
- **Home remedies/alternative therapies:** Document any use of home remedies (e.g., ice or heating pack) or alternative therapies (e.g., acupuncture) and whether or not they help
- **Previous therapy:** Document whether patient has had speech, occupational, cognitive, or physical therapy for this or other conditions and what specific treatments were helpful or not helpful

– **Aggravating/easing factors**

- Does the patient have vision or hearing problems?
- Does the patient have difficulty with mobility?
- What language(s) does the patient speak, read, or write?
  - Obtain information about order of acquisition of each language and language history (e.g., language used in education)[9]
  - Which language is used in different situations (e.g., work, home, with relatives, with friends)?[9]
  - What modalities are used in each language (e.g., reading, speaking, writing)?[9]
  - Premorbid proficiency in each language can be compared to present proficiency using a 7-pointscale (e.g., 1 = not fluent, 7 = native proficiency)[10]
- Does the patient suffer from a mood disorder (e.g., depression) that may affect motivation to communicate?[7]

– **Nature of symptoms:** Patients with hypokinetic dysarthria present with the following speech characteristics:[1,4,11]

- Hypophonia (decreased vocal loudness)[11]
- Variable articulatory precision[1,4]
- Altered rate of speech (slow rate of speech or uncommonly fast rate of speech)[1,11]
- Hypoadduction of the vocal folds[12]
- Reduced phonation[1]
- Harsh, breathy, and/or hoarse voice quality[1,4]
- Excessive and overly long pauses[1]
- Prolonged syllables[1]
- Monotony of loudness and pitch[4]
- Reduced stress[4]
- Inappropriate silences[4]
- Short spurts of speech[4]
- Variable rate[4]
- Decreased conversational inflection[11]

– **Body chart:** Use body chart to document location and nature of symptoms

- **Nature of symptoms:** Document nature of symptoms (constant vs. intermittent, sharp, dull, aching, burning, numbness, tingling)
- **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 changes in symptoms throughout the day and night, if any (a.m., mid-day, p.m., night); also document changes in symptoms due to weather or other external variables
- **Sleep disturbance:** Document number of wakings/night
- **Other symptoms:** Document symptoms the patient is experiencing in the areas of cognition, receptive language, expressive language, or swallowing. Document other symptoms the patient is experiencing that could exacerbate the condition and/or symptoms that could indicate the need for physician referral (e.g., dizziness, bowel/bladder/sexual dysfunction, saddle anesthesia, depression)
- **Respiratory status:** Note use of supplemental oxygen, mechanical ventilator, etc. Patients with hypokinetic dysarthria often have poor respiratory support and respiratory patterns that negatively affect speech production.[1,11,12] Respiration should be evaluated while the patient is at rest, during phonation, and during speech production tasks.[4] The patient's respiratory support should be evaluated in addition to his or her ability to coordinate respiration and phonation. Kinematic measures, such as magnetometer systems or respiratory inductive plethysmography, can provide objective information on a patient's patterns of inhalations and exhalations[12]
- **Psychosocial status:** Depression and anxiety are common among people with brain injury and can adversely affect test performance.[7] SLPs should be knowledgeable about symptoms of depression and refer to a neuropsychologist or clinical psychologist when signs are present (e.g., loss of interest in daily activities, problems sleeping, feelings of sadness and hopelessness)[7]
- **Hearing:** Document hearing ability
  - Does the patient have a known hearing loss? If so, does he or she wear hearing aids and/or use a cochlear implant? Left, right, or bilateral?
  - For patients with suspected hearing loss, an audiology consult is appropriate
- **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:** Has patient been previously diagnosed with dysarthria or any other speech/language disorder?
  - **Comorbid diagnoses:** Refer to medical charts and ask the patient, family, or caretaker about the presence of other speech and language problems, especially aphasia. Aphasia is often a comorbid diagnosis in patients with dysarthria.[4] (For detailed information on assessment and treatment of aphasia, see the series of Clinical Reviews on this topic.) Ask about other problems, including diabetes, cancer, heart disease, pregnancy, psychiatric disorders, and orthopedic disorders
  - **Medications previously prescribed:** Obtain a comprehensive list of medications prescribed and/or being taken (including over-the-counter drugs)
  - **Other symptoms:** Ask patient or caregiver about other symptoms the patient is experiencing

• **Social/occupational history**
- **Patient's goals:** Document what the patient and patient's family hope to accomplish with therapy and in general
- **Vocation/avocation and associated repetitive behaviors, if any:** For example, does the patient participate in language- or speech-based recreational activities (e.g., book clubs, speaking clubs)? Does the patient participate in recreational or competitive sports? Does the patient work or attend school? If the patient attends school, what support services are in place? Does the patient regularly use a computer/telephone?
- **Functional limitations/assistance with ADLs/adaptive equipment:** Obtain information on adaptive equipment the patient is using, such as augmentative and alternative communication devices (AAC), wheelchairs, walkers, hearing aids, or glasses. Obtain information about the patient's ability to use the telephone, participate in conversations, attend school, and participate in employment activities[2]
- **Living environment:** Obtain information about with whom patient lives (e.g., family members, caregivers). Are there barriers to independence in the home?

