

Treatment Efficacy Summary



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Stuttering

Stuttering is a communication disorder characterized by disruptions in the flow of speech or disfluencies. Disfluencies can be part and whole word repetitions, prolongations of sounds, or hesitations. The frequency, duration, type, and severity of disfluencies vary greatly from person to person and from situation to situation. Approximately 2% of adults stutter and 5% of children exhibit stuttering. People who stutter are often subjected to discrimination due to public misconceptions about the disorder. Employers believe that stuttering decreases employability and interferes with promotion opportunities. School children who stutter exhibit poorer educational and social adjustment than their normally fluent peers. The speech-language pathologist diagnoses and treats people who stutter.

Clinical evidence shows that individuals who stutter can benefit from treatment provided by speech-language pathologists at any time in their life span. Treatment can be scheduled on an intensive (several hours per day for several weeks) or extended (1–2 hours per week for several months or longer) basis. Techniques that appear to have the greatest efficacy for reducing the frequency of stuttering in adults and older children include those that change the *timing* of speech (e.g.,

slowing down, stretching out sounds) or reduce physical *tension* during speaking (e.g., gentle onsets of speech movement). Comprehensive treatment approaches focus on improving the speaker's attitudes toward communication and minimizing the negative impact of stuttering on the speaker's life. Many speakers report greater benefits from comprehensive approaches than from those that focus only on changes in speech fluency.ⁱ More than 100 studies on adults who stutter concluded that significant improvement typically occurs as a result of treatment in 60 to 80% of cases.ⁱⁱ Studies of school-age children reveal an average reduction in stuttering frequency of approximately 61%.ⁱⁱⁱ

According to data from ASHA's National Outcomes Measurement System (NOMS), 79% of adults who stutter showed gains of one or more levels on the Fluency Functional Communication Measure (FCM) following speech-language pathology intervention. FCMs are a series of seven-point rating scales ranging from least functional (Level 1) to most functional (Level 7) designed to measure improvement in a variety of clinical areas. Nearly one half of these individuals made multiple levels of FCM progress resulting in increased communicative competence.

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Cognitive-Communication Disorders Resulting From Traumatic Brain Injury

Communication requires a complex interplay between cognition, language, and speech across the lifespan. Cognitive processes range from basic to complex, including attention, memory, abstract reasoning, awareness, and executive functions (e.g. self-monitoring, planning, and solving problems). Broadly understood, communication involves listening, reading, writing, speaking, and gesturing at all levels of language.^{i, ii} Cognitive-communication disorders are the result of disruption of cognition. Adults and children who have experienced a traumatic brain injury (TBI) frequently exhibit cognitive-communication disorders.

Results from group and single-subject studies indicate that cognitive-communication disorders improve after intervention that is tailored to both the unique needs of the individual and contextual factors.ⁱⁱⁱ Recently published reviews of the efficacy literature provide evidence-based practice guidelines for speech-language clinicians.^{iv} Gains in cognitive-communication impairments, activities, and participation in society have been noted after speech and language intervention.^v Patients who receive rehabilitation have better than average cost

outcomes, according to outcome data provided by five well-established inpatient rehabilitation programs. Additionally, TBI patients receiving early intervention services were shown to be discharged at higher levels of cognitive functioning and had higher percentage of discharge to home versus long-term care facilities.

Data gathered from ASHA's National Outcomes Measurement System (NOMS) show that a large percentage of patients with TBI who received speech-language pathology services made significant gains on the Functional Communication Measures (FCMs) in 3 key areas of cognitive-communication skills—attention, memory, and pragmatics. FCMs are a series of seven-point rating scales ranging from least functional (Level 1) to most functional (Level 7) designed to measure improvement in a variety of clinical areas. Functional gains were demonstrated by 84% of the patients treated for memory, 85% of the patients treated for attention, and 87% of the patients treated for pragmatics. Moreover, in all three of these areas, the majority of patients achieved multiple levels of FCM progress.

