BREATHEWORKS

Integrated oromyofacial care for your practice

Adding value in diagnosis and recovery

BREATHEWORKS

We are a team of cross-trained and highly collaborative speech-language pathologists.

We are expert at addressing problems related to

- feeding and swallowing
- sleep-disordered breathing
- gut regulation, impeded airway
- TMJ dysfunction
- craniofacial pain and tension
- oral hygiene
- relapsed orthodontia
- focus and attention
- anxiety
- chronic congestion
- voice
- speech

We are active in the academic medical communities, where we educate and advocate for whole-body integrative health.

BREATHEWORKS

We're your partners in care

We are trained to assess and recognize how improper use of head and throat anatomy can complicate, or even cause, a wide range of syndromes and disorders. Our therapeutic model is non-invasive, interdisciplinary, and individualized, to address the root causes of dysfunction and optimize treatment outcomes. We work with dentists, orthodontists, primary care providers, and others, on how to assess and identify early signs of dysfunction and design ongoing care solutions. Our goal is to avoid or minimize medical intervention when possible and focus on quality of life and the continuing course of treatment.

Where we can help

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1

Dentistry and Orthodontic Care

There is an association between speech[1] and swallowing[2] disorders in routine and interventional **prosthesis and orthodonty**. Aligners can have an impact on the articulation of some phonemes, particularly fricative alveolar consonants.[3] Non-functional oral health and oral sensorimotor alterations go together too, and are associated with a high prevalence of oropharyngeal dysphagia.[4] The dentist and the speech-language pathologist can be a critical team in prevention, early identification, and management of this.[5]

Much is known about the myofunctional dynamics that cause problems in general dentition. One involves differential force[6] from **tongue-thrusting**, particularly on the maxillary right central incisor, a process that differs during swallowing.[7]

A complicating factor in children is **pacifier-sucking**, which can affect maxillary and mandibular intercanine widths, as well as breathing and speech functions.[8] Because it interferes with proper tongue position, the duration and frequency of non-nutritive sucking associates very clearly with occlusal and oral myofunctional alterations,[9] notably in anterior open bite,[10] and possibly posterior crossbite.[11]

Mouth breathing is another common deleterious oral habit in children. It often results from an upper airway obstruction, or adenoid or tonsil hypertrophy. Uncorrected, there can arise abnormal dental and maxillofacial development, and an increased risk of caries and periodontal disease.[12] Mouth breathers show narrower hard palate at the level of second premolars and first molars, and deeper palate at the level of second premolars and canines.[13]

In **malocclusions** the diagnostic and rehabilitation roles of speech-language therapists are vital.[14] There is a link between specific types of malocclusion and OMD and AD,[15] and an association with speech defects.[16] The effect of malocclusion on dyslalia seems to increase proportionally with the severity of the malocclusion.[17] Malocclusions in general cause imbalances in stomatognathic function.[18] Study data show a causal relationship between Class III malocclusions and articulation errors and spectral distortions in consonants.[19] Severity of skeletal AOB is correlated with degree of distortion for consonant sounds.[20]

All of these can lead to **articulation disorders**.[21] People can adapt their speech to compensate for abnormal tooth position,[22] even across populations.[23] And sometimes the problem is subtler than that, even if it is bound up in apparent primary problems of dentition. People who stutter actually have sensory-motor and tactile-proprioceptive deficits that impede coordination of the mandible, lips, and tongue.[24]

The association between **TMD** and speech disorders is unclear. Occlusal alterations may influence distortions and frontal lisp in phonemes /s/ and /z/ and inadequate tongue position in phonemes /t/; /d/; /n/; /l/.[25] The same is true with abnormal deglutition. Nevertheless, orofacial myofunctional alterations could be considered influencing factors on TMD.[26] Patients with chronic TMD do show poor tongue strength and masticatory and swallowing functions.[27] It has been suggested that in patients with TMD and clinically-diagnosed clenching-type bruxism, TMD diagnoses may be influenced features of slide RCP-MI, laterotrusive interference, and molar asymmetry.[28] Changes in chewing, of interest to speech-language pathologists, has been observed in TMD as well, pointing out the importance of interdisciplinary evaluation when establishing a treatment plan.[29] Finally, there is a clear association between TMD severity, voice-related and oral health-related quality of life.[30]

Speech-language pathologists are natural partners in **surgical cleft repair**, too, where evaluation encompasses cephalometric analysis, dentoalveolar morphology, dentofacial aesthetics, and speech, concerning articulation and nasality.[31] Long-term, longitudinal speech outcome after surgery, in patients undergoing two-stage primary palatal protocol with early veloplasty and delayed hard palate closure has been evaluated. Results were favorable even before hard palate repair. The typical retracted oral articulation was quite frequent during the early ages, and non-oral misarticulations were almost nonexistent, which implies good velopharyngeal competence.[32] Definite speech improvement occurs in all parameters following late primary palate repair, but residual speech problems do persist in most patients, requiring further evaluation and appropriate treatment.[33]

'The dentist and the speech-language pathologist can be a critical team in prevention, early identification, and management.'

