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What School Personnel Need to Know about the CDC Guideline on the Diagnosis and Management of Mild TBI in Children

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Traumatic brain injury (TBI) in children is a growing public health concern. In 2013, there were an estimated 641,935 TBI-related emergency department (ED) visits, 17,930 TBI-related hospitalizations, and 1,484 TBI-related deaths among children aged 0 to 14 years (Taylor et al., 2017). A recent research study on parent-reported TBI estimates that 1.8 million children in the United States have experienced TBI in their lifetime (Haarbauer-Krupa et al, 2018). Additionally, it is estimated that for children who seek care in an ED for a TBI, 70-90% of these are classified as mild (Cassidy et al., 2004; Faul et al., 2010). Recent research examining the point of entry for care in a large children's healthcare network reported that children with mild TBI (mTBI) are more likely to be seen in their pediatrician's office and not included in ED visit counts, broadening the diversity of locations where children receive medical care after TBI (Arbogast et al, 2016). In addition, some children may not be seen for a medical assessment at the time of injury. Children with

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mTBI are more likely to recover faster than children with more severe injuries (CDC, 2018). Current research suggests that 70% of children with mTBI will recover within 28 days post-injury (Zemek et al., 2016).

After a child experiences an mTBI, the child and the family must navigate two models of care: medical and educational. A medical assessment identifies a child's potential signs and symptoms resulting from a head injury, and provides the initial information about the potential for ongoing consequences as a result of an mTBI. Often, symptoms affect areas such as vision and cognition (CDC, 2018; Master, Master, Weibe, Storey, Lockyear, Podolak, & Grady, 2018; Taylor, Dietrich, Nuss, Wright, Rusin, Bangert, Minich & Yeates, 2010) that can impact performance in school settings. This is a concern since the time spent in acute medical care is very short compared to the time children spend at school; consequently it is important for those in the school environment to be made aware of a child's mTBI (Haarbauer-Krupa et al., 2017). Previous reports have described a gap in communication between medical and educational settings for children with TBI (Dettmer et al., 2014; CDC, 2018; Harbauer-Krupa et al., 2017; Kasamatsu et al 2017; Weber et al, 2018). Thus, in order to support a child who returns to school, information about the child's injury should be provided to the school. This responsibility typically falls to the parent/caregiver.

Children can be especially vulnerable to the effects of mTBI (Babcock, Byczkowski, Wade, Ho, Mookerjee, & Bazarian, 2013; Bijur PE, Haslum M, Golding J, 1990; CDC, 2018; Fay GC, Jaffe KM, Polissar NL et al, 1994; Taylor et al., 2010). Within the school environment, a child with an mTBI may experience consequences of the injury that negatively impact learning and behavior. Recent reports indicate that many children with TBI require some form of academic support at school (CDC, 2018; Gioia, 2014; Harbauer-Krupa et al., 2017; Ranson, Vaughn, Pratson, Sady, McGill, & Gioia, 2015); . Yet inconsistent communication between healthcare professionals, parents and school systems, coupled with parents' and educators' limited understanding of the possible effects of mTBI, often results in children with mTBI being underidentified for the receipt of support services in school (Haarbauer-Krupa et al., 2017). Children are also unlikely to receive follow-up in the healthcare system, particularly following mTBI, further increasing the likelihood that they will experience unmet educational needs (Fuentes, et al., 2018; Harbauer-Krupa et al., 2017). Some health care providers facilitate communication with schools by providing written documentation describing a student's current symptoms, complications and recommendations for accommodations at the time of injury (Dettmer et al., 2014; Gioia, 2014; Halstead et al., 2013; Harbauer-Krupa et al., 2017; Kirk, Fallon et al., 2014). The diversity of healthcare providers who diagnose and manage mTBI contributes to the variability in communicating health information to schools. Once children return to school, educators may not have training or knowledge about how to respond to a student experiencing symptoms. Recognizing and serving children with mTBI in schools has long been a challenge and we continue to have few evidence-based solutions that describe how school-based teams can improve mTBI identification and long-term outcomes. Promising practices for children returning to school after mTBI include the establishment of strong medical-school partnerships, clearly defining the child's symptom profile along with individualized school

accommodation needs, and providing training for educators on the effects of TBI (Dettmer et al., 2014; Gioia, 2014; Halstead et al., 2013; Iverson & Gioia 2015; Todis et al., 2018).