› **Relevant tests and measures:** Two methods can be used to evaluate dysarthria: instrumental and perceptual. Instrumental measures can be used to gather highly specific and objective information on nasal and oral airflow during speech, changes in voice onset time, atypical formant frequency in vowels, and subtle loudness variables. Examples of instrumental measures include an air pressure transducer with pneumotachometer to measure subglottal air pressure, a spirometer and/or pneumotachograph to measure lung volume, a spirometer and/or pneumotachograph to measure airflow, and imaging techniques to see vocal fold movement (e.g., videofluoroscopy, endoscopy).[13] However, such precise measures and/or instrumentation may be unavailable for clinical use. Occasionally, information on the results of these measures are included as part of a patient's medical history after having been obtained as part of a previous medical exam.[12,14] In many situations, speech evaluation will rely on perceptual information gained through the observation of a patient's speech systems: respiratory, phonatory, resonance, articulation, and prosody. The argument can be made that if the evaluating SLP does not perceive a speech problem, a disorder should not be diagnosed.[14] However, there is some risk that information gleaned from subjective perceptual measures is unreliable.[15] Recommendations for assessment have included combining 1) phonetic feature word analysis, 2) physiological assessment, and 3) acoustic information analysis during initial evaluations and to assess treatment outcome[16]

- **Arousal, attention, cognition (including memory, problem solving, sensory processing):** Refer to psychological and cognitive evaluations to assist in informing course of treatment and providing a prognosis for patient progress. Obtain family input on patient's memory, attention to task, and problem-solving skills
- **Assistive and adaptive devices:** Note if patient wears hearing aids, cochlear implants, contact lenses, or glasses, and determine if devices are in working order and prescriptions are up-to-date. Note safety issues related to ambulation. Note if patient uses any devices to assist with mobility (e.g., walker, wheelchair) or to communicate
- **Speech and language examination**
  - **Speech:** Patients with hypokinetic dysarthria might exhibit articulation that is imprecise and variable.[1,4] These patterns often negatively affect speech intelligibility. Articulation skills can be assessed using standardized assessments or by obtaining and analyzing a speech sample
    - In a study conducted in Australia comparing lingual kinematics of ten patients with Parkinson disease (five with hypokinetic dysarthria, five without) to those of six 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 hypokinetic 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[29]
      - The patients with Parkinson disease who had hypokinetic 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[29]
      - The patients with Parkinson disease who had hypokinetic 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[29]
      - 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[29]
  - **Language:** Assess receptive and expressive language ability as indicated
  - **Voice:** Patients with hypokinetic dysarthria often present with a voice that is characterized as breathy, hoarse, and quiet. This reduced phonatory function is related to hypoadduction of the vocal folds. Vocal folds might also exhibit slow opening, inadequate closing, asymmetry and bowing, or paresis.[11] An evaluation of voice quality should be conducted to include observations of:
    - vocal tremor

- vocal volume
  - In a study conducted in Canada with 30 participants with hypokinetic dysarthria related to Parkinson disease, researchers assessed the effect of background noise on self-adjustment of vocal volume compared to that of healthy controls[30]
    - 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 vocal 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[30]
    - 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[30]
    - 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.[30] 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[30]
- excessive or limited pitch variation
- excessive or limited loudness variation
- abnormal nasality
- wet phonation
- hoarseness and/or breathiness

– **Fluency:** Document any abnormalities of fluency or disruptions in the flow of speech and assess as indicated

• **Oral structure and oral motor function:** It is important to examine the speech structures and musculature at rest and during movement, as well as during both speech and nonspeech tasks.[13] For motor speech disorders, such as hypokinetic dysarthria, the following six items should be carefully evaluated:[14]

– Muscle strength: Does patient display good strength when pushing against a tongue blade? Is patient able to count from one to 100 and maintain good muscle strength?

– Muscle speed: Can patient perform alternate motion tasks (AMT) wherein he or she repeats a muscle sequence rapidly: puh, puh, puh? Can patient perform sequential motion tasks, such as puh, tuh, kuh, quickly and precisely with one breath of air?

