


## Clinical Focus

# Understanding Cognitive Communication Needs in Pediatric Traumatic Brain Injury: Issues Identified at the 2020 International Cognitive-Communication Disorders Conference

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**Purpose:** In early 2020, the second International Cognitive-Communication Disorders Conference was held to provide an opportunity for researchers and clinician-scientists to discuss the most recent advances and pressing issues in the care of individuals with cognitive-communication disorders (CCDs). Presentations and discussions resulted in the identification of four areas in need of attention: (a) terminology, (b) training, (c) interdisciplinary teams, and (d) pediatrics. We will explore the four themes identified at ICCDC, specifically expanding on how terminology, training, and teams intersect in pediatric traumatic brain injury care. Additionally, we will

provide two case studies to highlight the integration of these themes and suggest ways to advance clinical service provision across medical and educational settings for persons with CCDs through the lens of pediatrics.

**Conclusion:** While speech-language pathology has come a long way since the original discussion of CCD over 30 years ago, clinicians and researchers have ongoing opportunities to help advance the ways in which speech-language pathologists offer support to persons, specifically children, with CCDs and to continue to advance the profession.

It has been over 30 years since the American Speech-Language-Hearing Association (ASHA) first described how speech-language pathologists (SLPs) should be involved in the care of individuals with cognitive disorders affecting communicative abilities. This additional focus on cognition meant that SLPs must also consider individuals with brain disorders more broadly than just those with the left-hemisphere lesions associated with traditional language areas responsible for listening, speaking, reading, and writing (ASHA, 1987, 1990). Thus, the addition of cognition as an underlying consideration for communication expanded the role of SLPs in serving individuals with a wide range of neurological disorders.

Cognitive deficits that impact communication can manifest as difficulties in many domains including relating and communicating appropriately with peers, as well as more central cognitive skills such as recalling newly learned information, paying attention in a classroom, or following directions to participate in a structured activity at home or school. With an expanded understanding of the relationship between cognition and communication, ASHA, along with

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colleagues in neuropsychology, published guidelines for referral of suspected cognitive-communication disorders (CCDs) in 2003 (ASHA, 2003). These guidelines described specific behaviors in children and adults that should initiate screening or assessment procedures by both disciplines. One year later, ASHA added assessment and treatment of CCDs to the preferred practice patterns document for the profession (ASHA, 2004). The use of the term/diagnostic category of CCD has continued to increase steadily since 2004 based on both ASHA and PubMed searches of the term. In recognition of this continued growth in research and clinical practice and the need for CCD specialists to have a focused opportunity to discuss the most pressing needs in the area, the first International Cognitive-Communication Disorders Conference (ICCDC) was convened in 2017, and the second occurred in early 2020. Additionally, in 2019, ASHA added a Cognitive-Communication Disorders track to the annual convention. All of these changes reflect the tremendous growth on the topic of CCDs since the late 1980s, and yet discussions at the most recent ICCDC reveal that much work is needed to move research and evidence-based clinical practice forward for CCDs across age groups and treatment settings.

At the 2020 ICCDC conference, several interconnected themes emerged that warrant ongoing discussion and exploration pertaining to how SLPs conceptualize CCDs and consider their presence across the life span. ICCDC included several discussions focusing on the need for SLPs to embrace a broader understanding of the relationship between cognition and communication. That is, communication breakdown can reflect problems a person is experiencing in their thinking. For example, a person who is slow to answer questions in conversation may have difficulty with initiation, attention, memory, or processing speed. What appears as a difficulty in slowed response time is rooted in a cognitive deficit directly impacting communication. Thus, an intervention to improve this communication deficit must directly target the underlying cognitive deficits through basic principles of cognitive rehabilitation necessarily embedded in a functional context (Sohlberg & Turkstra, 2011). While a detailed discussion of the principles of cognitive rehabilitation are outside of the scope of this article, the main components should include (a) an alliance with the client to determine functional needs and goals, (b) practice that directly targets the client's needs framed within functional contexts, (c) sufficient practice for skills to be learned, and (d) generalization that is built into therapy plan (Sohlberg & Mateer, 2001). To align with these principles, cognitive rehabilitation for children should include individualized, contextualized goals to support generalization for their academic and social participation. For a greater discussion as to how to implement cognitive rehabilitation in practice, the reader is encouraged toward Sohlberg and Mateer's (2001) seminal book on cognitive rehabilitation, Kleim and Jones' 2008 paper applying principles of neuroplasticity to the practice of cognitive rehabilitation, and Sohlberg and Turkstra's (2011) book on optimizing cognitive rehabilitation.

Such CCD intervention practices can be difficult to conceptualize across treatment settings, so to deepen the discussion around implementation of processes relating to CCDs, we propose an enhanced focus on the following themes from 2020 ICCDC:

- (1) Terminology: employing consistency in the use of CCDs across practice settings (e.g., educational, medical, vocational).
- (2) Training: examining CCD training that addresses how cognitive disorders affect communication in all settings and across ages in both graduate curricula and continuing education.
- (3) Interdisciplinary teams: including SLPs on teams that work with individuals who experience cognitive deficits impacting communication.
- (4) Pediatrics: emphasizing the specific needs of youth with CCDs and the unique role of the school SLP for these students.

The four conference themes introduced above are relevant to all age groups that experience CCDs, but the unique communication and learning needs of children and adolescents with CCDs was a frequent conversation at the 2020 ICCDC. While CCD is often acknowledged in adult populations, acquired CCD in young people does not receive equivalent attention as developmental language and learning disorders. Yet, ASHA has long recognized the role of the SLP in addressing the needs of children with CCDs. SLP services for children with CCDs are offered in both health care settings and schools, with school being of particular importance because children spend the majority of their time after traumatic brain injury (TBI) in school compared to the time spent in medical settings. Additionally, after insurance coverage is exhausted in the medical setting, intervention services are the primary responsibility of the school. One challenge that is present in intervention for CCDs in pediatric TBI is that these two distinct models of care (hospitals and schools) have different frameworks for service provision. Below, we use pediatric TBI as an exemplar of how the first three ICCDC conference themes—terminology, training, and teams—interact with the fourth, pediatrics and how an understanding of CCD across these themes promotes optimal service provision in this group. Additionally, we aim to use the themes to consider the direction of future research and clinical work, ultimately expanding our understanding and services to children with CCDs.

