Diagnosing head injuries is key in child abuse cases

February 18 2022, by Kristie Auman-Gooding

Credit: Pixabay/CC0 Public Domain

Being able to accurately diagnose suspected child abuse is crucial, as an incorrect diagnosis can possibly lead to traumatic family separations and questionable criminal charges or result in the return of the child to an

abusive situation.

Researchers at Penn State are committed to improving the process for diagnosing abusive head trauma (AHT), which is the leading cause of traumatic death and disability in infants and young children in the United States.

Dr. Kent Hymel, professor of pediatrics at Penn State College of Medicine and Social Science Research Institute faculty co-hire, and his colleagues in the Pediatric Brain Injury Research Network (PediBIRN) have developed an evidence-based, 4-variable, clinical decision rule (CDR) that physicians can use to help confirm, exclude, and report suspected AHT.

In a study published recently in the journal *Child Abuse & Neglect*, the researchers examined the records of 973 acutely head-injured children under the age of three years who were hospitalized in Intensive Care Units (ICUs).

The researchers found that application of a simplified three variable clinical decision rule (CDR), facilitated detection of AHT with increased accuracy and fewer false positives in pediatric intensive care (PICU) settings.

"There is no gold standard for diagnosing AHT, so our goal is to reduce cases of missed or misdiagnosed AHT," said Hymel, who is also a child abuse pediatrician at Penn State Health Children's Hospital. "We were pleasantly surprised to find that the simplified three variable CDR performed with greater overall accuracy than the four variable screening tool and eliminated more false positives. By casting a smaller net more accurately, it helps to eliminate family stress due to a child abuse misdiagnosis."

In another study published in *Pediatrics*, the researchers studied data of 500 young patients with acute head injury admitted to the ICU.

The research was conducted in response to critics and defense experts in criminal court cases who question the possibility of identifying a unique subpopulation of AHT patients within the larger population of young, acutely head-injured patients.

"We wished to sort children with traumatic head injury using mathematical algorithms, without reference to physicians' diagnoses or predetermined diagnostic criteria, and to compare the results to existing AHT data, physicians' diagnoses, and a proposed triad of findings," Hymel explained.

The researchers sorted a population of 500 acutely head-injured patients under age three hospitalized in an ICU using an unsupervised cluster analysis. Three independent mathematical algorithms sorted the patient population optimally into just two clusters, one of which was strongly and independently associated with physician diagnosed AHT.

"Our results give strong support to current diagnostic practices related to AHT in the pediatric community. Physicians are recognizing and accurately diagnosing AHT in a unique subpopulation of their head-injured patients," said Hymel. "Our results should strengthen physicians' confidence in their current diagnostic practices and support presentation of their diagnosis in court cases."

In the future, Hymel would like to see the implementation of AHT screening tools in clinical and other less well-controlled and more diverse settings.

More information: Kent P. Hymel et al, Screening for pediatric abusive head trauma: Are three variables enough?, *Child Abuse &*

Neglect (2022). DOI: 10.1016/j.chiabu.2022.105518

Stephen C. Boos et al, Traumatic Head Injury and the Diagnosis of Abuse: A Cluster Analysis, *Pediatrics* (2021). DOI: 10.1542/peds.2021-051742