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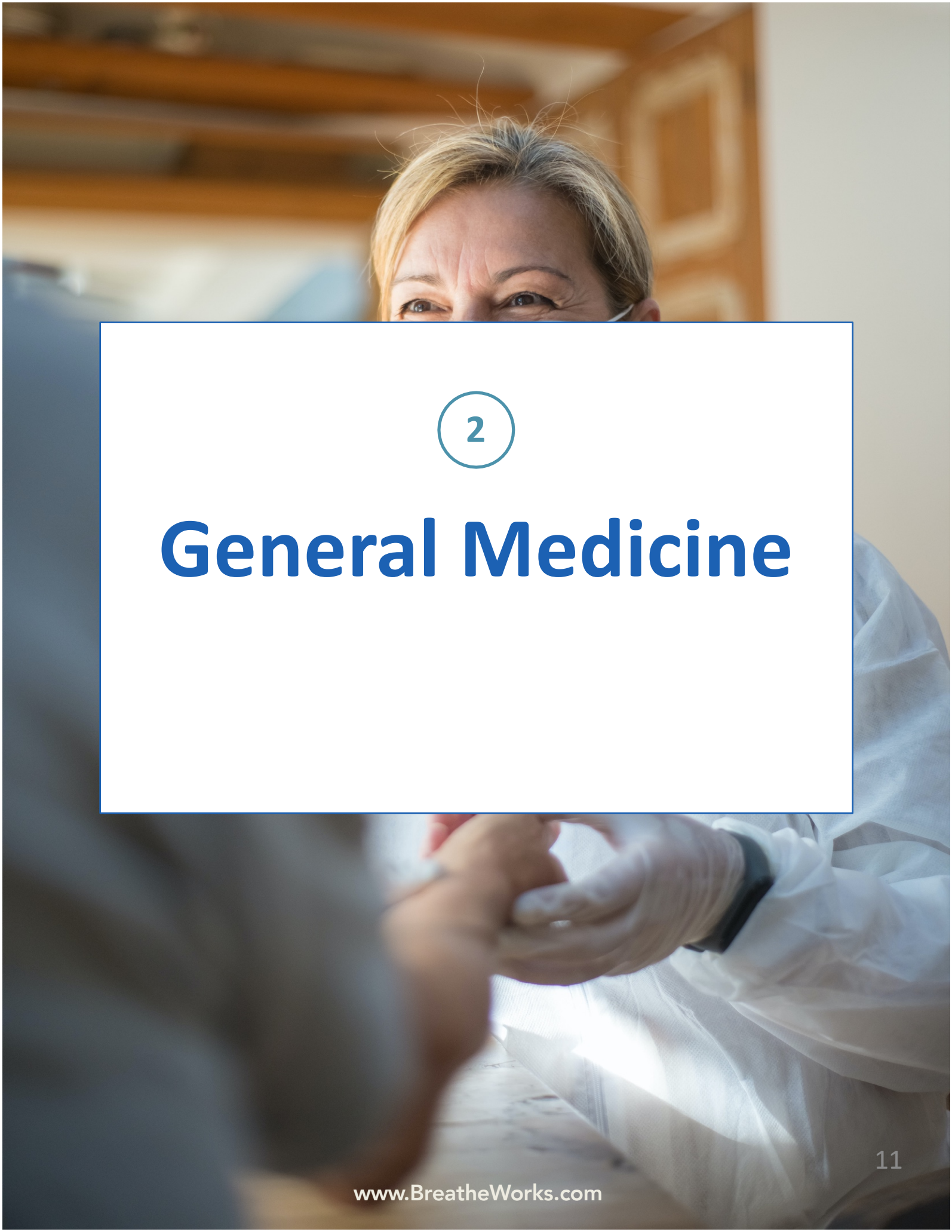

2

General Medicine

Patients like speech-language pathologists on hand in their primary care. Reliable poll data has shown that, where relevant, user satisfaction associates directly with the number of SLP's available in family health strategy planning.[1]

Speech disorders top the list in professional partnership. These are the patients, children and adults, who reproduce sounds poorly, for any number of reasons. Sometimes it's voice (and related cognitive) issues having to do with hyperkinetic disorders. SLP's play an important role in contributing to the differential diagnosis and management of impaired speech and even deglutition associated with these.[2] In **aphasia**, secondary to stroke, speech language therapy can elicit significant improvement,[3] and in primary progressive aphasia, in which the patient develops language deficits while other cognitive domains remain relatively preserved, the same is true.[4] In **stuttering**, common in persons of all ages, of varying etiology, and for which exact diagnosis and treatment is critical, the mainstay of intervention is speech analysis and therapy.[5]

Oropharyngeal dysphagia is another common, and frequently underreported, opportunity for team care. It can manifest as difficulty initiating swallowing, coughing, choking, or aspiration, and it is most often caused by chronic neurological conditions such as stroke, Parkinson's disease, or dementia, and it can arise from other causes as well. It is a well described geriatric syndrome, affecting 10% to 33% of older adults.[6] Speech-language pathologists and other specialists, in collaboration with family physicians, can provide structured assessments and make appropriate recommendations for safe swallowing, palliative care, or rehabilitation.[7] Even resistant hypertensive patients with **obstructive sleep apnea** (itself the cause of numerous syndromes of concern to speech-language pathologists), show improved swallowing performance after swallowing therapy.[8]