### ***Pediatric TBI: The Intersection of Communication and Cognition***

Children between the ages of 0 and 4 years experience the highest incidence of TBI compared to all age groups and teenagers experience high rates of TBI during sports and recreational activities, motor vehicle accidents, or other mechanisms (Centers for Disease Control and Prevention, 2018). While TBI is a leading cause of acquired disability in children, the TBI category is widely underutilized as an exceptionality category in special education (Nagele et al.,

2019). Few school-based SLPs report having students with TBI on their caseloads (ASHA, 2018), despite estimates that there are approximately 2.5 million students with TBI in the U.S. public education system annually (Schutz et al., 2010). Although the most recent ASHA Schools Survey states that 48% of school-based SLPs are serving children with cognitive-communication needs (ASHA, 2018), it is likely that this is an underestimate and that many more SLPs are treating children with CCD needs, but under multiple qualifying disabilities (e.g., Other Health Impairment [OHI], TBI).

Students who return to school after experiencing a TBI may not receive SLP services, even when they have needs that fall within our expertise (Haarbauer-Krupa et al., 2018). Although students may be missed for services for a variety of reasons, we focus here on the themes identified above and the value of the SLP in returning children to their functional environment—school—in hopes that this discussion can move our field forward to improve service access for these students and others with cognitively based language and learning challenges.

### ***Terminology: Establishing a Similar Language to Understand the Effects of Cognition on Learning and Communication***

We need to improve the ability of SLPs across different settings to have a common language to discuss the issues experienced by persons with CCDs. For example, the power of having a common language around a specific condition was highlighted in the recent debate regarding appropriate terminology to describe the needs of children with language disorders and whether such difficulties may be explained by language alone, or if cognitive or other factors may also play a role (see Leonard, 2020, for a discussion). This debate led to current recommendations that support the use of the term *developmental language disorder (DLA)* rather than *specific language disorder (SLD)*, representing a shift and allowing for the possibility of nonlinguistic factors contributing to linguistic performance (Bishop et al., 2017). This important discussion represents shifting terminology for our child language colleagues that provides clarification in terminology to more accurately reflect the characteristics of the populations served. While these terms may not apply to children in the schools who have an unexpected acquired TBI that impacts how they are using language and learning due to changes in their cognitive skills, the discussion provides an example of how other areas in our discipline are handling similar challenges.

Compared to the change in terminology and characterizations of students who experience developmental language difficulties, there has been less focused discussion on the terminology surrounding students who demonstrate primary deficits in cognitive domains that may interfere with language development and communication competence more broadly (Haarbauer-Krupa et al., 2017). Part of the challenge of using the term *cognitive communication* in school settings is that children are more often identified

and qualified for services in the schools based on a specific diagnosis (e.g., speech or language impairment), whereas the presence of CCDs can be associated with many disability categories. For example, a student with attention deficit disorder qualified for special education under OHI may have difficulty attending to multiple speakers during a class discussion and produce off-topic responses. Conversely, a student with a primary memory problem due to a TBI (qualified under the TBI designation) may have difficulty learning new vocabulary, performing poorly at this task despite perhaps functional expressive language and word-finding abilities. Both of these students have cognitive deficits that impact communication and result in difficulties in academic performance. These deficits for both of these students should be considered CCDs, but they are not academically labeled as such; rather, they are labeled with their educational disability categories of OHI or TBI. Perhaps if we consistently applied the label “CCD” and identified the core areas of cognitive weakness in the diagnostic statement and description and then more explicitly link these deficits to their impact on language and learning, we could make their relevance to educational (or vocational) performance clearer. In terms of intervention support, while the cognitive deficit itself (e.g., memory) may not often appear as a goal in an Individualized Education Program, it would be appropriate to address training the student to use specific compensatory strategies (e.g., memory strategies) to help recall and process academic information because the ability to learn new information is clearly educationally relevant.

This confusion surrounding pediatric CCDs not only is isolated to the school setting but also occurs in the medical setting. For example, there has been considerable confusion over billing codes applied to services rendered for children with developmental disorders that have associated CCDs (McCarty, 2013, 2015). Services in the medical setting are required to be “medically necessary,” and CCDs that occur as part of a developmental condition are often interpreted as not meeting the necessary criteria. Services billed for intervention related to CCDs in children with TBI can similarly experience difficulty in establishing medical versus general developmental impairment. A common understanding of the linkage between cognition and communication and the associated implications of the connections between language development and cognition, therefore, is needed and requires more focused training across practice settings and of other stakeholders that care for and work with children with TBI.

### ***Training: The Medical SLP and the School-Based SLP***

In addition to considering a common terminology across speech pathology, we must also consider how SLP training supports professionals in different work settings to interact with persons who have a CCD. Coursework in graduate programs is often either informally or formally divided into “adult” and “pediatric” courses, and neuro-genic disorders are frequently taught as diseases of aging.

Such divisions become even more pronounced in continuing education offerings, with many conferences having explicitly pediatric or adult focuses. This creates false divisions when neurologic impairments affecting communication occur across the life span. Morrow et al. (2021) address training opportunities in CCDs both in and beyond formal education in this issue, highlighting the need for structural change to our graduate programs, as well as a focus on creating meaningful, accessible, and clinically relevant training and materials to practicing clinicians. Below, we discuss how disparate training experiences can impact the gap in practice between school and medically based SLPs, to the detriment of the populations served.

