

6 Dysarthria Management for Unserved and Underserved Populations across the Globe

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Key information for local and national policy and lawmakers

The purpose of this chapter is to inform country leaders, professional organizations, and institutions of the importance of addressing the need for dysarthria management for those from medically unserved and underserved populations. Dysarthria is a neuromuscular speech execution disorder. Dysarthria occurs as a result of a lesion to either the peripheral or central nervous system which affects the neural pathways subserving speech (Liégeois et al., 2013). This results in neuromuscular incoordination or weakness affecting the speech sub-systems that include breathing, voicing, nasal resonance, articulation, and prosody (Morgan & Liégeois, 2010). Dysarthria impacts the naturalness and/or intelligibility of the speaker due to factors such as poor articulation, slurring, abnormal nasal resonance, and weak or strained vocal quality.

Incidence and prevalence of dysarthria

The most common speech disorder addressed in adult speech therapy clinics in countries with well-developed health services is dysarthria (Duffy, 2013). In adulthood, cardiovascular accident (CVA), traumatic brain injury (TBI), brain tumours, and neurological diseases such as Parkinson's disease are common causes. The most usual aetiology for childhood dysarthria is cerebral palsy, this being the most common form of childhood disability (Mei et al., 2020). Other common paediatric dysarthria aetiologies include neurogenetic syndromes, traumatic brain injury, cortical malformation syndromes, metabolic disorders, and brain tumours (mainly of the posterior fossa region of the brain), stroke, neurodegenerative diseases, and epilepsy. The incidence and prevalence of dysarthria in low-middle income countries are unknown. Data from developed nations have been reviewed but even this is poorly documented, as shown in Table 6.1 (adults) and Table 6.2 (children).

The impact of neuromotor speech disorders

Neuromotor speech disorders have related psychosocial impacts, such as communication breakdown in everyday social interactions (Dickson et al., 2008; Enderby, 2012;

Table 6.1 Incidence and prevalence of dysarthria in adults in the UK and the USA.

Neurological condition	Dysarthria within the disorder	
	Incidence	Prevalence
Traumatic brain injury	33% (Enderby et al., 2009)	10–65% (ASHA, 2021)
Parkinson's disease	50–90%* (Enderby, et al., 2012)	70%–100% (ASHA, 2021)
Stroke	20%	50% diminishing as recovery (Enderby et al., 2009)
Motor neuron disease	Not known	Not known
Multiple sclerosis	25% (ASHA, 2021)	50% at some stage during the continuity of their disease (ASHA, 2021)
Progressive neurological disorder	Not known	30–80% (Enderby et al., 2012)

*Range given, with increasing incidence as the disease progresses.

Table 6.2 Prevalence of dysarthria in paediatric clinical cohorts.

Neurological condition	Prevalence of dysarthria within the condition	Citation
Cerebral palsy	78%	Mei et al., 2020
Neuromuscular diseases (e.g., muscular dystrophy, congenital myopathy)	30%	Kooi van Es et al., 2020
Moderate/severe traumatic brain injury [^]	20–67%	Morgan et al., 2010
Stroke	74%	Liégeois et al., 2019
Posterior fossa tumour	30%	Mei & Morgan., 2011

[^]Dysarthria is infrequently seen in children with mild traumatic brain injury (Morgan et al., 2010).

Yorkston, Beukelman, Strand, & Hakel, 2010). Dysarthria is likely to affect the quality of life by altering the patient's self-identity and restricting opportunities of developing relationships, which in turn may lead to increased societal burden in terms of cost and burden for social care services (Dickson et al., 2008; Enderby, 2012; Yorkston et al., 2010).

Key information for health professionals, social workers, community leaders and educational practitioners

The literature indicates that dysarthria is the most common acquired neurogenic communication disorder (Duffy, 2005). Clear evidence-based guidelines and practice documents should be developed and supported by relevant professional bodies, alongside appropriate resource provision. The current World Health Organization's (WHO) 2030 Rehabilitation Call to Action is addressing this need by provision of core rehabilitation guidelines for conditions associated with dysarthria (e.g., stroke, traumatic brain injury, cerebral palsy, and intellectual disability). The ultimate goal of dysarthria management should be to enable effective communication in order to increase the number of productive, active citizens who can participate socially (Qutishat, 2015). The purpose of dysarthria therapy is to enhance the clients' impaired speech, communication effectiveness, social participation, and their wellbeing (WHO, 2001).