Speech-language pathologists are playing a crucial role in the assessment and management of **chronic cough**, too. This is true for patients infected with severe acute respiratory syndrome coronavirus,[9] and for patients with refractory cough for other reasons. They frequently warrant referral to a pulmonologist, an otolaryngologist, or, particularly where reflux issues are suspected, to a speech therapist.[10] Trials have now shown that speech therapy has resulted in decreases in cough severity and improvement of quality of life.[11, 12]

'Data has shown that … [patient] satisfaction associates directly with the number of SLP's available in family health strategy planning.'

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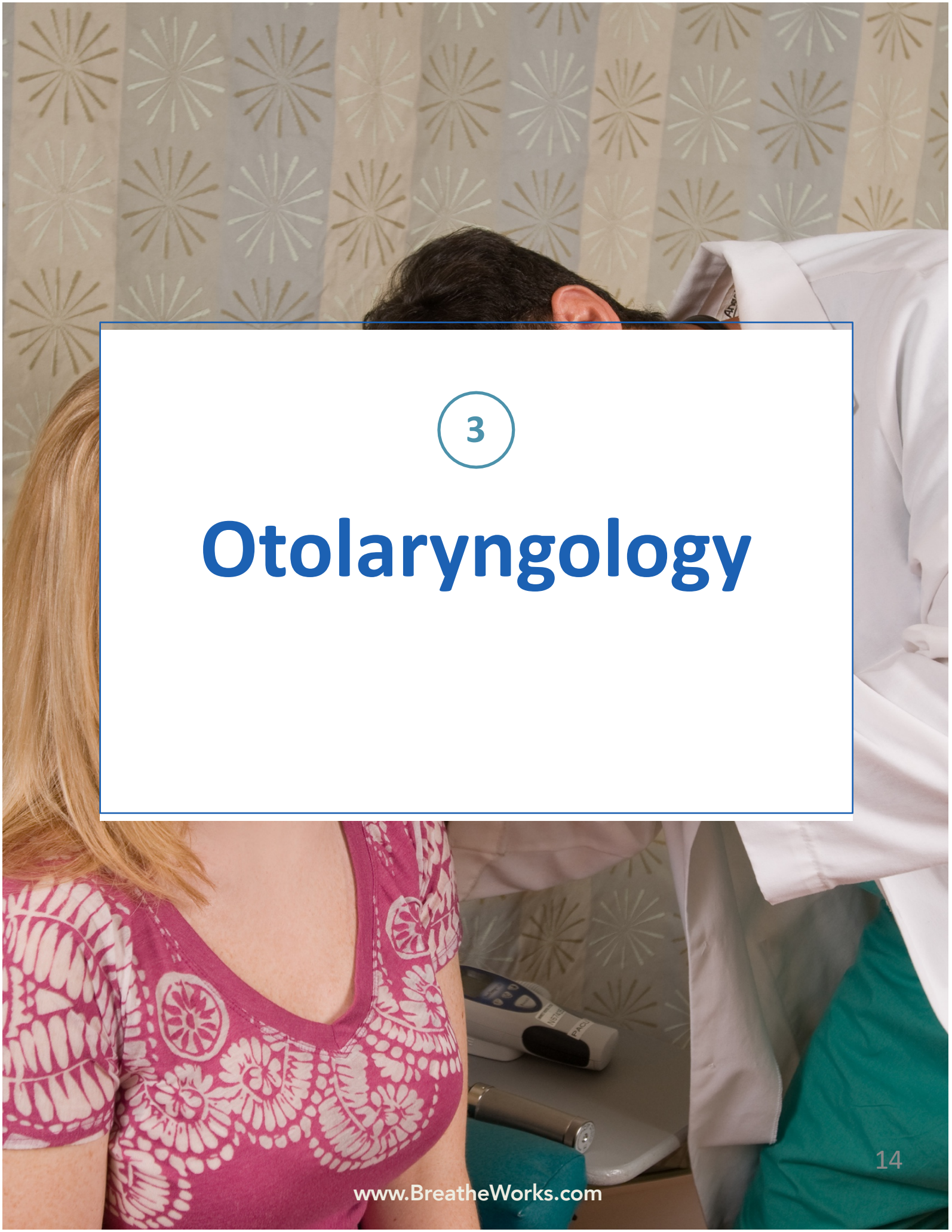

3

Otolaryngology

The development of communication and listening is easily disrupted because of ENT disease or abnormality. The child's relationship with both the ENT specialist and the speech-language pathologist is critical, and may need to span several years, because communication difficulties may persist after any apparent physical problems resolve. Jointly-considered timing for surgical and speech intervention keeps services well-targeted and cost-effective.[1]