Medical and school-based SLPs are both critical components of the continuum of care for children with TBI. While there are differences in their focus, each benefits from the other's perspective to provide optimal assessment and intervention for children with CCDs. SLPs who work in medical settings frequently work under a rehabilitation model where the focus is on functional skills and activities that may have been impacted by a neurological or medical event. SLPs working in the medical environment often assess or treat changes to an individual's speech, language, cognition, or feeding/swallowing across recovery stages to facilitate everyday functioning and independence after an injury or illness that affects any of the neurologic or anatomic systems involved in communication. SLPs who work in the schools, in contrast, are guided by the premise (and law) that their services must be academically relevant. Students with signs and symptoms from a health condition, such as TBI, must therefore have deficits that impact educational performance to qualify for services within the school setting. School-based SLPs may incorrectly presume a student who is walking and talking and who has ongoing cognitive deficits after sustaining a TBI as needing medical rehabilitation, but not necessarily services to support learning in the school environment.

The potential for children with subtle CCDs to "fall through the cracks" is highlighted by research on young children with TBI demonstrating that they often perform within average limits on standardized tests of developmental language, which may make them less likely to qualify for school services (Anderson et al., 2000; Cermak et al., 2019; Haarbauer-Krupa et al., 2018). However, these children can show differences on measures that assess complex language skills that are impacted by changes in cognition such as pragmatic language and reading comprehension when compared to an orthopedic control group (Haarbauer-Krupa et al., 2018). Administration of these additional measures of complex language tasks is often not completed in many clinical or educational settings as they go beyond the traditional assessment battery and time allotment for assessment; however, these skills impact a student's ability to learn and participate at school. For pediatric SLPs in all settings, training around assessment, such as protocols that are sensitive to cognitive and language challenges for children with CCD (e.g., use of discourse analysis, curriculum-based assessment, hearing screening), is important

in both graduate education and professional continuing education.

To move our assessment and treatment of students with CCDs forward, we must acknowledge within our graduate training and professional practice environments that the medical and educational models are not completely distinct service delivery pathways, but a continuum of care for children who experience TBI. Too often, students with TBI receive care through medically based facilities when SLPs are present in what would be considered the most functional and natural treatment setting—their schools. Consider the following: A student who has returned to school following a TBI has average scores on a developmental language assessment and therefore does not qualify for traditional speech-language services. However, this student demonstrates impaired attention, working memory, and disinhibition. These cognitive skills are essential foundations for learning (Welsh et al., 2010). In fact, without support of these foundational cognitive skills, this student is likely to fall behind academically and to struggle to maintain peer relationships and appropriate behavior in the classroom. Such problems may even worsen over time as the student falls further away from their developmental trajectory (Gamino et al., 2009). The school-based SLP, rather than a medically based SLP, is the best person to work with this student to develop strategies to support cognitive processes that in turn support learning and optimal use and understanding of complex language in the functional daily setting of the classroom. While these skills could surely be addressed in an outpatient rehabilitation setting, addressing these challenges in the school setting adds an evidence-based, relevant context to help a child or an adolescent transition new skills or strategies to everyday use (Sohlberg & Turkstra, 2011; Ylvisaker et al., 2003).

### ***Interdisciplinary Teams: Building the Presence of SLPs in All Settings Where Persons With CCDs Are Encountered***

Coordination of services in schools often relies heavily on a team-based approach. From Individualized Education Program and 504 meetings to managing communication across disciplines, schools focus on bringing relevant expertise to bear on the needs of students. SLPs have models in place to establish and lead teams particular to their expertise, such as reading (Ehren, 2006; Ehren & Ehren, 2001) and swallowing/feeding (Homer et al., 2000). In regard to management of pediatric TBI, team approaches are central to meeting the wide range of needs exhibited by these children and to monitor how they progress or needs change and evolve over time. Expert opinion consistently highlights team processes and communication as central to management of TBI (Gioia et al., 2016; McAvoy et al., 2018), but implementation has proved challenging, and many students are missed for services (Haarbauer-Krupa et al., 2018; Linden et al., 2018). Composition of teams, given the areas of persistent challenge faced by children with TBI, would reasonably include the child's parent/s or caregiver, child's



teacher, child's special education teacher, SLP, intervention specialist, social worker, school/educational psychologist, school nurse, athletic trainer (where available/applicable), and the hospital-school transition specialist (where applicable). Where many schools do not have formal processes for children returning to school after TBI, especially in kindergarten to eighth grade, the school-based SLP could play a critical role in implementing monitoring and screening procedures that would help to identify children as they return to school and ensuring that a team of professionals is available to support the student as needed. Additionally, the school-based SLP can be a cornerstone for the identification and evaluation of persistent deficits that present themselves well after injury occurrence.

Recent reports have provided insights into CCDs and the role of the SLP in providing diagnosis and interventions for these disorders (Coreno & Ciccina, 2020; Lundine & Hall, 2020; Stockbridge & Newman, 2019) as well as the relationship of cognition to social communication disorders, a place where SLPs also have a unique role (Wiseman-Hakes et al., 2020). CCDs cut across disability categories as well as academic and social needs, and SLPs have expertise that is highly relevant to a wide range of students. Unfortunately, overly narrow understandings of the scope of practice for SLPs (e.g., treating articulation or fluency only) often mean that SLP services may not be considered for CCD or social communication needs even when these deficits have been identified through the assessment process.