– Range of motion: What is the ROM of the patient's articulators? Is patient able to open his or her jaw? Is patient able to extend and hold articulators in various positions?

– Accuracy of movement: Is patient able to coordinate the speed, strength, range, direction, and timing of speech movements?

– Motor steadiness: Is patient able to hold a position with his or her articulators? Is patient able to sustain production of smooth, steady vowels?

– Muscle tone: What are the characteristics of the patient's muscle tone in his or her articulators? Does muscle tone affect patient's ability to adequately adduct vocal folds? Hypokinetic dysarthria is associated with rigidity, a form of hypertonia.[2,3] Since dysarthrias are characterized by abnormal muscle tone, it is important to attempt to judge the tone of the muscles involved in articulation during an oral-motor evaluation. This may be done perceptually by evaluating the articulators' resistance to passive stretching (e.g., having the patient puff his or her cheeks); however, most structures involved in articulation are inaccessible to hands-on-examination by the examiner[3]

• **Special tests specific to diagnosis**

– If culturally and linguistically appropriate, the following tests may be included in the assessment of hypokinetic dysarthria:
  - Assessment of Intelligibility of Dysarthric Speech:[17] Purpose is to quantify single word intelligibility, sentence intelligibility, and speaking rate for adult and adolescent speakers
  - Frenchay Dysarthria Assessment—Second Edition:[18] Purpose is to diagnose dysarthria and to provide differential descriptions. Includes the following eight sections: reflexes, respiration, lips, palate, laryngeal, tongue, intelligibility, and influencing factors (e.g., hearing, mood, language). Norms are provided for patients aged 12-97 years

- Dysarthria Examination Battery:[19] Purpose is to evaluate children and adults with dysarthria. Includes 21 quantitative tasks and 15 rating scale tasks that are used to determine the severity of a patient's dysarthria and make recommendations for treatment
- Dworkin-Culatta Oral Mechanism Examination and Treatment System:[20] Purpose is to evaluate the functioning of the articulators and motor speech programming through a series of yes/no questions. Responses to the yes/no questions are based upon perceptual observations

– **Breath patterns:** Due to the high likelihood of impairments to the respiratory system and larynx in hypokinetic dysarthria, breath patterns should also be evaluated.[11] Breath pattern observations should note irregular breathing rates, the absence of normal inhalation-exhalation patterns, the initiation of speaking at atypical points in the respiratory cycle, the interruption of speech from sudden, forced inspiratory/expiratory sighs, exaggerated respiratory maneuvers, running out of air before inhaling, and breathing at syntactically inappropriate locations in the utterance[12]

• **Swallow examination:** Complete dysphagia assessment as indicated, especially for those patients with Parkinson disease
– For detailed information on assessment and treatment of dysphagia in patients with Parkinson disease, see *Clinical Review…Dysphagia: Parkinson Disease*; CINAHL Topic ID Number: T708934

Assessment/Plan of Care

› **Contraindications/precautions**

• **Only those contraindications/precautions applicable to this diagnosis are mentioned below, including with regard 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**
• Patients with hypokinetic dysarthria are at risk for aspiration and penetration of oral intake. Ensure that the patient and family/caregivers are aware of potential aspiration risks and are educated about strategies when appropriate
• The relative benefits and risks of intensive therapy should be evaluated on a case-by-case basis. To ensure relevance and appropriateness of treatment program, decisions about goals and course of therapy should be made in collaboration with the patient, caregivers, and other healthcare professionals[21]
• Patients with hypokinetic dysarthria often require the care of multiple disciplines, including neurology, speech therapy, physical therapy, and occupational therapy, depending upon comorbid symptoms. Precautions will vary according to the individual patient and the severity of accompanying language, cognitive, and/or motor symptoms. As with an evaluation, it is important to thoroughly review a patient's medical records prior to any treatment. A patient's culture and language preference should also be considered to determine the appropriateness of treatment goals, objectives, and materials
• Formal laryngeal assessment should be conducted prior to providing a patient with intensive voice therapy, such as the Lee Silverman Voice Treatment (LSVT LOUD)[12]

› **Diagnosis/need for treatment:** A patient's medical status or a previous failure on a speech, language, or cognitive-communication screening might lead to referral for a full assessment. Full assessments, including those for dysarthria, should be completed by a fully credentialed and trained SLP. These assessments should include input from the patient, family, and/or caregivers. Once the assessment is complete and hypokinetic dysarthria has been diagnosed, treatment can begin[13]

› **Rule out:** Other types of dysarthria (e.g., spastic, ataxic, flaccid, hyperkinetic), apraxia