Speech-language pathologists provide services to persons with TBI by:

- evaluating cognitive-communication disorders in various contexts
- determining the appropriate combination of intervention approach-

es (e.g., behavioral approaches, skill training, counseling, process-specific training, metacognitive approaches) while taking into account other individuals who provide support (e.g., family, employers, educators); and

- implementing the intervention plan in collaboration with other professionals

Early in recovery, intervention goals focus on providing sufficient environmental support and structure to facilitate re-emergence of communication. Later in recovery, intervention goals focus on generalizing cognitive-communication skills across activities in various contexts. Ultimately, the goal of cognitive-communication intervention is for the person to achieve the highest level of communicative participation in daily living.

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Pediatric Feeding and Swallowing Disorders

Difficulties in sucking, swallowing, and breathing can severely compromise nutrition and hydration status in infants who get their nutrition needs met via breast or bottle. Difficulty in swallowing in infants and children, as in older children and adults, can cause food or liquid to enter the airway resulting in some or all of the following: coughing, choking, pulmonary problems, or inadequate nutrition and/or hydration with lack of weight gain—which is like a weight loss in adults and older children. Clinical evidence has documented that children with swallowing and feeding problems benefit from the services of a speech-language pathologist, who may function as part of a team of professionals.

Feeding and swallowing disorders in infants and children are usually caused by multiple factors. They can result from congenital or acquired neurologic damage (e.g., encephalopathies), anatomic and structural problems (e.g., craniofacial anomalies, tracheoesophageal fistula), genetic conditions (chromosomal, syndromic, or inborn errors of metabolism), systemic illness (bronchopulmonary dysplasia, gastrointestinal dysmotility), and

psychosocial and behavioral issues. Incidence estimates for children with cerebral palsy (CP) range from 85–90% at some time in life. During the first year of life, 57% of all children with CP are estimated to have problems with sucking, 38% with swallowing, and 33% with malnutrition.ⁱ As the severity of CP increases, the severity of swallowing problems also increases.

A meta-analysis of randomized controlled trials in 19 studies revealed that the development of nonnutritive sucking is found to significantly decrease the length of hospital stay in preterm infants.ⁱⁱ Examples of oral sensorimotor treatment with children with CP point out that success typically occurs when “total child” focuses are implemented.^{iii, iv} Another example showed that intraoral appliance (ISMAR) therapy for one year resulted in significant improvements in jaw stability in some children who demonstrated better lip closure, chewing, and oral manipulation of food.^{v, vi} Functional feeding skills in children with moderate dysphagia improved with this type of therapy.^{vii} Efficacy studies indicate improvements in swallowing safety (reduced aspiration), improved nutrition, and efficiency as a result of both compensatory and direct treatment procedures in adults.

Speech-language pathologists have extensive knowledge and skills in analyzing, interpreting, and facilitating communication. These skills are critical when evaluating and making management plans related to feeding and swallowing, safety and efficacy.

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Laryngeal-Based Voice Disorders

A voice disorder is characterized by abnormal pitch, loudness, or vocal quality resulting from disordered laryngeal function and may cause pain or vocal fatigue. Voice disorders range from mild hoarseness to complete voice loss, and limit the effectiveness of oral communication. Voice disorders can be caused by an injury resulting in paralysis of a vocal fold, an improper breathing pattern, or misuse of the voice. Voice disorders can also be due to medical/physical conditions or neurological in nature. The individual with a voice disorder may experience stress, withdrawal, and depression because of an inability to produce normal voice. Voice disorders affect as much as 10% of the U.S. population, with higher frequency for those who depend on their voice for work, such as teachers.

Studies find voice treatment to be a significant factor in improving voice function and in reducing the recurrence of laryngeal pathology. Voice treatment can resolve a voice disorder when medical intervention (e.g., surgery) is not warranted and may reduce the need for laryngeal surgery or other medical intervention, when indicated, if initiated before any medical interventions.ⁱ Murray and Woodson found that the results of treatment for vocal nodules with or without surgery were comparable and suggested that voice treatment should be the first recommendation for treatment of vocal nodules.ⁱⁱ A study of teachers with voice disor-

ders found that a program of vocal hygiene and voice amplification reduced the severity of voice problems and improved voice quality.ⁱⁱⁱ

ASHA's National Outcomes Measurement System (NOMS) reveals that the majority of patients with voice disorders showed multiple levels of improvement on the Voice Functional Communication Measure, a 7-point rating scale. More treatment time was associated with better outcomes.