Both multidisciplinary and interdisciplinary team assessment and management are becoming more prominent in the health care model, particularly for concussion (Bazarian, 2019; Collins et al., 2016; Ellis et al., 2016; Hardin & Kelly, 2019). Multidisciplinary health care teams include members from a variety of backgrounds who all provide services to a client to meet their varied needs. In contrast, interdisciplinary care represents a step-up from this model of each member contributing their expertise to the care of a person with concussion and instead integrates care to encourage pooling of expertise, ideas, and resources. Practitioners regularly meet either formally or informally to synthesize knowledge and treatment practices (Hardin & Kelly, 2019). Such an interdisciplinary approach allows for the whole to be more than the sum of its parts and for intervention to be harmonized across disciplines to the benefit of the client. Although "speech therapy" is identified in some instances as a specialty to be involved with people who have cognitive complaints after concussion (Bazarian, 2019; Hardin & Kelly, 2019), a description of CCDs and involvement of SLPs is not offered in many publications describing either multidisciplinary or interdisciplinary models (e.g., Bailey et al., 2019; Scratch et al., 2019). Furthermore, even though many SLPs are aware of CCDs, most assessments used by interdisciplinary partners in TBI care, including concussion, do not include tools or items that would highlight CCDs that would then easily lead to referral for SLP services. For example, symptoms of CCD and social communication are not included in typical assessments of

TBI and concussion. Therefore, medical providers or allied health professionals—even those who include SLPs on care teams—may miss the clear pathway to refer a child with concussion to SLP services based on the commonly used symptom rating scales.

An additional example of the presence, or more accurately the absence, of SLPs in the management of pediatric TBI is found in educationally based return-to-school management teams for concussion. While interdisciplinary teams represent the current best practice approach that support appropriate return-to-school support, the SLPs' knowledge, skills, and confidence to play a role on these teams are often lacking (Dettmer et al., 2014; Duff & Stuck, 2015; Myers et al., 2018; Pelatti et al., 2019). Thus, training issues described above also intersect with the ability of SLPs to serve meaningfully on pediatric TBI teams across settings, even though SLPs have the advantage of often having some background in brain injury and neurogenic disorders, likely much more so than their educationally based colleagues. Barriers may also exist around caseloads for SLPs in schools, so team-based work may not be protected time. Work that highlights the role of SLPs as part of an interdisciplinary concussion team is emerging (Dachtyl & Morales, 2017; Hardin & Kelly, 2019; Ketcham et al., 2017; Knollman Porter et al., 2014), but far more work is needed to understand and overcome barriers toward SLPs being full members of interdisciplinary teams managing the short- and long-term management of pediatric TBI. To help tie together the themes of terminology, training, and interdisciplinary teams specifically related to CCDs in pediatric TBI, two case examples are provided below.

### *Pediatric Case Study Illustrations*

To illustrate the importance of training, consistent terminology, and the need for interdisciplinary teams in pediatric CCDs, two case studies are presented below. These case studies are meant to serve as exemplars for how clinicians could consider the importance of addressing CCDs across treatment settings and to underscore how CCDs can be specifically addressed in the educational setting. Although the students in the cases did not receive formal diagnoses of CCDs, due to the case focusing on the educational setting, both students present with difficulties that could be categorized as CCDs and that negatively impact other aspects of their academic and social participation (e.g., language skills). The clinical examples represent compilations of students seen by three authors (S. K., B. W., and J. K.) as part of their work as school-based SLPs. The districts of these SLPs represent optimal referral, evaluation, and treatment practice for kids with TBI and may not be representative of broad approaches for children with TBI in the schools, as the themes identified at ICCDC demonstrate. The SLPs represented in these cases receive annual training on brain injury services based on statewide initiatives to better support children with TBI in schools. To protect confidentiality and privacy of those in the case study examples,

the demographics, characteristics, and outcomes included in these case studies have been altered.

### **Case 1: “Sophie”**

Sophie was a 3-year-old girl who was typically developing when she was struck by a motor vehicle while playing in her neighborhood. She was hospitalized for 2 months, including a stay on an inpatient rehabilitation unit. At discharge, she was performing within average limits on standardized developmental tests of language and appeared fairly “typical” compared to peers. Sophie did not receive additional rehabilitation or educational services after discharge.

When she entered kindergarten in the public schools, Sophie had difficulty learning classroom routines, often needing three to four prompts, and she needed one-on-one instruction with repeated exposure to learn new information while still only experiencing variable success. Additionally, Sophie was not demonstrating proficiency on reading, writing, or math assessments. Following a conversation with Sophie’s parents, consistent with the Response to Intervention framework, Sophie began receiving math and reading intervention. After 6 weeks, little progress was noted, and her teacher requested a team meeting with an interdisciplinary team including the special-education director, school nurse, and school-based therapists (i.e., occupational therapy, speech-language pathology, and counselor). During this meeting, the school staff became aware of Sophie’s TBI for the first time. Because of Sophie’s current educational needs and medical history, the school-based team decided to evaluate her for special education.

During the evaluation, the SLP utilized formal and informal measures, including teacher comments and parent report, to broadly assess Sophie’s language and learning abilities. After a hearing screening was conducted to ensure adequate hearing status, the Clinical Evaluation of Language Fundamentals–Fifth Edition (CELF-5) was administered. Although concerns have been raised about the appropriateness and sensitivity of the CELF for children with TBI (Turkstra, 1999), based on Sophie’s expected strengths and weaknesses, the SLP chose to administer the CELF-5 to capture Sophie’s language skills. That being said, the SLP carefully considered the relationship of Sophie’s cognitive deficits (based on assessment by the school psychologist) with her performance on the CELF-5 to get a picture of Sophie’s cognitive-communication strengths and weaknesses. On the CELF-5, Sophie demonstrated scores that were slightly below average than expected for her age, which was a notable decline in continued skill development since testing at hospital discharge revealed Sophie’s expressive and receptive language abilities were within average limits. To further augment the CELF-5 results, a language sample was gathered using story retell and a summarization task focusing on curricular material. Sophie exhibited a range of deficits on these discourse tasks. She did not recall most of the key details from the narrative and expository passages, only remembering main features from the last sentence, indicating potential deficits in memory and attention. Sophie demonstrated a relative

strength in receptive language with the use of visual supports and repetition. During classroom observations, the SLP observed that Sophie had difficulties sustaining her attention (e.g., looking around the room, getting up from her seat, talking out of turn), consistent with her behavior during the administration of the CELF. Additional areas of cognitive communication that likely impacted her performance on formal and informal assessment measures included Sophie’s ability to recall information and follow multistep directions.