Clinical management of **hearing impairment** typically involves a combination of hearing aids, cochlear or brainstem implants, signal-to-noise improvement in educational settings, and speech therapy.[2] For children with cochlear implant, auditory habilitation intervention is associated with markedly improved outcomes.[3] For adults as well, person-centered management of postlingually deafened individuals with cochlear implants can be augmented by a more complete approach utilizing the skill set of a speech-language pathologist.[4]

Children with **dysphonia** are best handled by a team of specialists in pediatric otolaryngology and speech-language pathology with expertise in voice and resonance disorders. Voice teams use a variety of assessment tools, including perceptual, parent- and patient-based, instrumental, and imaging measures.[5] Because behavioral evaluation and treatment of dysphonia is the interdisciplinary responsibility of the speech-language pathologist as well.[6]

In **ankyloglossia** and **velopharyngeal dysfunction**, if amenable to surgical intervention, it is important for experienced speech language pathologists to be involved, principally to diagnose the related speech disorder, and to optimize speech outcomes.[7]

The literature supports behavioral treatment provided by a speech-language pathologist in treating idiopathic conditions like **exercise-induced laryngeal obstruction**, with paced exercise, and use of breathing techniques to optimize laryngeal aperture,[8] and **globus sensation**, a condition accounting for about 4% of new referrals to ENT clinics,[9] and poor **glottal gap closure**, for which meta-analysis supports the clear efficacy of voice therapy intervention.[10] Another vexing condition is objective **chronic cough**, that persists despite comprehensive medical management. For these particular patients, there is a range of evaluation and interventional therapy speech-language pathologists as well.[11]

Oromyofunctional speech-language pathologist are vital to patients' recovery and rehabilitation following surgery, such as for **adenotonsillectomy**,[12] treatment for **vocal nodules**,[13] **cleft palate repair** (particularly with regard to monitoring

for **obstructive sleep apnea**), and of course **cancer** of the head and neck.[14] Dysphagia is a significant complication of cancer treatment in particular, due to neuromuscular and sensory damage to the swallowing mechanism.[15] Post-treatment dysphonia and dysphagia are also common, and diverse in presentation. With the help of voice and swallowing therapy, many patients return to functional communication and oral feeding.[16,17]

'Jointly-considered timing for surgical and speech intervention keeps services well-targeted and cost-effective.'

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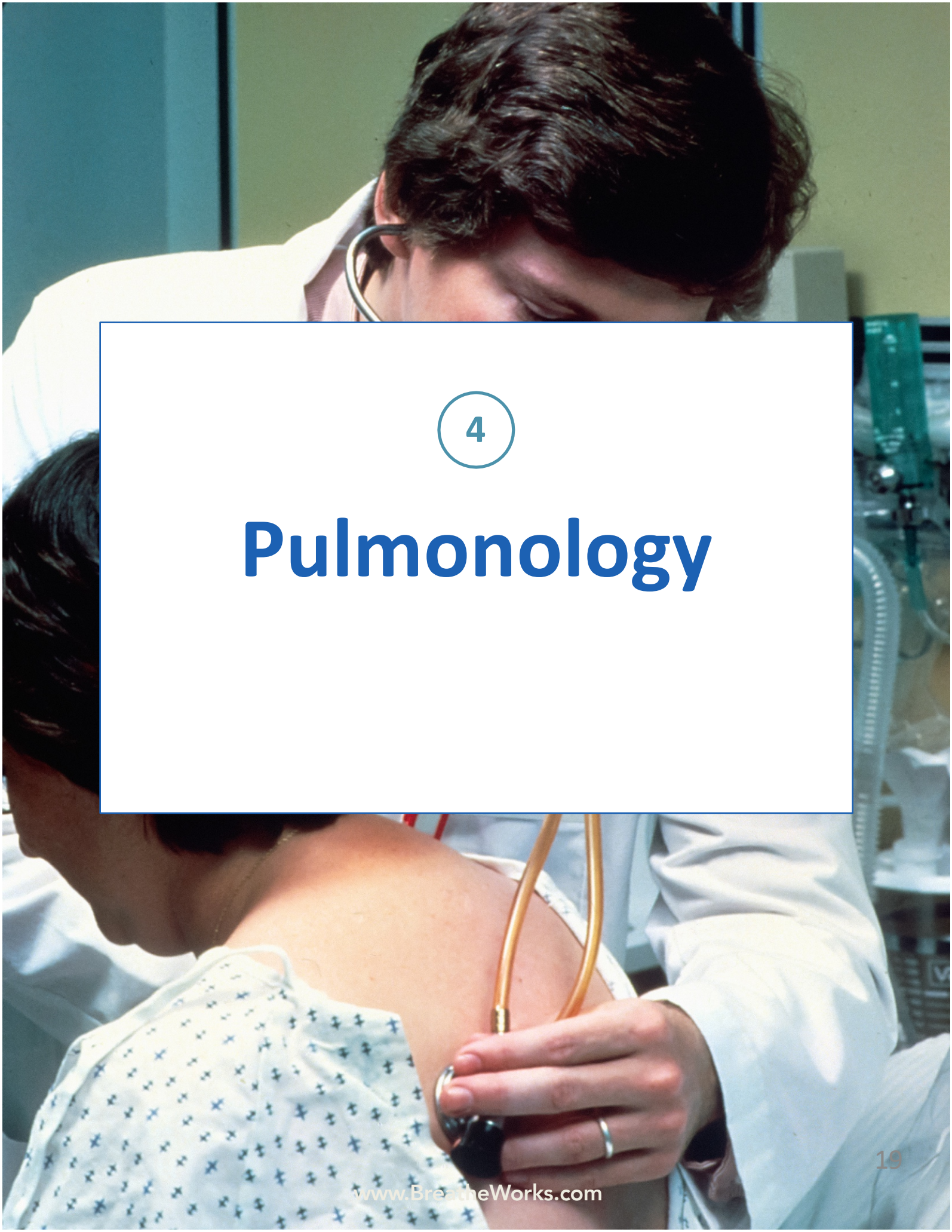