› **Prognosis:** Prognosis will vary depending upon the presence of coexisting disorders such as aphasia and cognitive impairments, as well as level of patient motivation and family support

› **Referral to other disciplines:** Patients with hypokinetic dysarthria might need to be referred to a neurologist, physical therapist, occupational therapist, nutritionist, social worker, and/or psychologist depending upon their individual needs

› **Other considerations:** Especially in the case of progressive disorders resulting in hypokinetic dysarthria, patients should continually be monitored for respiratory and phonatory decline[12]

› **Treatment summary**

• The treatment of hypokinetic dysarthria will vary according to the presenting symptoms, severity of impairment, and degree of associated disability. Treatment should focus on the level of disability experienced by a patient, and treatment goals should relate to functional communication. The return of "normal" speech may be an unrealistic goal[1]

- Patients with hypokinetic dysarthria associated with advanced Parkinson disease sometimes require surgical intervention. Examples of surgical interventions used in patients with Parkinson disease include thalamotomy, unilateral pallidotomy, and deep brain stimulation. Deep brain stimulation has been shown to positively affect the speech of patients with Parkinson disease[22]
- Pharmacological treatment for patients with hypokinetic dysarthria associated with Parkinson disease typically includes dopamine therapy. Dopamine therapy involves the administration of levodopa or dopamine agonists. The effects of these drugs on voice and speech impairments on patients with Parkinson disease appears to be inconsistent[2,23]
- Often, a number of techniques may be involved in treating a patient with hypokinetic dysarthria[24]
- Treatment goals should be influenced by the severity of the hypokinetic dysarthria, as well as the patient's goals and preferences[24]
- It is important to include patient and family education goals in a treatment plan. Family education should include training the family to use compensatory communication strategies[2]. The majority of articles included in a comprehensive review of the literature on the treatment of stable dysarthrias (i.e., dysarthrias resulting from nonprogressive causes) were one of the following:
  - Research studies using a single-subject experimental design[24]
  - Case studies of an individual patient[24]
  - Articles expressing expert opinion[24]
  - Therefore, it is difficult to generalize findings to a wider population of dysarthric speakers.[24] Studies with several participants typically include patients with various types of dysarthria and do not describe treatment results according to the type of dysarthria

› In a published study conducted in New Zealand, researchers examined the effects of increased vocal loudness and reduced speech rate on listeners' perceptual processing. The study involved 51 listeners without any medical diagnosis and five individuals with hypokinetic dysarthria. The individuals with dysarthria recorded phrases in three conditions: habitual voice, loud speaking volume, and slow speaking rate. The 51 listeners listened to the recorded phrases and were asked to repeat the phrases exactly as heard. Results of this study indicate that listener performance in the loud and slow conditions were better than in the habitual condition, indicating that each of these modifications has perceptual benefits to listeners[31]

- **The Lee Silverman Voice Treatment (LSVT LOUD):** The most extensively researched therapy technique for patients with hypokinetic dysarthria associated with Parkinson disease is the LSVTLOUD. Numerous Phase 1-type studies, as well as Phase 2 and Phase 3 experimental studies, have validated the efficacy of this intensive treatment. Phase 1-type studies have included case studies and single-subject design studies, while Phase 2 and 3 studies have included randomized and blinded research. Outcomes of this research have shown that LSVT LOUD results in improved sound pressure levels (SPLs) associated with increased vocal loudness, improved intonation, increased vocal fold closure, increased respiratory drive, larger movements in the upper articulatory system, and improved functional communication. Effects of LSVT LOUD have been shown to be maintained up to 12 months post treatment.[23]Multiple research studies have investigated the effects of other, less intense therapeutic interventions that are also based on having the patient modify vocal effort (i.e., "think loud and shout"). These studies have found that these less intense therapies are largely effective for increasing vocal volume at the word and conversation level in individuals with hypokinetic dysarthria due to Parkinson disease.[33] For detailed information on LSVT LOUD and other therapies targeting vocal effort scaling, see *Clinical Review…Parkinson Disease (Speech)*, referenced above
- **Speech rate modification strategies:** In the abovementioned study conducted in New Zealand with 51 healthy listeners who were hearing phrases produced by speakers with hypokinetic dysarthria using a variety of different strategies, researchers found that the greatest benefit to intelligibility came from a reduced speaking rate.[31] Authors of a published review of the literature on treatment of stable dysarthrias found that cued metered speech and metronome pacing were most effective in slowing a patient's speech rate. These treatment strategies were found to be more effective for patients with severe dysarthria than for patients with mild or moderately severe dysarthria[24]
- **Neuromuscular treatment:** Neuromuscular treatments are often used with patients with dysarthria; however, their effectiveness is often debated.[24] The efficacy of neuromuscular treatments is uncertain given that 1) treatment often does not occur at the level of speech production, and 2) experts do not completely understand how underlying neuromuscular functioning and speech production are related. Therefore, questions still exist on whether treating the impaired neuromuscular function will affect speech production.[3] Neuromuscular treatments for patients with hypokinetic