From the comprehensive evaluation and verification of her medical record, Sophie was verified for special education under the TBI designation. Based on her school’s educational model, she continued in a general education classroom but received specific push-in (intervention delivered within the classroom) and pull-out services with the school SLP, once a week respectively. The push-in SLP intervention addressed goals to improve Sophie’s attention to task in the classroom and help her follow one-step directions with embedded concepts. Because this intervention was delivered in the academic setting, it would be considered a functional intervention and therefore in alignment with the principles of cognitive rehabilitation that would be appropriate given Sophie’s history. In individual, pull-out interventions, the SLP focused on teaching Sophie specific strategies to help with learning new vocabulary encountered in the classroom. Additionally, the SLP provided consultation to the classroom teacher and educational team during which the SLP shared strategies that could improve Sophie’s success in the classroom, including stating Sophie’s name to gain her attention prior to giving her a direction; using visual cues including a picture schedule to decrease Sophie’s need to rely on her memory; and speaking slower with concise, concrete language and emphasizing key vocabulary or facts during group activities to improve her attention to key concepts.

For the past 2 years, Sophie has made marked progress in all areas of academics (reading, writing, and math) and the use of strategies for memory and recall. Sophie continues to present with difficulties related to her early childhood TBI, including higher level deficits in expressive and receptive language, social-pragmatic interactions, and fatigue. Her speech-language therapy now focuses on listening comprehension, story retell, and social-pragmatic skills, areas of need that most negatively impact her educational participation. The SLP and school-based team anticipate that Sophie will continue to need educational supports and services through direct therapy and consultation to address her academic needs as she progresses through her schooling. Sophie’s school team continues collaborating to ensure effective strategies are utilized across settings, including in the home and community. The focus on functional, curriculum-based therapy goals has helped Sophie to generalize skills addressed in therapy not just in the classroom but also to her participation in other environments such as when she is interacting with her peers.

### **Case 2: “Jack”**

Jack was a 10th-grade student when he sustained a concussion during physical education class. He reported

his injury to the school nurse who called his parents and suggested an evaluation by a health care provider. After medical confirmation of the concussion by his primary care provider, the physician excused Jack from school for 2 days with directions to return as tolerated with partial days as necessary for the subsequent 2 weeks. Jack's mother sent the recommendations back to the school nurse. The school nurse and Jack's counselor sent an e-mail to his teachers informing them of his concussion and the standard accommodations used by the school for the few days following Jack's return to school, including reducing workload expectations by half, providing written class notes, and providing rest breaks as needed. Jack returned to school 2 days following his concussion and utilized the accommodations for the remainder of the week. After the weekend, the nurse checked in with Jack regarding his symptoms. He reported feeling fine, so the nurse e-mailed the team that he no longer needed the accommodations.

One month after his concussion, Jack was visiting the school nurse with headache complaints several days a week and complained that his memory was "not good." He was staying up later than normal to complete homework assignments and was becoming nervous about his grades, which he felt were suffering. One day, Jack went to the nurse to ask for medicine for his headache. Jack confirmed to the nurse that his headaches were persisting from his concussion. The school nurse contacted the school's SLP, a member of the school's Concussion Protocol Team, to consult on Jack's case. With Jack's parents' permission, the SLP observed Jack in the classroom and talked to him about his symptoms and the concerns he had about his recent school performance. The SLP, school nurse, school counselor, teachers, parents, and Jack met to create an informal plan to support him in his ongoing recovery. The SLP provided education on concussion and the physical and cognitive symptoms that can occur if a person returns to full cognitive and physical activity too soon. The team then created a plan to reinstate informal accommodations in the classroom, which included (a) delaying tests or quizzes if Jack is experiencing physical or cognitive symptoms, (b) providing notes for review, (c) modifying his workload with clear directions on what assignments to complete, and (d) using smaller assessments (e.g., quizzes) to replace larger exams. The SLP checked in with Jack 2 times per week; and his teachers, 1 time per week. Additionally, the SLP supported Jack by talking about his symptoms and providing some strategies for how to prevent symptoms, when possible, such as trying to get a full night's sleep or not rushing to take notes during class since he would be provided with the teacher's notes following class. The SLP collaborated with Jack's teachers by helping to determine the appropriate workload for Jack and the format of notes that could support Jack's learning most effectively.

Three weeks later, the teachers reported that Jack seemed to be using his accommodations less but he was struggling to complete missed assignments. Jack reported that he was feeling better but that he was still not caught up on the work he had missed. He also reported that he

was nervous that, if the notes were taken away or he had to sit through an entire exam, he would perform poorly. The SLP and team helped Jack devise a plan with a charted time table of dates and times to organize projected completion of these assignments. The team also planned to gradually decrease classroom accommodations over the next 2 weeks. The SLP continued to check in with Jack and his teachers to ensure Jack's symptoms did not return and he continued making progress on missed work. Additionally, Jack and his family were encouraged to request an appointment with his pediatrician if he continued to experience difficulties as the pediatrician could potentially make additional referrals as necessary (e.g., visual-vestibular assessment). After 2 weeks, the group met again with Jack and his parents and determined that Jack no longer needed these accommodations. Jack finished his 10th-grade year with grades consistent to the semesters before his concussion.