The speech-language pathologist and otolaryngologist evaluate a patient and recommend voice treatment. Voice treatment may eliminate the need for surgical or pharmacological treatment, and it is frequently recommended before and after laryngeal surgery to achieve optimal voice.

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Swallowing Disorders (Dysphagia) in Adults

Difficulty in swallowing can cause food to enter the airway, resulting in choking, pulmonary problems, inadequate nutrition and hydration, weight loss, and may even lead to death from causes like aspiration pneumonia. Swallowing difficulties are commonly found in over 6 million Americans. Causes include traumatic brain injury, stroke, central nervous system infection, head and neck cancer, and degenerative diseases in young and older adults.

Treatment outcome studies have provided evidence that compensatory strategies designed to have an immediate effect on the swallow (i.e., postural changes or diet manipulation) can improve swallowing safety and efficiency.ⁱ Postural techniques eliminated aspiration on thin liquids in 75 to 80% of dysphagic patients. Likewise, data are beginning to emerge that demonstrate the utility of pharyngeal muscle strengthening exercises for improving swallowing physiology.^{ii, iii} Treatment approaches improve nutritional status and hydration, and reduce morbidity from pneumonia. The speech-language pathologist's intervention in swallowing disorders helps contain medical costs by reducing the length of hospital stays, decreasing the need for nonoral feedings, reducing nutritional problems, and decreasing expenses associated with pneumonia and other pulmonary complications.

According to data collected from ASHA's National Outcomes Measurement System (NOMS), the majority of adults treated for dysphagia in home-based settings made significant functional gains. The data reveal that approximately 60% of adults who required an alternative method of feeding (e.g., nasogastric tube, PEG) at the outset of treatment progressed to a level at the end of treatment where their swallow was safe and they no longer needed an alternative method of feeding.

Speech-language pathologists assess and treat patients with dysphagia. Assessments may include clinical bedside and/or instrumental methods such as videofluoroscopy or fiberoptic endoscopy (FEES). Studies of these assessment tools have found them to be highly sensitive in diagnosing dysphagia and guiding appropriate clinical decisions and treatments.

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Aphasia Resulting From Left Hemisphere Stroke

Aphasia is a language disorder that occurs in individuals after brain damage. The most common cause of aphasia is stroke. It is estimated that over one million Americans have aphasia. Adults who were previously able to express their thoughts, wishes, and desires, and who understood communication through speech, sign language, reading, and writing, suddenly find themselves unable to or limited in their ability to participate in one of human's most important and unique undertakings, communication. Because aphasia is so little understood by other members of society, social isolation and despair often occur in its wake.

Both clinical evidence and research findings agree that individuals with aphasia benefit from the services of speech-language pathologists. The most comprehensive study to date, which followed more than 120 subjects, indicated that people who become aphasic and receive 8–10 hours of treatment each week for 12 weeks make significantly greater improvement than individuals with aphasia who are not treated.ⁱ

According to data collected from ASHA's National Outcomes Measurement System (NOMS), approximately 80% of stroke patients with concomitant receptive and expressive language disorders achieved one or more levels of progress on the Functional Communication Measures (FCMs). FCMs are a series of seven-point rating scales ranging from least functional (Level 1) to most functional

(Level 7) designed to measure improvement in a variety of clinical areas. For example, Level 1 on the Spoken Language Expression FCM indicates that a patient attempts to speak but does not make any meaningful verbalizations. At Level 4, the patient is able to produce simple sentences and initiate communication in structured conversations. At Level 7, the patient participates successfully and independently in vocational and social activities, and is not limited by his/her spoken language skills. Those patients that demonstrated functional gains of more than one level on the FCMs received roughly twice the amount of treatment of those who did not exhibit progress on these scales.