dysarthria that are supported by research or theoretical principles include the use of slow stretch, passive range of motion (PROM) exercises, deep massage, and the application of cold to affected muscles. However, slow stretch, PROM, and the application of cold are more effective for treating the musculature of the jaw than the lips or tongue. Strengthening exercises and the introduction of vibration, which can lead to increased or irregular muscle tone, are contraindicated when treating patients with hypokinetic dysarthria[3]

- **Oral motor and articulation therapy with home program:** In a study conducted in the United Kingdom, eight patients with dysarthria participated in a therapy program focusing on oral motor exercises and improved articulation for ten weeks. The specific type of dysarthria exhibited by each patient was not revealed; however, all subjects had had a stroke at least four weeks prior to beginning this study. Patient performance pre and post intervention was assessed using *The Dysarthria Profile*. Results indicated that five of the eight people improved between .4% and 17.5% on areas specifically targeted: 1) orofacial muscle movements including diadochokinetic rates (focus on rate rather than strength), and 2) articulation. Their overall intelligibility also improved an average of 3.7%. One patient's scores decreased by 6.7% and two patients had scores that stayed within one point of their original score. The five patients who showed the most improvement completed home exercises an average of 2.5 times per day. Three patients showing much less improvement averaged less than one home practice session per day[25]
- **Ortho-Logo-Paedia computer program:** In a study conducted in the United Kingdom involving seven patients with long-standing dysarthria of varying types found that computerized therapy was as effective as traditional treatment over a six-monthperiod[26]
- **Techniques to improve listener comprehension:** The effectiveness of these techniques has been found to vary according to the severity of a speaker's dysarthria. Most strategies are helpful when speaking to someone with moderate dysarthria, but letter cueing strategy was most useful when speaking with someone with severe dysarthria[24]
- For detailed information on treatment related to Parkinson disease, please see *Clinical Review…Parkinson Disease (Speech)*, referenced above
- For detailed information on the treatment of dysphagia, please see *Clinical Review…Dysphagia: Parkinson Disease*, referenced above

Problem	Goal	Intervention	Expected Progression	Home Program
Poor respiratory support	Improve respiratory support for speech tasks	**Postural modification** Facilitate an upright position to optimize speech breathing[12]	Progress as indicated for each patient	Unspecified

Fast speech rate leading to poor intelligibility	Slow speech rate to increase intelligibility	**Speech rate modification strategies** Alphabet board – Patient points to the first letter of each word as he or she speaks the word in order to slow speech rate and aid listener's comprehension of the message being sent[24] Computer-assisted pacing – A computer is used in a variety of ways to pace speech at regular intervals or in intervals reflecting naturally produced speech[24] Metronome pacing – Patient speaks one word per beat of the metronome[24] Cued-metered pacing – All the words a person will speak are shown on a computer screen and then highlighted at regular intervals as the person is supposed to speak them[24]	Progress as indicated for each patient	Unspecified

Poor oral motor strength and/or endurance	Increase strength and endurance of the oral motor musculature	**Neuromuscular treatments** (3) Slow stretch/PROM – To decrease hypertonicity/rigidity by inhibiting the stretch reflex Deep massage – Effleurage (stroking) massage to decrease hypertonicity/rigidity Presentation of cold – Therapeutically applying cold before PROM to relieve pain or after PROM to maintain treatment effects	PROM exercises can be increased as muscle tone decreases	Unspecified

Poor speech intelligibility; poor articulation	Improve speech intelligibility and articulation skills	**Oral-motor and articulation therapy with home program** [25] One structured treatment program described in the literature contained the following main components: 1. Oral-motor and articulation therapy with home program 2. Oral-motor exercises including diadochokinetic rates to focus on quick alternating movements and improved production of sound sequences 3. Articulation exercises ranging from single CVC words to complex longer utterances 4. Home practice suggested three times a day Subjects were seen once a week for 45 minutes; exercises were performed in four sets of five repetitions	Articulation exercises ranged from focusing on CVC words to complex longer utterances[25]	Patients were asked to practice at home three times per day. Each home practice session was to include four sets of exercises with five repetitions in each set[25]
Poor speech intelligibility; poor articulation	Improve speech intelligibility and articulation skills	**Ortho-Logo-Paedia computer program** Patients play speech exercise games to practice sounds in words, phonation, pitch, and volume and are provided with feedback on their productions by the computer. Patients also meet with a therapist once a week[26]	During OLP treatment, patients' exercise schedules were tailor made to address individual needs[26]	Participants receiving computerized treatment were given individualized exercise schedules Additionally, a computer was left at each patient's home in order for them to practice between weekly SLP-supervised therapy sessions[26]