### *Implications for Future Directions*

Since 1987, the profession of speech-language pathology has come a long way in our understanding of CCDs. It was, however, clear at ICCDC 2020 that we need to focus our attention on building awareness of CCDs especially in the areas of training, terminology, and teams in both medical and educational settings. In pediatric CCDs specifically, it can be challenging to frame services differently to justify the medical necessity for services in health care versus the need to justify services for academic progress in the school setting. Because of these differences in training and terminology, service provision for pediatric CCDs can result in gaps in care, particularly in communication from the health care to school settings (Haarbauer-Krupa et al., 2017). Because SLPs are in a unique position to work in and understand both settings, we have an opportunity not only to enhance training specifically for SLPs related to CCDs but also for other health care and educational professionals. We can lead efforts to create consistent terminology and promote the interdisciplinary care for people with CCDs to optimize their abilities across all settings. Our future in leading care for persons with CCDs is related to our training in core concepts of cognition and communication, our ability to think across traditional treatment boundaries, and our skills to participate meaningfully as members of interdisciplinary teams. Discussions among clinician researchers at ICCDC 2020 revealed consistent themes that must be addressed by both clinicians and researchers in the near term to help advance the way in which SLPs offer support to persons of all ages with CCDs. Work should focus on enhancing training of new and experienced clinicians, establishing consistent terminology, and promoting the involvement of SLPs on relevant interdisciplinary teams across clinical settings.

To begin to make progress in these areas, SLPs across treatment settings need to make specific efforts to talk to each other and exchange ideas for ways to bridge these two care models. While researchers may be able to identify the gaps and provide data to support their existence, practicing clinicians are critical and credible change agents within their



institutions. Every pediatric SLP, whether medically based or school based, can reach out to their counterparts to begin the conversation on how to best support the children with TBI whom they serve. The medical-school SLP team can explore, document, and seek to understand how each organization is serving children with TBI. From there, the SLPs could identify ways for improvement of service provision that would not create a serious disruption to current services, ultimately leading to a local clinical pathway of care that could then be pilot tested and then, potentially, scaled up. Once pilot information is obtained, it creates an avenue to approach administration for more formalized supports (e.g., buy-in) for the change.

Not only could these local partnerships between medical and school-based SLPs lead directly to powerful improvements care, it would also provide the clinicians an opportunity for ongoing professional development regarding CCDs that may have been missing from their graduate education. Additionally, these teams could feed the results of their work into professional development opportunities (e.g., ASHA convention, ASHA Connect, state-level SLP conventions), thereby enhancing training in CCDs for the profession overall.

In addition to the medical-school SLP team, and enhancing professional development, the school-based SLP has the specific ability to expand CCD understanding outside of the medical/rehabilitation community and to promote contextually, evidence-based cognitive rehabilitation in a way that is not possible in a hospital or outpatient clinic. School-based SLPs have unique opportunities to support educational personnel's knowledge on CCDs and contribute ideas to the classroom to support the students' progress (Mitchell et al., 2020). When in the classroom, SLPs can provide direct intervention to support generalization, coach teachers and aides on strategies for consistency and to encourage carryover, and foster collaboration to problem-solve in real time with the entire team. SLPs' time in the students' academic environment also increases educational personnel's exposure to the expertise of SLPs in the area of CCDs. With this exposure comes increased awareness of the important and vital role school-based SLPs can play in supporting students with brain injury and maximizing their recovery and potential.

As we move into the next 30 years of research and clinical practice for children with CCDs, it will be critical for SLPs to collectively address terminology, training, and teams to create optimal treatment and long-term management options. We have created a strong foundation and call on all providers of services, medical and educational, for children with CCDs to consider how they can contribute to propelling us forward.

## Author Contributions

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## References

- American Speech-Language-Hearing Association.** (1987). Role of speech-language pathologists in the habilitation and rehabilitation of cognitively impaired individuals. *Asha*, 29, 53–55.
- American Speech-Language-Hearing Association.** (1990). *Interdisciplinary approaches to brain damage* [Position statement]. <http://www.asha.org/policy>
- American Speech-Language-Hearing Association.** (2003). *Evaluating and treating communication and cognitive disorders: approaches to referral and collaboration for speech-language pathology and clinical neuropsychology* [Technical report]. <https://www.asha.org/policy>
- American Speech-Language-Hearing Association.** (2004). *Preferred practice patterns for the profession of speech-language pathology* [Preferred practice patterns]. <https://www.asha.org/policy>
- American Speech-Language-Hearing Association.** (2018). *2018 Schools Survey report: SLP caseload and workload characteristics*. <http://www.asha.org/research/memberdata/schoolsurvey/>
- Anderson, V. A., Catroppa, C., Morse, S., Haritou, F., & Rosenfeld, J.** (2000). Recovery of intellectual ability following traumatic brain injury in childhood: Impact of injury severity and age at injury. *Pediatric Neurosurgery*, 32, 282–290. <https://doi.org/10.1159/000028956>
- Bailey, C., Meyer, J. M., Briskin, S., Tangen, C., Hoffer, A., Dundr, J., Brennan, B., & Smith, P.** (2019). Multidisciplinary concussion management: A model for outpatient concussion management in the acute and post-acute settings. *Journal of Head Trauma Rehabilitation*, 34(6), 375–384. <https://doi.org/10.1097/HTR.0000000000000527>
- Bazarian, J. J.** (2019). Preface to multidisciplinary concussion clinics. *Journal of Head Trauma Rehabilitation*, 34(6), 371–374. <https://doi.org/10.1097/HTR.0000000000000548>
- Bishop, D. V. M., Snowling, M. J., Thompson, P. A., Greenhalgh, T., & The CATALISE-2 consortium.** (2017). Phase 2 of CATALISE: A multinational and multidisciplinary Delphi consensus study of problems with language development: Terminology. *The Journal of Child Psychology and Psychiatry*, 58, 1068–1080. <https://doi.org/10.1111/jcpp.12721>
- Centers for Disease Control and Prevention.** (2018). *Report to congress: The management of traumatic brain injury in children*. Division of Unintentional Injury Prevention, National Center for Injury Prevention and Control. <https://www.cdc.gov/traumaticbraininjury/pdf/reportstocongress/managementofbiinchildren/TBI-ReporttoCongress-508.pdf>
- Cermak, C. A., Scratch, S. E., Reed, N. P., Bradley, K., Quinn de Launay, K. L., & Beal, D. S.** (2019). Cognitive communication impairments in children with traumatic brain injury: A scoping review. *The Journal of Head Trauma Rehabilitation*, 34(2), 13–20. <https://doi.org/10.1097/HTR.0000000000000419>
- Collins, M. W., Kontos, A. P., Okonkwo, D. O., Almqvist, J., Bailes, J., Barisa, M., Bazarian, J., Bloom, O. J., Brody, D. L., Cantu, R., Cardenas, J., Clugston, J., Cohen, R., Echemendia, R., Elbin, R. J.,**