Improvements have been documented in terms of both the quality and quantity of the language used by those receiving treatment.ⁱⁱ Clinicians and researchers now understand that positive changes can also occur long after the stroke that produced aphasia, dispelling the notion that language rehabilitation undertaken very soon after stroke made the biggest difference. Speech-language pathologists assess aphasic communication impairments and then develop a treatment program to assist with the goal of helping individuals with aphasia to regain as much of their communication skills as possible, and develop strategies to compensate for deficient skills that remain. They also counsel and assist families and other caregivers about the individual's aphasia and provide them with the skills necessary to promote language gains.

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Dysarthria

(Neurological Motor Speech Impairment)

Dysarthria is a neurological motor speech impairment characterized by slow, weak, uncoordinated movements of the speech musculature. It results in reduced speech intelligibility and reduced ability to function in communication situations, which can lead to social isolation and depression. Dysarthria can be congenital (e.g., cerebral palsy) or acquired (e.g., Parkinson's disease, brain injury, stroke).

Effectiveness of speech treatment for individuals with dysarthria has been documented via group treatment studies, single-subject studies, and case reports. Study outcomes measure improvements in muscle strength and control, reduction in consonant imprecision, and improved speech intelligibility. Frequently, intervention focuses on specific components of the speech production process. For example, recent reviews suggest that problems with the function of the soft palate can be treated effectively in individuals with traumatic brain injury and stroke.ⁱ Effective treatments for individuals with problems in respiration or producing an adequate voice have also been reported.ⁱⁱ Effectiveness of speech treatment for individuals with Parkinson's disease has recently been most encouraging for intensive treatments focusing on phonation, or the production of vocal sounds.ⁱⁱⁱ A

variety of augmentative/alternative communication systems provide a functional means of communication for individuals whose natural speech is not understandable.

Information collected from ASHA's National Outcomes Measurement System (NOMS) reveals that outpatient speech-language pathology services are associated with improved intelligibility and communication functioning of patients. The data show that approximately two thirds of adults with diseases of the central nervous system (e.g., Parkinson's, multiple sclerosis) who were unintelligible at the outset of treatment progressed to a level of increased communicative independence and were intelligible to all listeners following speech-language pathology intervention.

The role of the speech-language pathologist is to diagnose the severity of the problem and develop and implement a treatment plan to improve speech. The speech-language pathologist will also coordinate selection and use (via training) of assistive technology. Staging of intervention is also crucial, particularly for degenerative diseases such as amyotrophic lateral sclerosis, because such diseases frequently progress through a series of stages from mild speech impairment to loss of vocal ability.

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Phonological Disorders in Children

A phonological disorder is a deficit in the production of speech sounds. It may reflect an inability to articulate speech sounds correctly or to understand differences among speech sounds. Phonological disorders in children can result from physical or organic causes or may be functional in nature. Phonological disorders are among the most prevalent communication disabilities diagnosed in preschool and school-aged children, affecting 10% of this population. Children with phonological disorders are also at risk for reading and writing disabilities. If left unresolved, phonological disorders have long-term consequences that may interfere with an individual's future social, academic, and vocational well-being, largely resulting from persistent, reduced intelligibility of speech.

Clinical evidence has shown that children with phonological disorders benefit from treatment provided by speech-language pathologists. The benefits of effective phonological treatments have been widely documented in clinical and experimental studies dating from the 1960s.ⁱ According to data collected from ASHA's National Outcomes Measurement System (NOMS), 70% of preschool-aged children who received phonological treatment exhibited improved intelligibility and communication functioning.ⁱⁱ Moreover, approximately one half of the children who were unintelligible to familiar and/or unfamiliar people at the beginning of treatment progressed to a level where they

were understandable to all listeners. The amount of treatment had a significant impact on outcome. The preschoolers who achieved intelligible speech received roughly twice as much treatment as those children who remained unintelligible.

The speech-language pathologist assesses the phonological disorder and develops a treatment plan to correct speech sound production. The goal of treatment is to improve accuracy and use of speech sounds to achieve maximum intelligibility in both single words and connected speech, as well as across all settings in which children communicate. There are a number of acceptable treatment approaches. A single treatment approach is not endorsed over others. Each clinically accepted method has been shown to result in improved accuracy and use of speech sounds.

