

The role of the speech language pathologist in acute stroke

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Abstract

Dysphagia and communication impairment are common consequences of stroke. Stroke survivors with either or both of these impairments are likely to have poorer long-term outcomes than those who do not have them. Speech-language pathologists (SLP) play a significant role in the screening, formal assessment, management, and rehabilitation of stroke survivors who present with dysphagia and/or communication impairment. Early diagnosis and referral is critical, as is intensive intervention as soon as the patient is able to participate. The SLP is also responsible for educating carers and staff in strategies that can support the patient and for making appropriate environmental modifications (e.g. altering diet consistencies or providing information in an aphasia-friendly format) to optimize the stroke survivor's participation, initially, in the rehabilitation program and, subsequently, within the community.

Keywords

Communication, dysphagia, speech pathologist, stroke.

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Stroke unit care is internationally recognized as the gold standard for the acute management and early rehabilitation of stroke patients.^[1] A key element of comprehensive stroke unit care is the involvement of a multidisciplinary team. Speech-language pathologists (SLPs), along with medical, nursing, occupational therapy, physiotherapy, and social work staff are considered as core members of the multidisciplinary stroke team as defined in the Australian,^[2] New Zealand,^[3] United Kingdom,^[4] United States,^[5] and European^[6] guidelines. SLPs working with stroke survivors have particular skills in the assessment and management of dysphagia and will be directly involved in the assessment and management of communication disorders associated with stroke, including aphasia, motor speech disorders, and cognitive communication disorders.

Dysphagia

There are three levels of care for stroke survivors with dysphagia. Stroke patients should receive a swallow screening test within 24 h of admission; those patients with evidence of dysphagia should have a formal clinical and/or instrumental assessment, which is generally undertaken by the SLP; and following this, a swallowing management and/or rehabilitation program should be developed with the involvement of the multidisciplinary

team, the patient, and their significant others.

Dysphagia Screening

Up to 50% of acute stroke patients are likely to experience dysphagia.^[7,8] If it is not recognized early, dysphagia may be responsible for aspiration, aspiration pneumonia, and/or undernutrition and dehydration.^[9] Stroke patients with dysphagia are likely to have poorer outcomes.^[9] Therefore, dysphagia screening should be undertaken as soon as possible after the patient has been admitted to hospital and before starting oral intake of food, fluids, or medication.

A number of dysphagia screening tools exist,^[10] many of which combine an evaluation of the clinical predictors of dysphagia (i.e., dysphonia, dysarthria, abnormal volitional cough, abnormal gag reflex, cough after swallow, and voice change after swallow)^[11] with a water swallowing test. While this combination appears comprehensive, it may prove time consuming, both because of the amount of education required to train nursing or emergency department staff and because of the actual time taken to screen. A combination of the water swallow test with pulse oximetry has also been advocated,^[12] and this may prove to be an equally effective and more efficient tool. SLPs may or may not

be responsible for the dysphagia screening; however, in countries where they are the lead dysphagia clinician, they should be involved in the selection of a suitable screening tool for their hospital and in providing training to the staff responsible for screening.

Dysphagia Assessment

If the patient fails dysphagia screening, referral to an SLP should occur for more comprehensive assessment. Alternative means for hydration and nutrition should be considered and implemented if a full assessment is not available within 24 h and if such intervention is deemed medically appropriate.^[2-6] Formal dysphagia assessment includes an initial clinical bedside evaluation. If the clinical examination is inconclusive, the patient develops signs consistent with aspiration despite adherence to a dysphagia management plan, or dysphagia continues without improvement for longer than 7 days, instrumental evaluation such as a videofluoroscopic modified barium swallow (VMBS) or fiberoendoscopic examination of swallowing (FEES) is indicated. Either of these tests (or both) can be used in conjunction with clinical examination to inform the swallowing management plan or to develop a swallowing rehabilitation plan.