4

Pulmonology

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Tracheostomy and ventilator patients present a particular challenge to health-care providers. The interaction of pulmonary physiology and deglutition is problematic, particularly in the weaning process. Speech-language pathologists work closely with their physician colleagues to understand the influence of the many possible medical co-morbidities, notably dysphagia.[1] For critically ill patients with **acute respiratory failure** as well, timely initiation of physical, occupational, and speech therapy is crucial to reduce morbidity and improve outcomes.

In **Vocal cord dysfunction**, whose etiology can be any combination of post-nasal drip, gastro-oesophageal reflux, laryngopharyngeal reflux or psychological conditions, speech therapy is one of the cornerstones of management.[2,3] This is true as well in structural syndromes like **laryngomalacia** or **glossoptosis**, in which dysphagia is prevalent, that can sometimes respond to speech and language therapy interventions.[4] Myofunctional therapy is also a reasonable therapeutic option in **obstructive sleep apnea-hypopnea syndrome** (OSAHS). This therapy is regular exercising of the upper airway muscles to increase their tone and prevent their collapse.[5]

Multidisciplinary programs, that include oromyofunctional therapy, have emerged for coordinated and comprehensive care for the growing population of children with **aerodigestive disorders**, including complex airway, pulmonary, gastrointestinal, and feeding problems common in infants discharged from neonatal intensive care.[6] Team care involving speech pathology even extends to **chronic cough**,[7] whose etiology may sometimes involve an ineffective swallow, or esophageal reflux.[8]

'Speech-language pathologists work closely with their physician colleagues to understand the influence of the many possible medical co-morbidities.'

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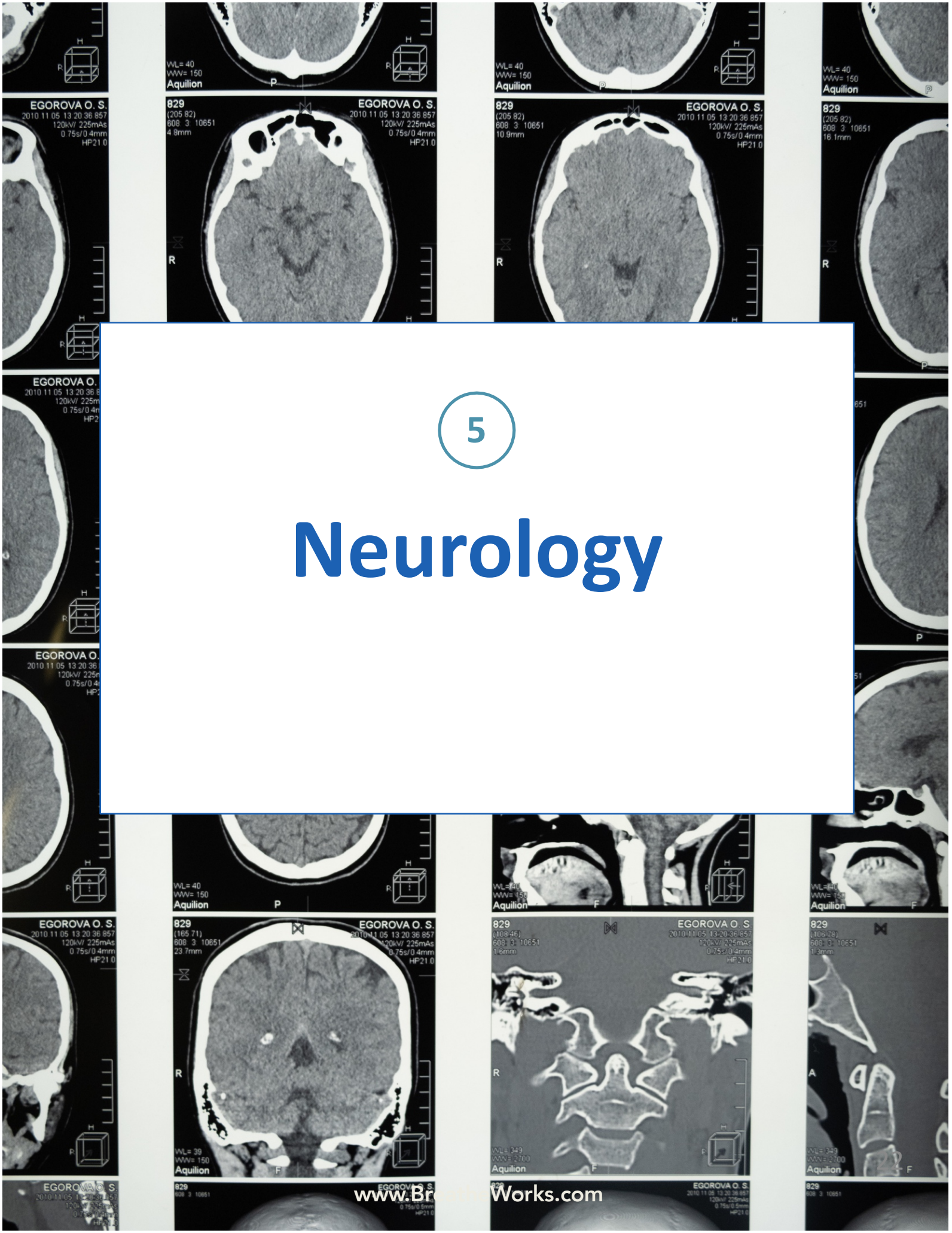