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Hearing Loss in Children

The early detection of infants and children with hearing loss is an important public health objective in the United States.ⁱ Hearing loss is one of the most common major abnormalities present at birth affecting approximately 4 infants per 1,000 births. If undetected, hearing loss will negatively impact cognitive development, communication competency, optimal child development, literacy, and subsequently academic achievement. Additionally, the prevalence of hearing loss in school age children is between 11% and 15%.^{ii, iii}

Hearing loss can be congenital (present at birth) or acquired. As such, universal detection requires screening in hospital nurseries, birthing centers, medical and audiology facilities, early childhood education/intervention programs, and schools. Additionally, there should be ongoing surveillance of children at risk for hearing loss. Infants and children who do not pass their initial hearing screen and any re-screening should begin appropriate audiological evaluations to confirm the presence of hearing loss. Regardless of prior hearing screening outcomes, infants and children who demonstrate risk indicators for delayed onset or progressive hearing loss should receive ongoing audiological monitoring. Moreover, those children who may not be acquiring developmental communication, cognitive, social-emotional, and/or

academic milestones also need immediate evaluation.

For infants, early detection of hearing loss and enrollment in intervention services within the child's first year of life is an evolving standard of care that reduces the consequences of hearing loss. Evidence demonstrates that early intervention programs are effective in reducing the extent of delay a child experiences and in easing familial stress reactions. Moreover, as a result of early intervention by audiologists and speech-language pathologists, many children have demonstrated the ability to overcome the effects of hearing loss on language and literacy development and compete successfully in school with their hearing peers.^{iv}

As experts in identification, evaluation, and auditory habilitation/rehabilitation of infants and children who are hard of hearing and deaf, audiologists are involved in the hearing screening, follow-up evaluation, and early intervention components. For the early intervention component, audiologists provide timely fitting and monitoring of amplification (hearing aids and hearing assistive listening technology) systems or the selection and monitoring of tactile aids or cochlear implants. In addition, audiologists provide direct audiological habilitation/rehabilitation services. Long-term monitoring also includes continual validation of communication, social-emotional,

cognitive, and academic development to assure that progress is commensurate with the child's abilities.

Cognitive, social, and emotional developments depend on the acquisition of language. A complete language evaluation should be performed by a speech-language pathologist for infants and children with hearing loss. In addition, the speech-language pathologist is involved with all aspects of communication including oral and/or sign language development, speech production, voice characteristics, lipreading, and aural habilitation/rehabilitation.

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Hearing Loss and Hearing Aids in Adults

Hearing loss is measured as a difference from the normal ability to detect sound relative to established standards. Hearing loss interferes with communication efficiency and hinders interpersonal communication, the most basic of all human attributes. Difficulty in understanding conversation affects employment performance, familial and peer relationships, and interactions with health care professionals. Overall, 18% of the adult population in the United States experiences some hearing difficulty. One third of adults ages 70 and older have hearing loss. Individuals with hearing impairment benefit from the services of audiologists and the use of hearing aids as documented by clinical evidence. Additionally, audiologic rehabilitation promotes successful hearing aid use and improves communication and psychosocial functioning of individuals with hearing impairment.

Hearing aids have proven effective in alleviating the communicative and psychosocial consequences of hearing loss in adults with mild, moderate, and moderately-severe sensorineural hearing loss. A recent study conducted on 194 older adults with mild to moderately-severe sensorineural hearing loss found that beneficial treatment effects from hearing aids emerge as early as six

weeks after initiation of treatment. They are most pronounced in the areas of social, emotional, and communicative function, and remain one year after sustained hearing aid use.ⁱ The study concluded that hearing aids represent a relatively inexpensive intervention for the amount of benefit gained.ⁱⁱ According to a study released by the National Council on the Aging (NCOA), hearing aid users reported benefits in many areas of their lives including relations at home, mental health, sense of safety, and self-confidence.ⁱⁱⁱ A large-scale study conducted by the National Institute on Deafness and Other Communication Disorders (NIDCD) and the Department of Veterans Affairs (VA) provided strong scientific evidence that hearing aids provide benefit to adults with hearing loss in quiet and noisy listening situations.^{iv, v, vi}

The role of the audiologist in managing people with hearing impairment includes an evaluation and rehabilitation of the hearing loss and its negative effects. Evaluation entails identifying, assessing, and quantifying the degree of auditory dysfunction and obtaining the client's appraisal of the communication difficulties and associated adjustment. The rehabilitative component includes delivery of services and technology (e.g., hearing aid or assistive listening device) that enables functional communication, evaluation of client progress, and

assessment of treatment outcome. Intervention is considered successful when the communication and adjustment difficulties are alleviated for the short and long term.