Clinical Bedside Evaluation

Prior to undertaking the clinical bedside evaluation of swallowing, the SLP should review the patient's medical chart regarding the admission and make a note of comorbidities and medications which may impact on swallowing. The first part of the bedside swallowing evaluation involves screening for communication involvement, particularly with regard to the presence of dysarthria and dysphonia, the patient's ability to understand instructions (aphasia), and whether or not they are able to perform simple motor tasks in response to commands (apraxia). An oral examination is undertaken to note issues such as poor dentition, mucosal lesions, oral thrush, excessive or inadequate saliva, and halitosis. In addition, the SLP looks for facial (in particular, cheek and lip), tongue, soft palate, jaw, and laryngeal weakness. The SLP will examine for asymmetry at rest and in movement and, where possible, use resistance techniques to determine weakness. Subsequently, the patient's ability to perform a voluntary cough and saliva swallow will be checked. In combination, this provides information about the risk factors associated with oral health^[13] and the motor function of the key cranial nerves for swallowing (i.e., V, VII, IX [small motor component to stylopharyngeus], X, XI, and XII). The SLP may also screen for oropharyngeal sensory involvement by testing taste recognition and perception (VII, IX, and X),^[14] light and deep touch, and perception of hot and cold (V).^[15] In some countries, dysphagia assessment and

management is undertaken by other suitably trained health professionals; however, the SLP has particular skill in undertaking the above aspects of the bedside evaluation.

Subsequently, food and fluid trials may be undertaken to determine which, if any, food or fluid consistency can be swallowed safely. Trials are likely to include a range of fluids from very thick or pudding-like fluids to thin watery fluids, with the trial sequence determined by the preceding clinical examination. The SLP will check for oral residue, voice quality, and breathing rate after each trial. Cervical auscultation may be used to provide additional information about changes in breathing sounds or breathing patterns during or after each trial.^[16] If no fluid consistency proves safe, the SLP should advise the multidisciplinary team and consider other sensory stimulation pathways that can be used to promote swallowing activity (eg, tactile, temperature, or taste). If a given consistency appears to enable oral intake without apparent risk to the patient, a diet can be commenced incorporating food and fluids of that consistency. Generally, vitaminised foods are introduced first, as the bedside clinical examination is seldom long enough to detect fatigue either in the swallowing act itself or in the muscles involved in bolus preparation. The final part of a bedside clinical evaluation should be the observation of the patient consuming a full meal of the recommended consistency of food and fluid. At this point, a swallowing management plan has to be developed. This plan should include:

- Positioning for oral intake or sensory stimulation (determined after consultation with the physiotherapist and occupational therapist)
- A sensory stimulation program to encourage swallowing activity if no level of oral intake appears 'safe'
- Texture specification for all oral intake
- Recommendations for oral medications
- Requirements for meal-time monitoring, including indicators of poor swallow function
- Review schedule

A formal review should include evaluation trials of food and fluid consistencies that have previously been considered 'unsafe.' It is important for the patient to move toward normal consistency food and fluids as soon as it is clinically safe. The Consumption of normal food and fluids encourage adequate oral intake,^[17] increases saliva flow and therefore taste acuity, increases activity in a range of speech and swallowing muscles, and enhances social interactions and quality of life.^[18]

Instrumental Assessment

A thorough bedside clinical examination is a sensitive,

but not always specific, tool.^[19] The bedside clinical examination may fail to identify some patients at risk of aspiration and may predict aspiration in patients where an instrumental study demonstrates safe swallowing. Nevertheless, routine use of an instrumental examination such as VMBS is unlikely to add significantly to functional outcome for people with post-stroke dysphagia.^[9] For many stroke patients, dysphagia will resolve quickly. Instrumental examination should however be considered when:

- The clinical examination is inconclusive.
- The patient fails to improve in the first week, and additional information is required to inform swallowing management or rehabilitation.
- The patient develops clinical signs consistent with aspiration, even though there had been no clinical evidence of dysphagia during screening or despite adherence to the swallowing management plan.

Two instrumental techniques are available for the evaluation of swallowing: FEES and VMBS. Both examinations have similar sensitivity and specificity.^[20] The SLP must be present for either of these assessments.

FEES

During the FEES examination, a flexible endoscope is passed transnasally to enable direct viewing of the velopharynx, pharynx, base of tongue, epiglottis, pyriforms, laryngeal vestibule, and vocal cords; the subglottic space may also be viewed. These structures can be examined both at rest and during speech and swallowing, providing information about structural and functional asymmetries and integrity of the swallowing mechanism. Although the movement of the tongue base and epiglottis block the endoscopic view once the involuntary swallow has been initiated, the information provided just prior to this and immediately after swallowing is invaluable.