- Ellenbogen, R., Fonseca, J., Gioia, G., Guskiewicz, K., . . . Zafonte, R. (2016). Statements of agreement from the Targeted Evaluation and Active Management (TEAM) Approaches to Treating Concussion meeting held in Pittsburgh, October 15–16, 2015. *Neurosurgery*, 79(6), 912–929. <https://doi.org/10.1227/NEU.0000000000001447>
- Coreno, A., & Ciccia, A. (2020). Supporting students with TBI: Clinically focused tutorial for speech-language pathologists. *Seminars in Speech and Language*, 41(02), 161–169. <https://doi.org/10.1055/s-0040-1701684>
- Dachtyl, S. A., & Morales, P. (2017). A collaborative model for return to academics after concussion: Athletic training and speech-language pathology. *American Journal of Speech-Language Pathology*, 26(3), 716–713. [https://doi.org/10.1044/2017\\_AJSLP-16-0138](https://doi.org/10.1044/2017_AJSLP-16-0138)
- Dettmer, J., Ettel, D., Glang, A., & McAvoy, K. (2014). Building statewide infrastructure for effective educational services for students with TBI. *Journal of Head Trauma Rehabilitation*, 29(3), 224–232. <https://doi.org/10.1097/HTR.0b013e3182a1cd68>
- Duff, M. C., & Stuck, S. (2015). Paediatric concussion: Knowledge and practices of school speech-language pathologists. *Brain Injury*, 29(1), 64–77. <https://doi.org/10.3109/02699052.2014.965747>
- Ehren, B. J. (2006). Partnerships to support reading comprehension for students with language impairment. *Topics in Language Disorders*, 26(1), 42–54. <https://doi.org/10.1097/00011363-200601000-00005>
- Ehren, B. J., & Ehren, T. C. (2001). New or expanded literacy roles for speech-language pathologists: Making it happen in the schools. *Seminars in Speech and Language*, 22(03), 233–244. <https://doi.org/10.1055/s-2001-16146>
- Ellis, M. J., Leddy, J., & Willer, B. (2016). Multi-disciplinary management of athletes with post-concussion syndrome: An evolving pathophysiological approach. *Frontiers in Neurology*, 7, 136. <https://doi.org/10.3389/fneur.2016.00136>
- Gamino, J., Chapman, S., & Cook, L. (2009). Strategic learning in youth with traumatic brain injury: Evidence for stall in higher-order cognition. *Topics in Language Disorders*, 29(3), 224–235. <https://doi.org/10.1097/TLD.0b013e3181b531da>
- Gioia, G. A., Glang, A. E., Hooper, S. R., & Brown, B. E. (2016). Building statewide infrastructure for the academic support of students with mild traumatic brain injury. *The Journal of Head Trauma Rehabilitation*, 31(6), 397–406. <https://doi.org/10.1097/HTR.0000000000000205>
- Haarbauer-Krupa, J., Ciccia, A., Dodd, D., Ettel, D., Kurowski, B., Lumba-Brown, A., & Suskauer, S. (2017). Service delivery in the healthcare and educational systems for children following traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 32(6), 367–377. <https://doi.org/10.1097/HTR.0000000000000287>
- Haarbauer-Krupa, J., King, T. Z., Wise, J., Gillam, S., Trapani, J., Weissman, B., & DePompei, R. (2018). Early elementary school outcomes in children with a history of traumatic brain injury. *Journal of Head Trauma Rehabilitation*, 34(2), 111–121. <https://doi.org/10.1097/HTR.0000000000000414>
- Hardin, K., & Kelly, J. (2019). The role of speech-language pathology in an interdisciplinary care model for persistent symptomatology of mild traumatic brain injury. *Seminars in Speech and Language*, 40(01), 065–078. <https://doi.org/10.1055/s-0038-1676452>
- Homer, E. M., Bickerton, C., Hill, S., Parham, L., & Taylor, D. (2000). Development of an interdisciplinary dysphagia team in the public schools. *American Journal of Speech-Language Pathology*, 31(1), 62–75. <https://doi.org/10.1044/0161-1461.3101.62>
- Ketcham, C., Bowie, M., Buckley, T., Baker, M., Patel, K., & Hall, E. (2017). The value of speech-language pathologists in concussion management. *Current Research: Concussion*, 4(01), e8–e13. <https://doi.org/10.1055/s-0037-1603645>
- Kleim, J. A., & Jones, T. A. (2008). Principles of experience-dependent neural plasticity: Implications for rehabilitation after brain damage. *Journal of Speech, Language, and Hearing Research*, 51(1), S225–S239. [https://doi.org/10.1044/1092-4388\(2008\)018](https://doi.org/10.1044/1092-4388(2008)018)
- Knollman-Porter, K., Constantinidou, F., & Hutchinson Marron, K. (2014). Speech-language pathology and concussion management in intercollegiate athletics: The Miami University concussion management program. *American Journal of Speech-Language Pathology*, 23(4), 507–519. [https://doi.org/10.1044/2014\\_AJSLP-13-0126](https://doi.org/10.1044/2014_AJSLP-13-0126)
- Leonard, L. B. (2020). A 200-year history of the study of childhood language disorders of unknown origin: Changes in terminology. *Perspectives of the ASHA Special Interest Groups*, 5(1), 6–11. [https://doi.org/10.1044/2019\\_PERS-SIG1-2019-0007](https://doi.org/10.1044/2019_PERS-SIG1-2019-0007)
- Linden, M. A., Glang, A. E., & McKinlay, A. (2018). A systematic review and meta-analysis of educational interventions for children and adolescents with acquired brain injury. *Neuro-Rehabilitation*, 42(3), 311–323. <https://doi.org/10.3233/NRE-172357>
- Lundine, J. P., & Hall, A. (2020). Using non-standardized assessments to evaluate cognitive-communication abilities following pediatric traumatic brain injury. *Seminars in Speech and Language*, 41(3), 170–182. <https://doi.org/10.3233/NRE-172357>
- McAvoy, K., Eagan-Johnson, B., & Halstead, M. (2018). Return to learn: Transitioning to school and through ascending levels of academic support for students following a concussion. *NeuroRehabilitation*, 42(3), 325–330. <https://doi.org/10.3233/NRE-172381>
- McCarty, J. (2013). Policy analysis: Autism and cognitive communication codes don't go together. *The ASHA Leader*, 18(2), 22–23. <https://doi.org/10.1044/leader.pa2.18022013.22>
- McCarty, J. (2015). How do you code executive-function services for children? *The ASHA Leader*, 20(5), 28–29. <https://doi.org/10.1044/leader.bml.20052015.28>
- Mitchell, M., Ehren, B., & Towson, J. (2020). Collaboration in schools: Let's define it. *Perspectives of the ASHA Special Interest Groups*, 5(3), 732–751. [https://doi.org/10.1044/2020\\_PERSP-19-00125](https://doi.org/10.1044/2020_PERSP-19-00125)
- Morrow, E. L., Turkstra, L. S., & Duff, M. C. (2021). Confidence and training of speech-language pathologists in cognitive-communication disorders: Time to rethink graduate education models? *American Journal of Speech-Language Pathology*. Advance online publication. [https://doi.org/10.1044/2020\\_AJSLP-20-00073](https://doi.org/10.1044/2020_AJSLP-20-00073)
- Myers, R. K., Eagan-Brown, B. L., Conway, A. T., Nagele, D. A., Vaccaro, M. J., Kendi, S., & Zonfrillo, M. R. (2018). Examining a statewide educational consulting program for pediatric brain injury. *Clinical Pediatrics*, 57(6), 645–655. <https://doi.org/10.1177/0009922817732146>
- Nagele, D., Hooper, S., Hildebrant, K., McCart, M., Dettmer, J., & Glang, A. (2019). Under-identification of students with long term disability from moderate to severe TBI: Research, advocacy, and practice: For complex and chronic conditions. *A Journal for Physical, Health, and Multiple Disabilities*, 38(1), 10–25. <https://doi.org/10.14434/pders.v38i1.26850>
- Pelatti, C. Y., Bush, E. J., Farquharson, K., Schneider-Cline, W., Harvey, J., & Carter, M. W. (2019). Speech-language pathologists' comfort providing intervention to children with traumatic brain injury: Results from a national survey. *American Journal*

