Published in final edited form as:

Pediatr Crit Care Med. 2013 February ; 14(2): 230–231. doi:10.1097/PCC.0b013e31827204a8.

Deciding whether to screen for abusive head trauma: Do we need a clinical decision rule?

Rachel Berger, MD MPH and

Children's Hospital of Pittsburgh, Pittsburgh, Pennsylvania

Thomas McGinn, MD, MPH

Hofstra North Shore LIJ School of Medicine

Abusive head trauma (AHT) is the leading cause of death from traumatic brain injury (TBI) in children <2 years of age and a leading cause of morbidity and mortality in young children.^{1–3} If AHT is not recognized, children may inadvertently be returned to a violent home and there is a high rate of re-injury and/or death.⁴

Determining when to screen for AHT can be difficult; a plethora of data demonstrate that physicians' decisions about when to screen for child abuse, in general, and AHT, in particular, are biased by patient race and socioeconomic status and professional experience.^{4–7} In a study evaluating the rate at which infants with non-motor vehicle associated TBI were screened for physical abuse, Caucasian infants and those with private insurance were less likely to undergo a skeletal survey than Black or Hispanic children or children with public insurance. Once screened, however, Caucasian children were more likely to be diagnosed with physical abuse, suggesting either an over-evaluation of black infants or an under-evaluation of white infants.⁵ In a study of missed AHT, children who were Caucasian with married parents were most likely to be misdiagnosed; 4 of the 5 deaths in the study were felt to be a direct result of misdiagnosis.⁴

A clinical prediction/decision rule (CDR) is a tool that quantifies the contributions that the history, physical examination, and laboratory results make toward a diagnosis or prognosis in a patient. CDRs attempt to increase the accuracy of clinicians' diagnostic and prognostic assessments.⁸ They are particularly important for diseases which are relatively rare and in which the stakes for missing the diagnosis are high. CDRs have been derived for a variety of clinical scenarios.^{9–13}

In this issue of PCCM, Hymel and colleagues describe the derivation of a CDR to help PICU physicians determine which children <3 years of age with non-vehicle associated TBI do NOT need an evaluation for AHT.¹⁴ The study was conducted in 14 PICUs over a 15-month period. Of the 209 subjects, 45% were diagnosed with AHT using an a priori study definitional criterion. The authors concluded that the absence of five variables - acute respiratory compromise, bilateral or interhemispheric subdural hemorrhage, seizure or acute encephalopathy, bruising of the torso, ear or neck region or a skull fracture other than a

Contact: rachel.p.berger@gmail.com.

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

The authors have not disclosed any potential conflicts of interest

linear parietal one - had a negative predictive value of 93%. Therefore, if none of the five variables were presented, only 7% of the subjects had AHT.

The authors are to be congratulated for clearly describing their methodology and limitations. If their CDR were successful in subsequent validation and implementation studies, it would be the first CDR to assess which children should be screened for any type of abuse.

But despite my praise of this study, I have a difficult time as a pediatrician and child abuse physician accepting that in a population in which the pre-test probability of disease is 45% (as it was in this population) that screening for the disease is not indicated in every child in the population. Is there any other disease with a pre-test probability of 45% in which we would even consider not screening every patient? If 45% of women in a population had breast cancer, would we try to develop a CDR to avoid screening some of these women? Screening for AHT in children with TBI involves a skeletal survey and dilated eye examination, minimal interventions compared with all the interventions a child in a PICU is likely to get. The authors have chosen a point along the continuum of children who may need an evaluation for AHT (e.g. young children in the PICU with TBI) where the prevalence of disease is so high that a CDR is not indicated. Indeed, a CDR in the PICU may be potentially harmful; the negative predictive value is not 100%, a negative screen may give physicians a false sense of security that a child does not have AHT. This CDR would be more useful had it been derived in a population of children who were at a much earlier point in the evaluation process (i.e. prior to getting a head CT or after the head CT, but prior to the decision to admit to a PICU).