Prosody	Improve pitch, volume, stress, and intonation to increase speech intelligibility	**Oscilloscope** A patient is provided with visual feedback on his or her vocal volume. The patient is asked to imitate the upper and lower limits of the therapist's modeled volume[24] **Speech Viewer III** Provides a visual model of pitch for the patient to reproduce, and visual feedback on his or her own pitch[24]	Progress as indicated for each patient	Unspecified
Inadequate breath support for speech	Improve respiratory drive	**Therapeutic modalities** Authors of a review of the literature with the goal to establish practice guidelines for treatment in dysarthria found that the following treatment techniques to improve respiratory drive were supported by evidence[12] 1 Breathing against resistance through a water manometer, blow bottle, or resistive mask 2 Pushing and pulling techniques (such as pushing the abdomen in with one hand during expiration) 3 Biofeedback of chest wall movement 4 Abdominal trussing 5 Providing biofeedback of targeted air pressure levels	Progress as indicated for each patient	Unspecified

Poor coordination of the respiratory and phonatory systems	Improve coordination of the respiratory and phonatory systems to support speech production	**Therapeutic modalities** Although these treatments are primarily relevant for patients with ataxic or hyperkinetic dysarthrias, they might be appropriate for others exhibiting poor coordination. Authors of a review of the literature with the goal to establish practice guidelines for treatment in dysarthria[12] found that the following treatment techniques were supported by evidence: 1. Providing biofeedback during therapy to increase control of inhalation and exhalation (nonspeech tasks) 2. Providing biofeedback of chest wall movements and phonation (speech tasks)	Progress as indicated for each patient	Unspecified

Reduced phonatory function resulting from incomplete or excessive adduction of the vocal folds	Improve phonatory function for speech production by improving vocal fold adduction	**Therapeutic modalities** Authors of a review of the literature with the goal to establish practice guidelines for treatment in dysarthria[12] found that the following treatment techniques were supported by evidence: 1. Effort closure techniques (used with patients experiencing hypoadduction of the vocal folds). Effort closure techniques increase vocal fold adduction force. Examples of effort closure techniques include 1) clasping hands together and squeezing palms as hard as possible, 2) interlacing hands and pulling outward, 3) sitting in a chair, grasping the bottom of the chair with both hands, and pulling upward or pushing downward with both hands 2. LSVT LOUD focuses on 1) improving phonation, 2) improving ability to perceive effort levels, 3) expending high levels of effort during therapy, 4) intensive treatment schedules, and 5) quantifying treatment-related changes[23] Additional interventions are supported by expert opinion	Progress as indicated for each patient	Unspecified

Unintelligible speech	Provide patient with alternative means of communication	**Augmentative and alternative communication (AAC)** AAC can vary from low-tech to high-tech and should be considered if the patient is unable to communicate effectively through speech. The choice of an AAC system depends on the patient's motor, sensory, cognitive, and linguistic abilities[12] For detailed information about AAC for individuals with dysarthria, see *Clinical Review…Augmentative and Alternative Communication: Dysarthria*; CINAHL Topic ID Number: T905995	Progress as indicated for each patient	AAC devices should be obtained with the intent of home and community use

Poor listener comprehension	Improve the listener's ability to comprehend the communication of an individual with hypokinetic dysarthria	**Therapeutic strategies** Techniques to improve listener comprehension Listener strategies 1 Allowing listeners to have a good view of the speaker's face 2 Asking for a repetition of the part of the message that was not understood[24] 3 Asking yes/no questions if necessary[27] 4 Letting the speaker know when his/her message is not understood[27] 5 Reducing background noise and distractions[27] Speaker strategies 1 Using an alphabet board to identify the initial letter of a spoken word[24] 2 Providing cues for the topic of conversation (semantic or syntactic supplementation)[27,28] (Results from one study indicated that listeners with topic knowledge were more likely to inaccurately guess or mishear words spoken by patients with hypokinetic dysarthria that were not in fact related to the topic; determine the effectiveness of this strategy with each individual patient-conversation partner dyad prior to recommending its regular use)[28] 3 Using illustrative gestures – patient uses gestures to	Progress as indicated for each patient/family	Strategies should be taught with the intention of having them used at home and in the community