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Hearing Aids for Infants and Children

Permanent hearing loss in childhood interferes with the normal development of speech perception and production, language, literacy skills, and social-emotional development. Hearing aids that amplify speech clearly and comfortably provide a highly effective form of intervention, along with family counseling and communication therapy.

Four infants per 1,000 are born with hearing loss, while up to 12% of all newborns are at risk for hearing loss. At risk indicators include such factors as family history of hearing loss, low birth weight, use of ototoxic medications, and craniofacial anomalies. The identification of hearing loss and intervention in early infancy is known to significantly reduce its impact on speech and language production and educational achievement.ⁱ Hearing aid amplification is a critical element of this intervention and it has helped many children to overcome the effects of hearing loss on speech, language, and literacy and achieve at performance levels commensurate with their normally hearing peers. Children whose hearing loss is identified by 3 months and who start intervention by 6 months have the same language abilities as their peers by the time they enter kindergarten.

The timely and accurate fitting of hearing aids to infants and children is one of the most important responsibilities of the audiologist. The audiologist selects, fits, and evaluates all forms of amplification devices for infants and children including personal hearing aids, FM systems,

and other assistive listening devices. Audiologists have the knowledge and experience required for the hearing assessment and auditory management of infants and children with hearing loss and the full array of sophisticated instrumentation necessary for use with contemporary pediatric hearing assessment procedures and hearing aid selection and evaluation methods. Best practice guidelines for pediatric hearing aid fitting are well established within the profession.ⁱⁱ The speech-language pathologist is involved with aspects of communication including receptive and expressive language, speech production, voice characteristics, lipreading, and listening skills.

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Cognitive-Communication Disorders

Resulting From Right Hemisphere Brain Damage

Damage to the right hemisphere of the brain (RHD), often due to stroke, can result in a variety of deficits in cognition and communication. Cognitive deficits may affect attention (including visuospatial neglect), memory, problem solving, reasoning, organizing, planning, and awareness of deficits. These deficits impact communication by decreasing the efficiency and effectiveness of comprehension, expression, and pragmatics (a person's use and interpretation of verbal and nonverbal language in social interaction). Specific language deficits often affect non-literal language, alternative meanings, and other subtleties of language. Conversation may focus on insignificant details and speech may be rambling. Speech-language problems associated with RHD are sufficient to interfere with the communication needed for daily living.

Clinical research studies demonstrate that individuals with right hemisphere brain damage benefit from treatment services provided by speech-language pathologists. One outcomes study evaluated the benefits of an interdisciplinary program that focused on physical, emotional, vocational, speech, and language function along with family education and support.ⁱ Although improvement was not seen in all deficit areas, results suggested that the

participants developed greater independence in daily living and returned to modified work programs. Treatments for visuospatial neglect have been shown to be effective primarily when they are intensive, encourage active scanning or internal cueing (as opposed to clinician-driven cues, such as "look to the left"), or involve left limb movement combined with scanning tasks.ⁱⁱ

The role of the speech-language pathologist is to assess patients with RHD to identify the specific deficits that are present along with preserved abilities and areas of relative strength in order to maximize functional independence and safety. The treatment plan should be based on each individual's goals and needs to address the deficits that diminish that person's ability to communicate efficiently and effectively. It should build upon and exploit strengths. Treatment implementation should be accompanied by data collection to assess the effectiveness of the treatments. Another important element in the treatment of adults with RHD is counseling family members and caregivers about a patient's abilities and deficits, especially since these cognitive-communicative deficits are often unfamiliar to the general population. Speech-language pathologists also serve as case managers to coordinate and ensure appropriate and timely delivery of a management plan.