How to identify dysarthria

Detecting dysarthria requires expert visual and auditory observational skills from a trained speech and language pathologist/speech therapist. Key features of dysarthria include one or a combination of the following: abnormal voice quality (for example, strained or breathy); abnormal resonance (usually excessive nasality); abnormal vocal tone; distortion or 'slurring' of articulation/speech sounds; abnormal speech rate (usually too slow but sometimes too fast); and abnormal speech rhythm (for example, too little or too much variation in pitch or loudness). Affected individuals and listeners have a sense that, while the language plan (vocabulary, syntax, and motor plan) for expression is unimpaired, it cannot be conveyed easily because of the underlying weakness, lax or excessive muscle tone, incoordination and/or involuntary movements. This contrasts with apraxia of speech in adults (AOS), or childhood apraxia of speech (CAS), which is a disorder of motor planning and coordinating the movements for speech that results in highly variable speech production.

It is important to note that some individuals experience dysarthria that is co-morbid with apraxia. Dysarthria may also co-occur with other acquired or developmental disorders, such as language impairment. A practitioner needs to possess knowledge of the neuroanatomy and neurophysiology of speech, as well as the underlying neurogenic aetiologies that might lead to dysarthria. Healthcare management requires a clear model (conceptual framework) for identifying and classifying health conditions which is easily understandable by all relevant practitioners.

A widely-used management model for dysarthria is the WHO International Classification of Functioning model based on a biopsychosocial approach (Kostanjsek,

2011). These include aspects of impairment, activity, and participation. The impairment includes consideration of the aetiology of the condition (i.e., whether the medical condition is static or progressive), the neurophysiology of the speech-subsystems that are affected, and the severity of each of the symptoms of the speech disorder. As regards to activity, this involves the impact on intelligibility of speech and effectiveness of communication. Participation considers the patient's social context, self-identity, relationships, education, and employment.

The impact of this condition

Different severity levels of dysarthria, regardless of the underlying neurogenic aetiology, will have an impact on the ability to communicate effectively, live a normal social life, study and/or work functionally.

The importance of identification

People with dysarthria might have reduced intelligibility of speech, which may affect self-identity, relationships, social participation, education, and employment (Enderby, 2012). There are many ways of assisting a person with dysarthria to improve their communication whilst also considering the importance of the quality of their life.

What to do when this disorder has been identified

Individuals with a possible dysarthria disorder should be referred to speech therapy/speech language pathology to provide a definitive diagnosis and management plan. In addition, dysarthria onset and its type (hypokinetic, ataxic, or spastic) is sometimes an early marker for the onset of an underlying neurological condition. Referral to neurology may also be indicated if the aetiology of the dysarthria is unknown.

The support of those with dysarthria

It is important to detect and identify dysarthria as early as possible and to refer the individual to an expert in management of speech disorders, typically a speech-language therapist/pathologist. This gives the person the opportunity to talk about their speech and communication challenges, to learn strategies, to be provided with an exercise plan, to improve their intelligibility, to access appropriate technology if required, and to receive encouragement.

Key dos and don'ts

It is important to remember that, in some cultures, it is important to use general terminology when describing the speech disorder without reference to the underlying condition; however, in other cultures, it may not be unusual for a client to be informed of their underlying neurological condition.

Information for professionals

Dysarthria assessment requires the speech language pathologist/speech therapist to detect whether the speech abnormality is a dysarthria or another condition and, if so, to identify the type of dysarthria when possible. It is important to screen for possible co-occurring speech/language disorders and to identify influencing factors such as hearing loss. This should lead to a management plan, including any onward referrals that may be required. Considering the limitations of resources and costs, the speech language pathologist/speech therapist has to aim to identify measure(s) suitable for use in the person's home where specialist speech instruments/technology may not be readily available (Qutishat, 2015).

Examining dysarthria depends on the experience of the SLP in assessing dysarthria and being able to differentiate between its types, e.g., spastic, flaccid, mixed, hyperkinetic, or hypokinetic. This can be achieved by listening to the patient, observing the oral motor, vocal and respiratory functions while considering the patterns of dysarthric characteristics and normal neuromuscular functions of speech production. Moreover, it is important to highlight that identifying dysarthria is assisted by the underlying medical diagnosis (Qutishat, 2015).