Dysphagia	Improve swallow safety	**Therapeutic strategies** Intervention will vary according to the feeding/swallowing stage effected by dysphagia, as well as individual patient goals	Progress as indicated for each patient/family	Educate patient on proper nutrition and hydration concepts. Continually review proper posture principles and safe swallowing techniques

Desired Outcomes/Outcome Measures

› Improved functional communication
› Improved speech production and intelligibility
  • Assessment of Intelligibility of Dysarthric Speech
  • FrenchayDysarthria Assessment—Second Edition
  • Dysarthria Examination Battery
› Increased vocal volume
› Improved communication through the use of AAC
› Improved quality of life
  • Quality of Communication Life Scale (ASHA QCL): provides information about the patient's communication interactions and participation in social, leisure, and work activities[32]

Maintenance or Prevention

› Maintenance of communication skills will depend upon the etiology of the hypokinetic dysarthria. Patients with stable hypokinetic dysarthria (e.g., resulting from head trauma) may exhibit maintenance or improvement in their communication skills. There is a small body of research supporting the fact that treatment can be effective even when delayed up to 48 months post-onsetof dysarthria.[26] However, hypokinetic dysarthria associated with progressive diseases, such as Parkinson disease, might continue to worsen over time

Patient Education

› See information from the American Speech-Language-Hearing Association, https://www.asha.org/public/speech/disorders/dysarthria/

Note

› Recent review of the literature has found no updated research evidence on this topic since previous publication on February 3, 2017

Coding Matrix

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

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

References

1. Sarno MT, Galgano J. Neurogenic disorders of speech and language. In: O'Sullivan SB, Schmitz TJ, Fulk GD, eds. *Physical Rehabilitation*. 6th ed. Philadelphia, PA: FA Davis Co; 2014:1280-1282. **(GI)**
2. Kortte JH, Palmer JB. Speech and language disorders. In: Frontera WR, Silver JK, Rizzo TD Jr, eds. *Essentials of Physical Medicine and Rehabilitation: Musculoskeletal Disorders, Pain, and Rehabilitation*. 3rd ed. Philadelphia, PA: Elsevier Saunders; 2015:833-838. **(GI)**
3. Clark HM. Neuromuscular treatments for speech and swallowing: a tutorial. *Am J Speech Lang Pathol*. 2003;12(4):400-415. **(X)**