The Centers for Disease Control and Prevention (CDC) released evidence-based clinical recommendations on the diagnosis and management of pediatric mTBI in an effort to improve long-term outcomes of affected children. The *CDC Guideline on the Diagnosis and Management of Mild Traumatic Brain Injury Among Children* offers practical recommendations for all persons involved in the diagnosis and care of school-aged children who experience a mTBI (Lumba Brown et al., 2018). The CDC Pediatric mTBI Guideline uses a broad clinical and functional definition of pediatric mTBI, and is focused on: (1) diagnostic recommendations regarding the utility of head imaging, symptom scales, cognitive testing, and biomarkers; (2) prognostic recommendations that focus on counseling, assessing history and risk, tools to track recovery, and interventions for patients with poor prognosis; and (3) management and treatment recommendations that focus on education, counseling, emotional support, return to activity and school, and management of specific symptoms (Lumba-Brown et al., 2018). In this commentary, we describe the systematic review and resultant guidelines and implications for school personnel related to the recognition, prognosis and management of mTBI.

To develop the CDC Pediatric mTBI Guideline, the authors followed a rigorous process that included expert input from a wide variety of perspectives (clinical providers, researchers, patients) and specialties (pediatrics, neurology, emergency medicine, sports medicine). The authors identified clinical questions and completed a systematic review of the literature published over a 25 year time period. They rated the evidence using a modified Grading of Recommendation Assessment Development and Evaluation (GRADE) approach. The best available evidence thus informed recommendations on the diagnosis, prognosis, and management of mTBI in the context of scientific principles, related literature, and expert judgement.

One section of the CDC Pediatric mTBI Guideline offers specific recommendations about returning a child to school following a mTBI. CDC recommends (Lumba-Brown et al., 2018) that:

- To assist children returning to school after mTBI, medical and school-based teams should counsel the student and family regarding the process of gradually increasing the duration and intensity of academic activities as tolerated, with the goal of increasing participation without significantly exacerbating symptoms
- Return-to-school protocols should be customized based on the severity of post-concussion symptoms in children with mTBI as determined jointly by medical and school-based teams.
- For any student with prolonged symptoms that interfere with academic performance, school-based teams should assess the educational needs of that student and determine the student's need for additional educational supports, including those described under pertinent federal statutes (e.g., Individuals With Disabilities Education Act §504)123.

- Post concussion symptoms and academic progress in school should be monitored collaboratively by the student, family, health care professional(s), and school teams, who jointly determine what modifications or accommodations are needed to maintain an academic workload without significantly exacerbating symptoms.
- The provision of educational supports should be monitored and adjusted on an ongoing basis by the school based team until the student's academic performance has returned to preinjury levels.
- For students who demonstrate prolonged symptoms and academic difficulties despite an active treatment approach, health care professionals should refer the child for a formal evaluation by a specialist in pediatric mTBI.

The CDC Pediatric mTBI Guideline provides a model for diagnosis and long-term management of mTBI with recommendations for all key stakeholders. Implementation of the Guideline will improve the consistency of diagnosis at the time of injury and increase the specificity of discharge instructions to guide management of post-injury symptoms. In an effort to reduce the communication gap between medical and educational settings, the CDC Pediatric mTBI Guideline recommends the education of parents and students at the time of injury and offers specific recommendations about implementation and monitoring for the return-to-school process. Schools and school districts can review their existing mTBI policy and incorporate Guideline recommendations. Furthermore, schools should use this publication as an opportunity to build an interdisciplinary TBI team that can aid students in their return to school following injury. The team should include parents/caregivers, who need to be empowered to notify schools about valuable medical information, so that educators can translate diagnostic information into appropriate academic supports for students who return to school with post-injury symptoms that impact learning.

In a recent commentary titled, *Have we made progress with educational services for students with TBI?*, DePompei and Glang (2018) describe how awareness has increased about student needs and the importance of healthcare-to-school transitions following TBI in the 25 years since TBI was added as a special education eligibility category under the Individuals with Disability Act (IDEA). Yet, despite this progress, very little measurable action has improved the monitoring and execution of individualized programs in the school setting. The CDC Pediatric mTBI Guideline offers evidence-based direction to healthcare providers to provide more information to parents at the time of injury, including discharge instructions and advice about school supports. Additionally, based on the best available evidence, the Guideline offers specific recommendations for the school-based team to help guide the return-to-school process for students who experience an mTBI. To best serve students who experience post-injury symptoms, healthcare personnel, families, and school-based personnel must understand the importance of ongoing, collaborative supports aimed at returning the student to his or her pre-injury level of functioning. The CDC Pediatric mTBI Guideline is based on a systematic review of high quality, evidence-based research on mTBI diagnosis, prognosis, and management. Now is the time to take action by disseminating the Guideline to schools in your local community and educating parents about the importance of notifying schools about the recommendations of their child's healthcare provider following mTBI. For further information on the Guideline, provider tools, and patient and family resources, please visit

the CDC website: <https://www.cdc.gov/traumaticbraininjury/PediatricmTBIGuideline.html>. Specific tools are available on this site to assist the healthcare to school transition such as a letter to schools from healthcare providers and a fact sheet guide for parents on how they can help their child recover and return to school,

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