- of *Speech-Language Pathology*, 28(4), 1611–1624. [https://doi.org/10.1044/2019\\_AJSLP-19-0029](https://doi.org/10.1044/2019_AJSLP-19-0029)
- Schutz, L., Rivers, K. O., McNamara, E., Schutz, J., & Lobato, E. J.** (2010). Traumatic brain injury in K-12 students: Where have all the children gone? *International Journal of Special Education*, 25(2), 55–71.
- Scratch, S., Rumney, P., Agnihotri, S., & Reed, N.** (2019). Pediatric concussion: Managing persistent symptoms with an interdisciplinary approach. *Journal of Head Trauma Rehabilitation*, 34(6), 385–393. <https://doi.org/10.1097/HTR.0000000000000542>
- Sohlberg, M. K. M., & Mateer, C. A.** (2001). Cognitive rehabilitation: *An integrative neuropsychological approach*. Guilford Press.
- Sohlberg, M. K. M., & Turkstra, L.** (2011). *Optimizing cognitive rehabilitation*. Guilford Press.
- Stockbridge, M., & Newman, R.** (2019). Enduring cognitive and linguistic deficits in individuals with a history of concussion. *American Journal of Speech-Language Pathology*, 28(4), 1554–1570. [https://doi.org/10.1044/2019\\_AJSLP-18-0196](https://doi.org/10.1044/2019_AJSLP-18-0196)
- Turkstra, L. S.** (1999). Language testing in adolescents with brain injury: A consideration of the CELF-3. *Language, Speech, and Hearing Services in Schools*, 30(2), 132–140. <https://doi.org/10.1044/0161-1461.3002.132>
- Welsh, J., Nix, R., Blair, C., Bierman, K., & Nelson, K.** (2010). The development of cognitive skills and gains in academic school readiness for children from low-income families. *Journal of Educational Psychology*, 102(1), 43–53. <https://doi.org/10.1037/a0016738>
- Wiseman-Hakes, C., Kakonge, L., Doherty, M., & Beauchamp, M.** (2020). A conceptual framework of social communication: Clinical applications to pediatric traumatic brain injury. *Seminars in Speech and Language*, 41(2), 143–160. <https://doi.org/10.1037/a0016738>
- Ylvisaker, M., Jacobs, H., & Feeney, T.** (2003). Positive supports for people who experience behavioral and cognitive disability after brain injury. *Journal of Head Trauma Rehabilitation*, 18(1), 7–32. <https://doi.org/10.1097/00001199-200301000-000>