VMBS

The VMBS is considered the 'gold standard' for the evaluation of swallowing. During the test, the patient swallows a range of fluids and/or foods impregnated with barium and the actual swallow is filmed. The test allows clear identification of laryngeal penetration and aspiration; the timing of that aspiration (before, during, or after the swallow); the function of the velopharyngeal, pharyngeal, and base-of-tongue muscles; excursion of the hyo-laryngeal complex; protection of the airway; pooling in the valleculae or pyriform sinuses; opening of cricopharyngeus; and any pharyngeal residue post swallow.

As well as providing a direct view of swallowing function for food/fluid of different textures, temperatures, or taste,

both procedures can be used to test the effectiveness of different postures/positions (eg, head turn, head tilt, chin tuck) and swallowing strategies (eg, supraglottic swallow, Mendelsohn maneuver) and so can inform the swallowing management plan. In conjunction with a thorough clinical examination, either of these tests can be used to develop a swallowing rehabilitation plan.

Swallowing Rehabilitation

Information supporting swallowing rehabilitation is circumstantial rather than evidence based. Carnaby^[21] found that stroke patients who received daily swallowing intervention (management and/or rehabilitation) demonstrated better swallowing outcomes at 6 months than those who received less intensive treatment or no treatment. Exercise physiology principles indicate that swallowing rehabilitation is likely to be more effective when coupled with actual swallowing activity. Published exercises which meet this criterion are the Masako maneuver (also known as the tongue-holding swallow) and effortful swallow, both of which promote activity in the base of tongue and pharyngeal wall muscles; effortful swallow supported by sEMG biofeedback; voluntary laryngeal elevation plus suck;^[22] sEMG-supported electrical stimulation to support involuntary saliva swallows;^[23] faucal arch stimulation and, potentially, taste stimulation. In the majority of patients, these exercises would be used to support saliva swallows. Swallowing maneuvers such as the Mendelsohn maneuver and supraglottic swallow would also meet this criterion if they were employed as an exercise for supporting saliva swallows. Other exercises may also be of benefit; two examples are the Shaker (head-lift) exercise^[24] and the Lee Silverman Voice Treatment (LSVT).^[25] Exercises that are not accompanied by swallowing activity need to be employed for a minimum of 3 weeks before any decision is made about their effectiveness.

Summary

Dysphagia is a common consequence of stroke, and stroke survivors with dysphagia are likely to have a much poorer outcome than those who do not have dysphagia. Stroke patients should be screened for dysphagia prior to commencing any oral intake. Once dysphagia has been identified, a swallowing management plan should be developed based on the results of the bedside clinical assessment with or without evidence from FEES or VMBS. Often dysphagia will resolve quickly; however, for some patients, a swallowing rehabilitation plan will be required. The SLP plays a major role in all aspects of dysphagia management. The evidence suggests that intensive swallowing exercises will result in optimal swallowing outcomes for patients.

Communication

The communication deficits associated with stroke are diverse; they can be described as affecting one of three main areas: language, motor speech, and/or cognitive communication. The evidence base for the management of post-stroke communication disorders is at best weak.^[26-28] This is partly because of the diversity of the communication deficits associated with stroke and also reflects the long history of communication intervention. Nevertheless, there is overall agreement in the international evidence-based guidelines regarding intervention for communication impairments associated with acute stroke. These take the form of: communication screening^[2-6]; full assessment of those identified with communication impairment by a SLP^[2-6]; intensive intervention, which should be initiated as soon as the patient is able to cooperate^[2-6]; and education of patient, family and significant others, and involved staff regarding the nature of the communication disorder, strategies to maximize communication, and activities that may support communication recovery.^[2-5] In addition, the SLP should work with the multidisciplinary team to ensure that written information given to stroke patients is provided in a way which maximizes their understanding.^[2,14] This holistic approach is supported by the International Classification of Functioning, Disability, and Health (ICF) as it seeks to address issues about the communication environment and the stroke survivor's ability to communicate effectively within that environment, as well as providing direct intervention at the level of impairment.^[29]