Assessment approaches

A comprehensive and systematic diagnostic assessment is recommended for paediatric and adult patients with dysarthria. There are commercially available adult-based standardized tests but fewer standardized options available for assessment of childhood dysarthria. As noted earlier, the holistic ICF-based approach to assessment of dysarthria includes examining the impairment via physiological functions (i.e., the neuromuscular and speech functions related to dysarthria), the activity (i.e., considering the impact on intelligibility, quality of speech and communication skills), and the participation effects on the patient's life (i.e., education, employment, and recreation).

The most usual approach to assessment of dysarthria is the perceptual assessment. This can be supported by instrumental methods such as electromagnetic articulography, oral pressure instruments, nasendoscopy or nasometry when available. In the perceptual model, diagnosis relies on an oral exam of neuromuscular function and structure and an assessment of speech production. The oral exam assesses the symmetry, size and positioning of oral structures (e.g., jaw malocclusion, micrognathia, and macroglossia), strength, and range, rate, and the smoothness of movements of the articulators (lips, tongue, jaw, cheeks, larynx, soft palate). Most critically, diagnosis depends on a clinician's perception of speech errors during conversation. Reading aloud is a useful method that can be used with literate individuals. Tasks such as sound prolongation (e.g., saying /ah/, /s/, /z/ aloud for as long as possible), rapid repetition of speech sound sequences (e.g., saying /pa-ta-ka/ as quickly and clearly as possible), and specific areas of respiratory control, voicing and detecting aspects of speech breakdown to aid differential diagnosis will assist in generating treatment targets (Frenchay Dysarthria Assessment; Enderby & Palmer, 2008). Additionally, any dysarthria test should include the screening of cranial nerve functions (Qutishat, 2015). It takes an experienced SLP approximately 30-40 minutes to complete diagnostic testing of dysarthria.

Evidence-based intervention

The ultimate goal of dysarthria speech therapy is to give the clients the opportunity to improve the quality of their speech production, intelligibility, and quality of life (Enderby, 2012; Palmer, 2005). The first step in any dysarthria treatment plan is explaining dysarthria to the patient, family, and other professionals involved in the care of the client, e.g., physiotherapists, doctors, teachers (Enderby, 2012).

Searching the best available EBP intervention might be challenging for the SLP who is without easy access to electronic databases for the latest research and does not have formally allocated time for research and development. In adults, evidence-based practice interventions for dysarthria might include Lee Silverman Voice Treatment (LSVT) (Ramig & Fox, 2007) and the Dysarthria Treatment Programme (DTP) (Drummond, Worley, & Walston, 2003).

Augmentative Alternative Communication (AAC) may be considered to augment or replace speech, as described in Chapter 11. Most programmes for the treatment of dysarthria include speech motor exercises, breathing exercises, lip and tongue exercises, motor learning skills, relaxation exercises, laryngeal treatment, swallowing treatment, different methods for enhancing intelligibility, articulation training, and oral motor strengthening exercises (Freed, 2000). More recently, there has been increased use of biofeedback devices, including a proliferation of computer- or phone-based applications with speech focused games or exercises, providing feedback to enable patients to monitor and modify speech characteristics (Qutishat, 2015).

Current recommended treatments for childhood dysarthria rely on modifying speech through intensive speech practice. The chosen treatment plan depends entirely on an individual child's speech deficits, severity of disorder and the neuromuscular deficits or physiological profile underlying those errors. Parents/caregivers and significant others in the child's life (e.g., teachers) should also be included in developing the management plan, particularly in ensuring that it is functionally relevant and has salient communication goals.

Where appropriate, older children who are cognitively able should be involved in developing their therapy plan. Moreover, Augmentative and Alternative Communication (AAC) might be considered where needed, for example by providing voice amplifiers or the Voice-Input Voice-Output Communication Aid (VIVOCA) for moderate and severe cases of dysarthria (Hawley et al., 2012). More information on AAC can be found in Chapter 11.

Current treatment approaches advocate intensive therapy delivery as leading to the best outcomes (Pennington, Parker, Kelly, & Miller, 2016). However, very few studies have examined the efficacy of interventions for childhood dysarthria associated with acquired brain lesions, neurogenetic or metabolic disorders (Morgan & Vogel, 2009) where children are largely nonverbal, with severe to profound dysarthric presentation. Alternative communication devices/supports may be required to facilitate effective communication. The SLP needs to consider the treatment regularity issue and to measure the effectiveness of the intervention formally, which requires the repeated use of validated assessment tools (published or unpublished) (Qutishat, 2015).