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Treatment Efficacy Summary



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Child Language Disorders

Language disorders in children are characterized by deficiencies in the comprehension (understanding) and/or production (use) of spoken and written language. Deficiencies in language can have a profound impact on a child's academic, social, and emotional development.ⁱ Seven percent of preschool and school-age children exhibit significant limitations in language ability.ⁱⁱ Language disorders in children can result from congenital syndromes (e.g., Down Syndrome or fragile X syndrome), diseases (e.g., cytomegalovirus or meningitis), toxins (e.g., fetal alcohol syndrome), reduction of sensory input (e.g., hearing loss), or head injury. Often, a specific etiology for the language disorder cannot be determined.

Clinical evidence has documented that children with language disorders benefit from treatment provided by speech-language pathologists. More than 200 studies report the effectiveness of language intervention for an overwhelming majority of participants.ⁱⁱⁱ In addition, studies have demonstrated the advantage of beginning intervention as early as possible.^{iv} Language treatment has been shown to improve functional communication skills, thereby enhancing the quality of life, social, academic, and vocational opportunities of the child.

According to data from ASHA's National Outcomes Measurement System (NOMS), approximately 70% of preschoolers with language disorders showed gains of one or more levels on the Spoken Language Production and/or Spoken Language Comprehension Functional Communication Measure (FCM) following speech-language pathology intervention. FCMs are a series of seven-point rating scales ranging from least functional (Level 1) to most functional (Level 7) designed to measure improvement in a variety of clinical areas. For example, Level 1 on the Spoken Language Expression FCM indicates that a patient attempts to speak but does not make any meaningful verbalizations. At Level 4, the patient is able to produce simple sentences and initiate communication in structured conversations. At Level 7, the patient can participate successfully and independently in vocational and social activities, and is not limited by his/her spoken language skills. NOMS data reveal that children who made one level of gain on either of these FCMs received about twice as much treatment as those children who did not show similar functional improvements.

The role of the speech-language pathologist is to assess and treat spoken and written language skills. The objective of language treatment is to increase the frequency and quality of language to age-appropri-

ate levels. Speech-language pathologists play a critical and direct role in helping children with language disorders learn to speak, listen, read, and write.^v Treatment may also include the use of augmentative/alternative communication systems.

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Autistic Spectrum Disorders

Autism is a complex neurobiological disorder that impairs an individual's ability to process and integrate ordinary information. It is characterized by speech, language, and communication impairments. Autism and autism spectrum disorders (ASD)—including Asperger disorder, pervasive developmental disorder, Rett disorder, and childhood disintegrative disorder—affect an individual's social interaction, verbal and non-verbal communication, and cognitive abilities. The incidence rate is approximately 1 out of every 250 births (National Institutes of Health, 2001).

Autism is treatable, with speech-language pathology services used to improve communication. Clinical evidence indicates that children and adults with ASD benefit from assessment and intervention services provided by speech-language pathologists. Effective interventions for children with ASD are characterized by early intervention, intensive instruction, and individualized objectives.ⁱ Empirical studies evaluating speech and language intervention procedures have documented the effectiveness of behavioral and naturalistic teaching strategies to target specific language outcomes, replace challenging behavior, and promote social interactions.ⁱⁱ Comprehensive programs for individuals with ASD draw on the expertise of speech-language pathologists to prioritize intervention objectives and coordinate planning for communicative success.

According to data from ASHA's National Outcomes Measurement System (NOMS), two thirds of preschoolers with ASD showed gains of one or more levels on the Spoken Language Production Functional Communication Measure (FCM) following speech-language pathology intervention. FCMs are a series of seven-point rating scales ranging from least functional (Level 1) to most functional (Level 7) designed to measure improvement in a variety of clinical areas. Similar gains were also seen in two other frequently treated areas—spoken language comprehension and pragmatics with 72% and 63% of children achieving one or more levels of progress respectively. Furthermore, NOMS data reveal that children who made functional gains in these areas received approximately 2–5 times more intervention (depending on the disorder being treated) than children who did not.