Communication Screening

Among stroke survivors, 30-60% are likely to experience a communication deficit.^[30,31] Communication deficits have been demonstrated to be associated with depression^[32,33] and therefore, by inference, with quality of life (QOL); however, any direct relationship between communication involvement and QOL remains unestablished. Many researchers have examined QOL in stroke survivors but have not been able to demonstrate a direct relationship; however, standard QOL measures do not routinely score items that are communication dependent. Results are beginning to emerge from the SAQOL-39 (Stroke and Aphasia Quality of Life Scale-39)^[34] which may clarify this. Overall, stroke survivors with acquired communication disorders have poorer outcomes than those who do not have such disorders, and this highlights the need for early diagnosis. The first step in this process is for all stroke survivors to undergo a communication screening test within 48 h of admission. This screening test should, if possible, be done using a validated tool and should be performed by the SLP or suitably trained nursing/other staff.

An effective communication screen needs to check whether the person is able to understand spoken and written material as well as gestures, facial expressions, and prosody; whether they can communicate their ideas effectively through speech, writing, facial expressions, and gestures; and whether or not their speech is easily understood or demands extra effort from the communication partner to decode. Currently, the most commonly used screening test is the Frenchay Aphasia Screening Test (FAST), which is designed to be used by any member of the multidisciplinary team to promote early referral to the SLP.^[35] This test however, only examines receptive and expressive language in the domains of speaking, listening, reading, and writing and therefore may fail to identify patients who demonstrate cognitive communication disorders or mild motor speech disorders.

Communication screening could also be seen as part of a more comprehensive cognitive screen. Cognitive screening of all stroke survivors is recommended in some of the clinical guidelines.^[2,4-6] The Functional Impairment Battery, which includes screening of memory, neglect, aphasia, anomia, hearing, visual acuity, and depression,^[31] identifies cognitive deficits in many more stroke survivors than informal screening or a standardized broad instrument such as the National Institutes of Health Stroke Scale (NIHSS).^[36] The administration of the Boston Naming Test in addition to FAST in this battery proved effective in identifying a greater number of patients with probable communication involvement than FAST alone. Given the strong relationship between language and memory,^[37] and the association between visual neglect and communication disorders associated with right hemisphere involvement,^[38] a comprehensive cognitive screen such as this would be more likely to identify stroke survivors with communication deficits.

For any screening tool to be effective, however, it needs to be both linguistically and culturally appropriate. The SLP must therefore be involved in the selection of an appropriate screening tool and in training other staff as required in the administration of that tool. Stroke survivors identified as having communication disorders (including those with memory problems, poor repetition skills, and/or neglect on cognitive screen) should be referred to an SLP for more comprehensive communication assessment. In addition, all stroke survivors who pre-morbidly used an alternate means of communication, including gesture, sign language, or augmentative device, should be referred for formal communication assessment.

Communication Assessment

Using the ICF as a framework, three areas emerge

for comprehensive communication assessment. These are the assessment of the communication impairment experienced by the stroke survivor, the impact that this has on their activity and participation within specific contexts, and the way in which their communication environment influences that activity and participation. Assessment in each of these areas should be both quantitative as well as qualitative so that outcomes of the rehabilitation program can be measured objectively.

Assessment of Communication Impairment

The assessment of the communication impairment should be informed by the cognitive or communication screening test and formal cognitive assessments undertaken by the occupational therapist, psychologist, and neuropsychologist. In addition communication assessments must be linguistically and culturally appropriate. Where possible, the assessment should provide clear direction for intervention strategies. Table 1 summarizes the areas identified by the ICF^[29] under the heading of ‘Body Functions’ that may be affected by stroke and which are likely to have a direct or indirect impact on communication. Areas indicated in bold type demand formal assessment by the SLP, while the other areas demand integrated assessment with other members of the team regarding their impact on communication.

Activity and participation

All formal communication assessment should be

undertaken to inform the intensive rehabilitation program which needs to address real goals identified by the stroke survivor. In some circumstances, however, the communication involvement is so severe that early assessment and intensive therapy must be directed toward the receptive and expressive language disorder to help provide the patient with basic communication skills so that they can be involved in goal setting. In other cases, the stroke survivor may have a range of communication impairments but each of these may not have the same impact on their ability to participate within their communication environment. The rehabilitation program is best directed toward those areas which will have maximum impact on the patient’s ability to participate: initially within the hospital environment and subsequently within the home and community. Again the ICF^[29] provides a framework for helping the clinicians and the patient evaluate those areas which are most significant [Table 2]. For example, a patient with mild language impairment may have lost the ability to interpret body language and facial expression and this will have a negative impact on activities involving interpersonal interactions and relationships; major life areas; and community, social, and civic life. Rehabilitation directed toward this impairment should be practiced in the context that is most limited by the impairment. For some patients that may be at the level of family relationships, while for others the impact may be most significant in their work life or career.