4. Ashley J, Duggan M, Sutcliffe N. Speech, language, and swallowing disorders in the older adult. *Clin Geriatr Med*. 2006;22(2):291-310. **(GI)**
5. McCaffrey P. CMSD 642 Neuropathologies of swallowing and speech. The Neuroscience on the Web Series Web site. http://www.csuchico.edu/~pmccaffrey/syllabi/SPPA342/342unit14.html. Accessed June 3, 2018. **(GI)**
6. Mayo Clinic staff. Parkinson's disease. MayoClinic.com Web site. http://www.mayoclinic.org/diseases-conditions/parkinsons-disease/basics/risk-factors/con-20028488. Accessed June 3, 2018. **(GI)**
7. Brumfitt S. Psychosocial aspects of aphasia: speech and language therapists' views on professional practice. *Disabil Rehabil*. 2006;28(8):523-534. **(R)**
8. Aminoff MJ, Kerchner GA. Nervous system disorders. In: Papadakis MA, McPhee SJ, Rabow MW, eds. *Current Medical Diagnosis and Treatment*. 55th ed. New York, NY: McGraw-Hill Medical; 2016:988-991. **(GI)**
9. Muñoz ML, Marquardt TP, Copeland G. A comparison of the code switching patterns of aphasic and neurologically normal bilingual speakers of English and Spanish. *Brain Lang*. 1999;66(2):249-274. **(R)**
10. Edmonds LA, Kiran S. Effect of semantic naming treatment on crosslinguistic generalization in bilingual aphasia. *J Speech Hear Res*. 2006;49(4):729-748. **(R)**
11. Johnson AM, Adams SG. Nonpharmacological management of hypokinetic dysarthria in Parkinson's disease. *GeriatrAging*. 2006;9(1):40-43. **(GI)**
12. Spencer KA, Yorkston KM, Duffy JR. Behavioral management of respiratory/phonatory dysfunction from dysarthria: a flowchart for guidance in clinical decision making. *J Med Speech Lang Pathol*. 2003;11(2):xxxix-lxi. **(G)**
13. American-Speech-Language-Hearing Association. Preferred practice patterns for the profession of speech-language pathology. American Speech-Language-Hearing Association Web site. http://www.asha.org/policy/PP2004-00191.htm. Accessed June 3, 2018. **(G)**
14. Freed DB. In: *Motor Speech Disorders: Diagnosis and Treatment*. San Diego, CA: Singular Pub. Group; 2000:93-133. **(GI)**
15. Kent RD. Hearing and believing: some limits to the auditory-perceptual assessment of speech and voice disorders. *Am J Speech Lang Pathol*. 1996;5(3):7-23. **(PP)**
16. Roy N, Leeper HA, Blomgren M, Cameron RM. A description of phonetic, acoustic and physiological changes associated with impaired intelligibility in a speaker with spastic dysarthria. *Am J Speech Lang Pathol*. 2001;10(3):274-290. **(C)**
17. Yorkston KM, Beukelman DR, Traynor C. *Assessment of Intelligibility of Dysarthric Speech*. Tigard, OR: CC Publications; 1984. **(PP)**
18. Palmer R. *Frenchay Dysarthria Assessment*. 2nd ed. Austin, TX: Pro-Ed; 2008. **(PP)**
19. Drummond SS. *Dysarthria Examination Battery*. San Antonio, TX: The Psychological Corporation; 1993. **(PP)**
20. Dworkin JP, Cullata RA. *Dworkin-Culatta Oral Mechanism Examination and Treatment System*. Farmington Hills, MI: Edgewood Press; 1996. **(PP)**
21. Simmons-Mackie N, Kagan A. Application of the ICF in aphasia. *Semin Speech Lang*. 2007;28(4):244-253. **(G)**
22. Sharma N. Parkinson disease. In: Frontera WR, Silver JK, Rizzo TD Jr, eds. *Essentials of Physical Medicine and Rehabilitation: Musculoskeletal Disorders, Pain, and Rehabilitation*. 3rd ed. Philadelphia, PA: Elsevier Saunders; 2015:746-750. **(GI)**
23. Ramig LO, Fox C, Sapir S. Parkinson's disease: speech and voice disorders and their treatment with the Lee Silverman Voice Treatment. *Semin Speech Lang*. 2004;25(2):169-180. **(RV)**
24. Palmer R, Enderby P. Methods of speech therapy treatment for stable dysarthria: a review. *Adv Speech Lang Pathol*. 2007;9(2):140-153. **(RV)**
25. Robertson S. The efficacy of oro-facial and articulation exercises in dysarthria following stroke. *Int J Lang Commun Disord*. 2001;36(Suppl):292-297. **(R)**
26. Palmer R, Enderby P, Hawley M. Addressing the needs of speakers with longstanding dysarthria: computerized and traditional therapy compared. *Int J Lang Commun Disord*. 2007;42(Suppl 1):61-79. **(R)**
27. American Speech-Language Hearing Association. Dysarthria. American Speech-Language Hearing Association Web site. http://www.asha.org/public/speech/disorders/dysarthria.htm#comm_better. Accessed June 3, 2018. **(GI)**
28. Utianski RL, Lansford KL, Liss JM, Azuma T. The effects of topic knowledge on intelligibility and lexical segmentation in hypokinetic and ataxic dysarthria. *J Med Speech Lang Pathol*. 2011;19(4):25-36. **(R)**
29. Wong MN, Murdoch BE, Whelan BM. Lingual kinematics during rapid syllable repetition in Parkinson's disease. *Int J Lang Commun Disord*. 2012;47(5):578-588. doi:10.1111/j.1460-6984.2012.00167.x. **(R)**
30. Dykstra AD, Adams SG, Jog M. The effect of background noise on the speech intensity of individuals with hypophonia associated with Parkinson's disease. *J Med Speech Lang Pathol*. 2012;20(3):19-30. **(R)**
31. McAuliffe MJ, Kerr SE, Gibson EM, Anderson T, LaShell PJ. Cognitive-perceptual examination of remediation approaches to hypokinetic dysarthria. *J Speech Lang Hear Res*. 2014;57(4):1268-1283. doi:10.1044/2014_JSLHR-S-12-0349. **(R)**
32. Paul DR, Frattali CM, Holland AL, Thompson CK, Caperton CJ, Slater SC. Quality of Communication Life Scale (ASHA QCL). Rockville, MD: American Speech-Language-Hearing Association; 2004. **(PP)**
33. Watts CR. A retrospective study of long-term treatment outcomes for reduced vocal intensity in hypokinetic dysarthria. *BMC Ear Nose Throat Disord*. February 1, 2016;(16):2. doi:10.1186/s12901-016-0022-8. **(R)**