5

Neurology

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Current literature supports speech and language support in a very wide range of neurological disorders in children[1] and adults.[2]

Both **amyotrophic lateral sclerosis** (ALS) and **Parkinson's disease** (PD) exhibit a variety of patterns of dysphagia, so evaluation and treatment of swallowing function is vital. When the oral or pharyngeal stage of swallowing are affected early in dysphagia, adjusting swallowing volume and varying consistency can be beneficial in ALS. When all stages of swallowing are impaired in ALS, complications such as pneumonia, dehydration and malnutrition can arise. In PD, dysphagia can appear at any time during the course of the disease, and can manifest at any stage of swallowing. Aspiration is an important risk factor for pneumonia in PD. On this, rehabilitation has been shown to be of some effect.[3,4]

In lobar ALS there are also changes in facial kinematics, vowel formant frequencies, and speech intelligibility,[5] and motor deficits like reduction in tongue strength may also coexist with cognitive deficits compatible with **frontotemporal lobar degeneration** (FTLD). A key intervention in this patient population is speech-language therapy, which evaluates communication skills and designs a personalized intervention plan to improve communication abilities. It has been used in patients with aphasia of different etiologies and has been shown to be effective. There is research on SLT interventions in patients on the FTLD-ALS spectrum, and the initial findings do indicate some success, where the goal is to delay language decline.[6]

Huntington's disease can give rise to dysarthria to generalized language impairment.[7] There is some evidence to support the use of speech pathology for the management of eating and swallowing disorders in this disease.[8] There is evidence as well that intervention is effective in HD-related dysphagia, in both the hyperkinetic and rigid-bradykinetic patient subgroups, in abnormalities of deglutition. These abnormalities include rapid lingual chorea, swallow incoordination, repetitive swallows, prolonged laryngeal elevation, inability to stop respiration, and frequent eructations.[9]

Dysarthria occurs in approximately 40% of all patients with **multiple sclerosis**. This usually presents as a spastic-ataxic dysarthria with disorders of voice intensity, voice quality, articulation, and intonation. Easily as common are swallowing disorders.[10] Treating both dysarthria and dysphagia is effective for reestablishing functional daily activities.[11] Dysarthria is also a core feature of **polymicrogyria**, often accompanied by receptive and expressive language impairments.[12] The same is true, with sleep abnormalities as well, in **progressive supranuclear palsy**.[13]

Dysphagia and dysarthria are common problems in **stroke recovery**, too.[14] Focussed interdisciplinary care can often restore much functionality in these two areas.[15] As well, people with **dementia** generally, and with **mild cognitive impairment**, are major consumers of services provided by speech-language pathologists. These services include not only direct assessment and treatment of communication and swallowing (communication disorders have proven to be among the strongest predictors for discriminating among dementia subtypes[16]) but also counseling, collaboration, prevention, and wellness. The demand for SLP services for patients with dementia and mild cognitive impairment is expected to grow significantly over the next few decades.[17]

There is a complicated relationship between disorder-related language activities and **epileptic seizures**.[18] This can raise thorny issues for diagnosticians. Research continues on the pathophysiological and psychogenic background of seizures, even to the apparent role of stuttering as a contributing factor to their appearance.[19] Individuals with **Down syndrome** often receive speech-language therapy services starting in infancy or toddlerhood, in part to consider the impact of other developmental and comorbid disorders that can affect language development, such as the presence of a dual diagnosis of DS and autism spectrum disorder, which is ~20% higher than in the general population.[20]

Finally, research in the area of **autism** interventions delivered, at least in part, by SLPs has markedly increased over the past 10 years. This research captures the versatility of the SLP's role in the preschool purview in particular.[21]

'Literature supports speech and language support in a very wide range of neurological disorders.'