Communication environment

The final part of the communication assessment

Table 1: Body functions (ICF framework) likely to be affected by stroke. The SLP provides primary assessment for areas indicated in bold type and supportive assessment for other areas listed.

Mental functions	Sensory functions and pain	Voice and speech functions	Respiratory	Neuromuscular-skeletal and movement
Attention	Hearing	Voice: 1. Production of voice 2. Quality of voice	Respiratory functions (to support speech)	Functions of the joints and bones (temporomandibular joint)
Memory		Articulation		
Emotional		Fluency and Rhythm: 1. Fluency 2. Rhythm 3. Melody	Respiratory muscle functions	Muscle functions (power, tone and endurance of speech muscles)
Perceptual Thought	Seeing	Alternative vocalization functions		Movement functions (reflex, involuntary and voluntary control, sensory feedback of speech muscles)
Higher level cognitive				
Language: 1. Reception of language (spoken, written and other) 2. Expression of language (spoken, written and other) 3. Integrative language functions such as semantic and symbolic meaning, grammatical structure, and ideas				
Sequencing complex movements: 1. Speech apraxia				

Table 2: Activity and participation (ICF framework).

Activity and participation	Areas	Skills
Learning and applying knowledge	Purposeful sensory experiences Basic learning	Hearing/listening Copying Rehearsing Learning to Read Learning to Write Focusing Attention Thinking Reading Writing
General tasks and demands	Applying knowledge	Many communication skills subserve these areas such as listening, understanding, verbal attention, verbal memory, reading, writing, and speech.
Communication	Undertaking a single task Undertaking multiple tasks Carrying out daily routine Handling stress and other psychosocial demands Communication - receiving	Speech Body gestures Drawings and pictures Signs and symbols, including sign language if appropriate. Written
	Communication - producing	Speech Body gestures Drawings and pictures Signs and symbols, including sign language if appropriate. Written
	Converstaion	Starting a conversation Sustaining a conversation Ending a conversation Conversing with one person Conversing with many people. Discussion with one person Discussion with many people
	Discussion	Phones Electronic communication devices including computers.
	Communication devices and techniques.	Using transportation Driving
Mobility	Moving around using transportation	Maintaining one's health (i.e., seeking advice)
Self care	Looking after one's health	Each of these areas may be subserved by specific communication skills
Domestic life	Acquisition of necessities Household tasks Caring for household objects and assisting others	
Interpersonal interactions and relationships	General interpersonal relationships Particular interpersonal relationships	Each of these is subserved by a range of communication skills, including the social skills and contextual knowledge required
Major life areas	Education Work and employment Economic life	Each of these areas may be subserved by specific communication skills
Community, social, and civic life	Community Recreation and leisure Religion and spirituality	Each of these areas may be subserved by specific communication skills

The intervention and rehabilitation plan developed by the SLP should focus on the activity and participation goals identified by the stroke survivor. The SLP will have a primary role in plan development for areas indicated in bold type and a supportive role for other areas.

undertaken by the SLP is to examine the communication environment which impacts on the stroke survivor. During the acute post-stroke stage, this is most likely to be a hospital. The SLP needs to determine:

- What communication devices, if any, can support the stroke survivor in their efforts to communicate
- What communication strategies can be employed by communication partners to enhance communication

with the stroke survivor

- What education is required by communication partners (including family, significant others, and staff) to employ the identified strategies
- What support the stroke survivor requires to access written information relevant to their care
- What support the stroke survivor requires to access leisure time activities in the hospital environment.

Intervention strategies for the patient during the initial acute post-stroke period and the early rehabilitative phase need to address the areas identified by these assessments.