Speech-language pathologists assist in the assessment and management of clients with ASD via a number of avenues. They serve on interdisciplinary teams to conduct evaluations. They work with individuals with ASD to treat specific speech and language deficits, notably impairments in motor speech, semantics, and pragmatics (a person's use and interpretation of verbal and nonverbal language in social interactions). For non-speaking individuals, speech-language pathologists design augmentative and alternative communication systems.

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Audiologic (Re)habilitation For Children With Cochlear Implants

The goal of technology for children with hearing loss is to enable them to access sufficient auditory information to learn speech and language through the auditory channel.

Children with severe and profound hearing loss use a variety of sensory aids to access sound. Hearing aids may provide sufficient auditory access for children with mild to fairly severe hearing loss, but children with severe and profound hearing loss may not receive sufficient auditory information when using hearing aids alone. Cochlear implants are able to provide significantly more auditory access to children with severe and profound hearing loss than is available to them through hearing aids.

Although cochlear implants provide significantly more auditory access than is available through hearing aids and FM systems, they do not provide normal hearing. Cochlear implant users must learn a new way of processing sound and maximizing the effectiveness of the device. In addition, even if children receive implants by 12 months of age, as per current FDA guidelines, they will have had a significant period of time prior to implantation during which they will not have had sufficient auditory access, even if they used hearing aids. As a result, they will be delayed in use of audition and in speech and language. Therefore, all children with cochlear implants are

in need of intensive audiologic (re)habilitation services.

Audiologic (re)habilitation may encourage the use of audition alone (auditory-verbal) or combine audition with visual cues (auditory-oral). Therapy should begin as soon as hearing loss is identified and the child is fit with amplification, ideally prior to six months of age.ⁱ Therapy initially focuses on teaching the child to attend to sound, alerting when sound is present, then moves through discrimination of suprasegmental aspects of speech, through discriminating speech sounds, and moving into using audition to learn language.^{ii, iii}

Both audiologists and speech-language pathologists are uniquely qualified to provide audiologic (re)habilitation services to children with hearing loss. Therapy may be provided in a clinic, school, or private practice setting. In addition to working with the child, the therapist works with families to teach them how to provide auditory, speech and language stimulation to their children so that children will have exposure to auditory learning throughout the day.

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Audiologic Rehabilitation for Adults

Hearing impairment, among the most common causes of chronic disability in the United States, can result from congenital or hereditary factors, age, disease, trauma, and ototoxicity. Hearing impairment affects the communication performance, psychosocial functioning, and general well-being of millions of people and impacts family members, friends, co-workers, and employers. According to a report released from the National Council on the Aging (NCOA), adults with untreated hearing loss were more likely to report depression and anxiety and were less likely to participate in organized social activities, compared to those who wear hearing aids.

For the vast majority of individuals, hearing aids are the most commonly recommended intervention. Among those who purchase hearing aids, however, at least one in five discontinues use, and even those who routinely wear their hearing aids demonstrate considerable evidence of residual disability or handicap.ⁱ Clinical evidence demonstrates that audiologic rehabilitation services enhance acceptance of and benefit from hearing aids/amplification devices and promote the resolution of residual communication and adjustment difficulties.

The efficacy of audiologic rehabilitation services including individual, family, and group counseling; speechreading, tactile, and auditory

training procedures; communication strategies development; and adaptive training with amplification and other assistive technologies has been documented in numerous studies. Audiologic rehabilitation promotes successful hearing aid use and improves the communication and psychosocial functioning of individuals with hearing impairment.^{ii, iii} Moreover, the cost-utility of providing audiologic rehabilitation services in conjunction with hearing aid fittings has been demonstrated.^{iv}

Audiologists administer rehabilitative assessments prior to intervention to document rehabilitative needs and identify appropriate intervention procedures. Audiologists provide educational, behavioral, technological, and counseling intervention procedures to address specific intervention needs and facilitate benefit. By providing ongoing client-clinician interaction, audiologists promote adherence to treatment recommendations. Additionally, audiologists monitor and evaluate progress to ensure treatment benefit, successful outcomes, and professional accountability.

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