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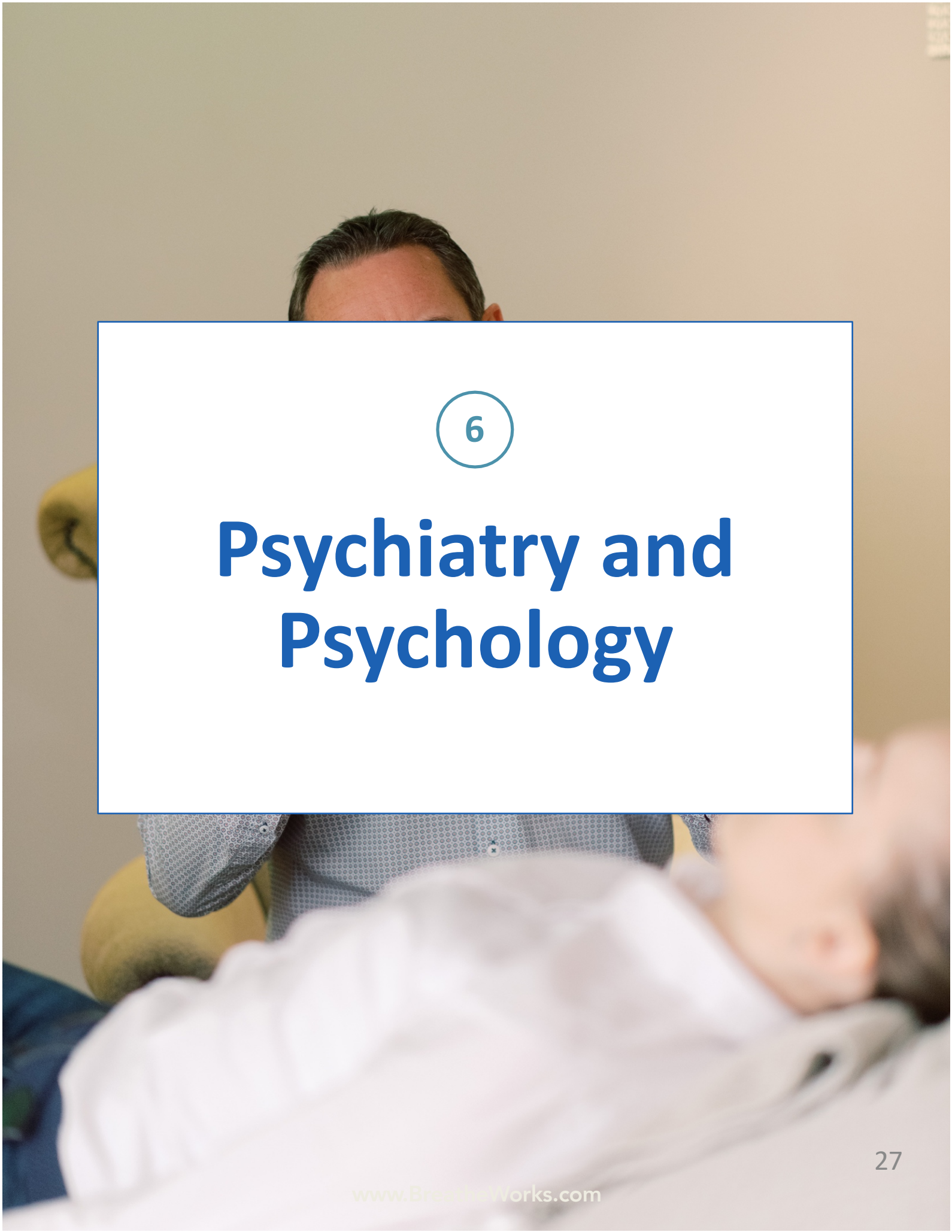

6

Psychiatry and Psychology

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Speech- and language-impaired children have a higher risk for developing a psychiatric disturbance compared with normal language controls, with girls being at greater risk than boys.[1] There is as well an association between early childhood speech and language disorders and young adult psychiatric disorders. This association underscores the importance of effective and early interventions.[2] Indeed, recent research in child psychiatry has demonstrated a high prevalence of speech, language, and communication disorders in children referred to psychiatric and mental health settings for emotional and behavioral problems. Conversely, children referred to speech and language clinics for communication disorders have been found to have a high rate of diagnosable psychiatric disorders.[3] Because of the link between communication impairments and psychiatric disorders, it is important for nurses and other healthcare professionals to engage in communication, speech, and language evaluation for children during infancy through early childhood. It is collaboration between mental health and communication professionals that allows for early identification and intervention. Early identification of children with developmental delay or developmental disabilities may lead to intervention at a young age when chances for improvement may be best.[4] Psychiatric disorder at age 12.5 years was more likely to co-occur with language disorder than with speech disorder.[5] These issues can propagate in domestic settings. There is a significantly higher prevalence rate of language-related problems in families of speech and language impaired children than in normal language controls, particularly in the case of girls, notably in families with histories of stuttering and reading disabilities.[6]

Elective mutism, an ICD-9 disturbance of emotions specific to childhood and adolescence that excludes pervasive developmental disorder and specific developmental disorders of speech and language is a syndrome in which speech-language pathologists can help with differential diagnoses.[7] Speech-language pathologists can assist as well in distinguishing between **attention deficit disorder** (ADD) with hyperactivity (ADDH) and without hyperactivity (ADDWO). The literature has revealed areas of possible differences not only in the core symptoms, but also associated conduct and emotional symptoms, social relations functioning, learning, medical disorders, family history, and course and outcome of the disorder.[8]