Communication interventions and early rehabilitation

Communication assessment will be an ongoing process throughout rehabilitation; however, once initial assessment is complete, an intervention and rehabilitation plan should be initiated. In the immediate post-stroke period, communication interventions are likely to take precedence over communication rehabilitation. Some strategies for both intervention and rehabilitation are described below; however, the SLP will have access to many other rehabilitation strategies which are accepted practice supported by expert opinion but have not been evaluated in appropriate controlled studies. It is therefore important that the assessment procedures allow adequate measure of outcomes to ensure that the rehabilitation program is effective.

Communication interventions

Communication interventions include strategies that can be employed by the stroke survivor to enhance their communication; strategies used by family, significant others, and staff to promote effective communication with the stroke survivor; and environmental adaptations to enhance communication effectiveness. The aim of these interventions is to maximize communication opportunities and participation for the stroke survivor and also to promote optimal involvement in the rehabilitation and recovery process.

Strategies for the stroke survivor

Where the major communication impairment is in the area of speech rather than language, the patient can be encouraged to use a range of communication supports such as:

- Pen and paper (using the non-dominant hand if necessary)
- Letter pointing board (either for first letter or whole word)*^[39]
- Electronic communication devices^[40]
- Amplification^[41]
- Reducing speed of speech*
- Introducing the topic first*^[39]
- Using iconic gestures*^[42]
- Talking one-to-one where possible

**There is emerging evidence from the literature on dysarthria (including that related to etiologies other than stroke) that using letter*

pointing for initial phoneme in combination with topic nomination or the trained use of gesture is likely to decrease the speed of speech, increase pause times, and improve the intelligibility of the dysarthric speaker.^[39,42]

For the patient with aphasia, useful strategies may include:

- Writing/drawing with either dominant or non-dominant hand^[43]
- Gesturing and pointing^[44]
- Introducing the topic first
- Talking one-to-one where possible
- Using any communication chart/device that has been developed for them^[45,46]
- Encouraging visitors to complete the communication diary (see below)

Strategies for family, significant others, and staff

For all stroke survivors who have communication impairment it is important to:

- Reduce distractions
- Talk one-to-one where possible
- Check that they have understood the message correctly by paraphrasing or reiteration
- Seek clarification if you have not understood
- Allow sufficient time
- Ensure that the area is well lit
- Encourage the patient to use any communication device/strategy developed for them
- Provide props such as photographs, magazines, or sports results that are important to the patient
- Fill in the communication diary at the completion of each visit (see below)

If the patient has aphasia it may also be important to reduce the complexity of sentences, write down key words, use pictures of gesture cues, and ensure that your face is well lit.

Environmental adaptations

A range of environmental adaptations may be considered; for example:

- Providing a nurse call button that is more easily recognized
- Changing ward rounds such that one team member remains with the patient to reiterate information after the team has moved on.
- Developing a communication diary that stays with the patient. Staff, family, and significant others should be encouraged to complete the diary with information about the time/date of the communication, the people involved, and the main elements that were discussed.

The patient with aphasia may require additional adaptations such as:

- Development of aphasia-friendly menus
- Provision of all essential information in an aphasia-friendly format (information about stroke and its consequences; the rehabilitation team and process; essential tests and medical management routinely used post stroke).^[47]
- Development of specific information sheets in an aphasia-friendly format where the patient's management varies from the standard protocols.^[47]

The SLP is responsible for choosing the optimal strategies and environmental adaptations for each patient; training family, significant others, and staff in the use of those strategies and adaptations; and for providing input for the development of all aphasia-friendly materials.

Rehabilitation

Where rehabilitation principles are included in the clinical stroke guidelines, the consensus is that rehabilitation for communication impairments should be initiated as soon as possible post stroke and as intensively as possible (approximately 3-8 h/week).^[48] In the early rehabilitative phase, rehabilitation is likely to be one-to-one. The actual nature of that intervention is determined by the SLP in response to the assessments described above. However, a number of methodologies have evidence base either within the stroke literature or in the broader neurological literature for those patients who demonstrate particular communication impairments.

Motor speech

Dysarthria is underpinned by possible impairment in the respiratory, phonatory, resonance, and/or articulatory systems. This impairment may include weakness, tonicity changes, or incoordination and therefore intervention strategies are inferred by careful assessment. Although evidence from randomized trials is lacking,^[27] evidence-based clinical practice guidelines are emerging for the management of dysarthria.^[49,50] These guidelines address issues in the areas of respiratory, phonatory and resonance strength, control and coordination.