The authors clearly articulate all the reasons why physicians may not screen for AHT including parental stress, doctor-parent relationship, cost and parental stigma. While these may all be true reasons why physicians don't screen, these reasons focus on the adults - the doctor and the parent - rather than on the child. As we know from countless situations in which abuse is missed, what is best for the child is often not what is best or easiest for adults.

If we lived in an ideal world, deciding when to screen for specific conditions would be dictated only by what is best for the child. In this ideal world, physicians would do a skeletal survey and dilated eye examination in all young children with non-motor vehicle related TBI. But until that time comes, perhaps development of a CDR will ultimately protect more children than the status quo. While I am willing to admit that the approach of Hymel and colleagues may be more realistic, I wish I lived in the ideal world in which we didn't need to try to meet the needs of the adults who care for children rather the needs of the children they care for.

References

1. Billmire ME, Myers PA. Serious head injury in infants: accident or abuse? *Pediatrics*. 1985; 75(2): 340–342. [PubMed: 3969337]
2. Keenan HT, Runyan DK, Marshall SW, Nocera MA, Merten DF, Sinal SH. A population-based study of inflicted traumatic brain injury in young children. *JAMA*. 2003; 290(5):621–626. [PubMed: 12902365]
3. Talbot, G. Abusive Head Trauma in Children. In: Rowin, M.; Spinella, PC., editors. *Current Concepts in Pediatric Critical Care*. Prospect: Society of Critical Care Medicine; 2010. p. 9-19.
4. Jenny C, Hymel KP, Ritzen A, Reinert SE, Hay TC. Analysis of missed cases of abusive head trauma. *JAMA*. 1999; 281(7):621–626. [PubMed: 10029123]
5. Wood JN, Hall M, Schilling S, Keren R, Mitra N, Rubin DM. Disparities in the evaluation and diagnosis of abuse among infants with traumatic brain injury. *Pediatrics*. 2010; 126(3):408–414. [PubMed: 20713477]

6. Lane WG, Rubin DM, Monteith R, Christian CW. Racial differences in the evaluation of pediatric fractures for physical abuse. *Jama*. 2002; 288(13):1603–1609. [PubMed: 12350191]
7. Rangel EL, Cook BS, Bennett BL, Shebesta K, Ying J, Falcone RA. Eliminating disparity in evaluation for abuse in infants with head injury: use of a screening guideline. *J Pediatr Surg*. 2009; 44(6):1229–1235. [PubMed: 19524746]
8. McGinn TG, Guyatt GH, Wyer PC, Naylor CD, Stiell IG, Richardson WS. Users' guides to the medical literature: XXII: how to use articles about clinical decision rules. Evidence-Based Medicine Working Group. *Jama*. 2000; 284(1):79–84. [PubMed: 10872017]
9. Atabaki SM, Stiell IG, Bazarian JJ, et al. A clinical decision rule for cranial computed tomography in minor pediatric head trauma. *Arch Pediatr Adolesc Med*. 2008; 162(5):439–445. [PubMed: 18458190]
10. Kuppermann N, Holmes JF, Dayan PS, et al. Identification of children at very low risk of clinically-important brain injuries after head trauma: a prospective cohort study. *Lancet*. 2009; 374(9696):1160–1170. [PubMed: 19758692]
11. Kharbanda AB, Taylor GA, Fishman SJ, Bachur RG. A clinical decision rule to identify children at low risk for appendicitis. *Pediatrics*. 2005; 116(3):709–716. [PubMed: 16140712]
12. Bleeker SE, Derksen-Lubsen G, Grobbee DE, Donders AR, Moons KG, Moll HA. Validating and updating a prediction rule for serious bacterial infection in patients with fever without source. *Acta Paediatr*. 2007; 96(1):100–104. [PubMed: 17187613]
13. Bleeker SE, Moons KG, Derksen-Lubsen G, Grobbee DE, Moll HA. Predicting serious bacterial infection in young children with fever without apparent source. *Acta Paediatr*. 2001; 90(11):1226–1232. [PubMed: 11808890]
14. Hymel K, Wilson D, Boos S, et al. Derivation of a clinical prediction rule for pediatric abusive head trauma. *Pediatr Crit Care Med*. 2012 in press.