Partnership with the speech-language community is fundamental in more profound disorders, too. In **Primary progressive aphasia**, characterized by insidious onset and gradual progression of speech and language impairment, misdiagnosis is a risk. To mitigate this, if a patient presents with new psychiatric symptoms accompanied by new onset speech or language impairment, referral to a speech-language pathologist is recommended.[9] As well, individuals with **schizophrenia** display speech and language impairments that greatly impact their integration to the society. Speech and language therapy is integral to their rehabilitation. The therapy settings vary widely.[10]

'Speech- and language-impaired children have a higher risk for developing a psychiatric disturbance.'

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7

Education

Speech-language impairment inhibits academic achievement. Empirically supported classifications identified as early as age 5 continue to be relevant into late childhood. There is a clear relationship between auditory-motor adaptation and phonological awareness, since phoneme representations emerge before literacy acquisition, and sensorimotor representations set the ground for phonological awareness.[1] For these children, the need is urgent for early intervention.[2] To this end, speech-language pathologists collaborate regularly with teaching staff. Verbal and written speech and language skills are inextricably linked and key to spelling development and progress.[3] Population level data provide strong evidence that all children who present with language difficulties even in kindergarten face further written academic challenges even if their issues resolve over time.[4,5] This has been shown to exist as far as the age of 19 years.[6] The same relationship is generally true in voice disorders, another vital point of intervention by SLP's.[7] The prevalence is high. In one emblematic study, 50.1% had at least one of the assessed disorders; of those, 33.6% had oral language disorder, 17.1% had orofacial motor skill impairment, and 27.3% had auditory processing disorder. There were significant associations between auditory processing skills' impairment, oral language impairment and age.[8] This general situation exists across all socio-economic groups,[9] with some variation between boys and girls.[10] In many places these children are underserved.[11,12] This is even more pronounced in bilingual populations.[13] Speech and language intervention for children in mainstream schools, even delivered by specialist teaching assistants, is measurably effective, however.[14,15]

Anxiety and depressive disorders are common among children with speech and language impairments from elementary school until youth.[16] These, and other emotional behavior disorders, in turn corrode narrative, structural language, and social communication skills, particularly in alternative school settings. Here, there is a particularly strong need for speech-language pathologists to be engaged.[17] This can extend to classroom bullying. Poor language skills at 3 and 5 years of age are associated with peer victimization at 5 years of age. Poor language skills at 5 and 8 years of age are associated with peer victimization and bully perpetration at 8 years of age. The association between poor language skills at 5 years of age and bully perpetration at 8 years of age is stronger for girls. Persistent paths of language difficulties at 3, 5, and 8 years of age show the highest risk of peer victimization and bully perpetration.[18]

Sometimes there are underlying disorders to speech and language problems. **Dyslexia** is one. SLP programs have improved the reading comprehension performance and increased motivation to reading in dyslexic schoolchildren.[19] Sometimes the problem is a function of physical habits. **Mouth breathing**, something in which we specialize at BreatheWorks, is a good example. Studies have

shown, as we tell educators repeatedly, that for a number of reasons mouth breathers are more likely to have learning difficulties than nasal breathers.[20] It may also be that basic problems in **dentition** form the basis of trouble with speech sound production, in children with or without articulatory speech disorders. It is more important to draw attention to symmetrical eruption and to individual timing pattern of eruption, in these children. Research findings suggest a decreasing risk of faulty speech sound production with advancing eruption of some permanent teeth still present in 7-year-old children.[21]

Beyond reading and speech, problems like childhood **dysphonia** exist frequently in school settings. This has many origins, the most common initial symptom being altered vocal quality. We find, as research also shows, that auditory-perceptual and acoustic parameters can be moderated, and that, with help, vocal characteristics can improve with age.[22] **Dysphagia** is another potential problem in school-age children. Speech-language pathologists in schools are increasingly evaluating and treating children with dysphagia associated with medically complex conditions. There is a rising incidence in preterm births and the survival of medically fragile children, suggesting that a greater number of children will be at risk for dysphagia in the future. School-based SLP's are uniquely positioned to identify swallowing and feeding problems, evaluate and treat children with dysphagia, participate on dysphagia teams in the school setting, and interact with medical teams.[23] Finally, and most broadly, there is a common, circular, syndrome in **disordered sleep**. Wide prevalence of nocturnal **bruxism** (tooth-grinding) is a marker for this, a known comorbidity of sleep and systemic neurobehavioral disturbances. The causes of disordered sleep can be widely varied. Its classroom consequences, unarrested, can be profound. In this too, speech-language therapists, particularly those trained in oromyofunctional airway disorders, can be extremely valuable indeed.[24]

'Speech-language impairment inhibits academic achievement … [S]peech-language therapists, particularly those trained in oromyofunctional airway disorders, can be extremely valuable indeed.'

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