Apraxia of speech frequently coexists with aphasia and therefore the most appropriate intervention will depend on the functional consequences observed in the individual patient. While there is no clear evidence, intervention strategies such as modeling, visual cueing, integral stimulation,^[51] and cueing for articulatory placement Prompts for Restructuring Oral Muscular Phonetic Targets (PROMPT)^[52-54] have proved effective for some patients.

Respiratory/phonatory

Exercises to improve the respiratory/phonatory parameters underpinning speech may include non-speech, postural, and speech activities. Resistance training techniques can target respiratory and/or phonatory muscles directly when reduced strength is hypothesized, while coordination of respiration and phonation should work toward the fast inspiration and controlled exhalation pattern suitable for supporting speech. Programs need to incorporate motor learning principles with strength and coordination exercises modified quickly to incorporate speech tasks.^[50] Patients may initially benefit from blocked practice to develop appropriate motor patterns but may require distributed and randomized practice sessions to promote motor recall.^[53,54] Biofeedback will also be an important element to promote effective motor learning across the respiratory/phonatory systems.

Little evidence is available to identify effective programs for patients who demonstrate hyperadduction syndromes. Relaxation with biofeedback may be of benefit, but the SLP should use careful assessment to ensure that the hyperactivity is not a functional adaptation to an underlying weakness.^[50]

Velopharyngeal

Increased nasal resonance is common across all types of dysarthria^[51] and indicates either velopharyngeal insufficiency or incoordination or a combination of these. A secondary consequence of this is reduced air flow via the oral cavity and therefore reduced resistance during oral articulation. Yorkston^[49] provides clinical practice guidelines for the management of velopharyngeal involvement based on a review of the literature and concludes that velopharyngeal prostheses are effective in some instances. Other therapies which directly affect air flow are LSVT^[25] and continuous positive airway pressure (CPAP) therapy.^[55,56]

Language

Early aphasia rehabilitation should target the areas identified during assessment. It should be initiated as soon as the patient is able to participate in rehabilitative activities and be offered intensively (3-8 h/week).^[48] Case study evidence has demonstrated the effectiveness of phonological and semantic interventions,^[57] which provide the patient with language models that are systematically made more complex, constraining the patient to produce utterances at the level they have reached.^[58]

There has been recent research in the area of pharmacotherapy for aphasia, ie, the use of drugs such as dopamine agonists, piracetam, amphetamines, and donepezil in conjunction with aphasia therapy.^[59] At present it is unclear whether the potential benefits of such treatments outweigh any associated risks and thus further research is required.^[2]

Cognitive language

Stroke survivors who demonstrate impairment in the areas of attention and memory will frequently have concomitant communication involvement. The speech pathologist should work with the occupational therapist and the neuropsychologist to minimize the impact of these impairments on communication. In particular, areas such as verbal attention, divided attention, sustained attention, auditory memory, verbal memory, and visual neglect are likely to have a direct impact on communication. As yet, there is little evidence on the efficacy of clinical interventions in this area.

Summary: Communication

Communication impairment occurs in 30-60% of stroke survivors. Despite the potential for improvement and recovery being high, communication impairment in stroke survivors is often related to poorer outcomes. Screening for cognitive and communication impairments is therefore critical to ensure that all patients with a communication impairment are referred to the SLP for comprehensive assessment and management.

Conclusion

The SLP plays a significant role in the multidisciplinary team managing patients with acute stroke. Screening for dysphagia (within 24 h) and communication impairment (within 48 h) is critical in working toward optimal outcomes for stroke survivors. The SLP is involved in choosing appropriate screening tools and providing training in the use of those tools. In addition the SLP must provide comprehensive dysphagia and/or communication assessment that takes into account the impairment, the impact that impairment has on the patient's life, and any environmental modifications which may minimize the impact of that impairment. Assessments chosen must be culturally appropriate and provide quantitative as well as qualitative information. The SLP is responsible for developing appropriate management and rehabilitation programs based on the assessments undertaken as well as the goals identified by the patient and the multidisciplinary team and for monitoring the functional gains associated with those programs through careful reassessment.

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