Key dos and don'ts

Individual speech language pathologists/speech therapists must consider the current scientific evidence, use of language, and cultural sensitivities when managing persons with dysarthria. It is important to use informal conversation with the appropriate style and dialect for the patient (Qutishat, 2015).

Discussion

A robust understanding of dysarthria management ensures more targeted assessment and treatment and maximizes use of limited speech language-pathology/speech therapy resources, in turn streamlining service provision for underserved or unserved populations. A comprehensive dysarthria assessment by a speech language pathologist/speech therapist includes examining non-speech or oral motor functions including cranial and/or spinal nerve assessment, speech motor function and overall speech intelligibility. These factors are considered alongside the physician's (e.g., neurologist) assessment and the broader health, medical, linguistic, and cultural concerns of a client. It is important to discuss the dysarthria diagnosis, impact of this speech condition and future management plan with the patient, family, and other clinicians within the medical team.

The expected challenges of dysarthria management for the underserved or unserved population may include the shortage or unavailability of equipment and technology in general, including: AAC devices; electrical stimulation devices; the Expiratory Muscle Strength Training (EMST) device; acoustic and aerodynamic measures; laptops, computers or other software or mobile applications. In some settings, there may also be unavailability of standardized tests, quality of life measures, therapy outcome measures or patient-centred measures. Another challenge that we might face in some unserved or underserved populations is that the health care is provided through multiple public and private programmes. Health sector providers include different institutions and organizations.

Moreover, there might be no professional bodies that organize the speech pathology profession. In addition, the field of speech language pathologist/speech therapist in unserved or underserved populations is relatively new and even the main public and private hospitals, or medical centres in capital cities may not yet have a speech clinic. However, different countries and regions will have some of these resources which can be used to support assessment and treatment. It is important to be innovative in ways to assist individuals improve their communication skills, using what resources are available for supporting family members and community workers. In addition, it is possible to assist patients to access some speech modification therapy apps on their phones or computers when this is indicated as likely to be of benefit.

In conclusion, despite the potential shortage of resources, the speech language pathologists/speech therapists can overcome challenges by using the tools available to them, including perceptual measures and traditional dysarthria treatment approaches and patient education around these approaches. The speech language pathologist/speech therapist needs to be flexible and adaptive to work in line with evidence-based practice principles in this environment, to best support their client.

Resources for professionals to guide practice

A selection of resources has been provided for an overview of dysarthria and its features, the facilitation of service delivery, commissioning, and planning, and the assessment and management of dysarthria.

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Assessment and outcome measures

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7 Managing Post-stroke Aphasia in Underserved or Unserved Multiethnic–Multilingual Populations

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Key information for local and international policymakers

The goal of this chapter is to inform policymakers, professional organizations, and healthcare institutions about the systemic healthcare needs, including gaps in research and administrative policies, which must be addressed to enhance clinical management and life reintegration in individuals with aphasia in underserved and unserved multiethnic–multilingual populations. Aphasia is a language and communication impairment, most frequently caused by damage to left-sided areas of the brain, affecting a person's communicative and social functioning and quality of life and the quality of life of his/her close social network (Hallowell, 2017; Papathanasiou, Coppens, & Davidson, 2022).

The incidence and prevalence of aphasia

The incidence and prevalence of post-stroke aphasia across the world is estimated to increase, as the world steadily ages and the risk of age-related cardiovascular complications, including stroke, markedly grows (Johnson, Onuma, Owolabi, & Sachdev, 2016; United Nations, Department of Economic and Social Affairs, Population Division, 2017). Aphasia, a frequent post-stroke disability, occurs in 21% to 38% of stroke survivors (Engelter et al., 2006). Yet, as the numbers of older adults with age-related disabilities, including post-stroke aphasia, expand, extensive cohorts of these individuals will be from unserved and underserved multiethnic–multilingual communities. Disability disproportionately affects older people, people living in poverty, indigenous individuals, refugees, and migrants (Centeno & Harris, 2021; WHO, 2015). Older adults from minority ethnoracial populations are more likely to experience age-related neuropathologies, including stroke, from the interaction of multiple health determinants, such as vulnerable life histories, limited access to health services, treatment inequities, and culturally inadequate clinical procedures (Australian Institute of Health and Welfare, 2016; Centeno, Kiran, & Armstrong,