

Deciding Whether to Screen for Abusive Head Trauma: Do We Need a Clinical Decision Rule?*

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Abusive head trauma (AHT) is the leading cause of death from traumatic brain injury (TBI) in children aged 2 yrs or younger 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 reinjury 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 underevaluation of white infants (5). In a study of missed AHT, children who were Caucasian with married parents were most likely to be misdiagnosed; four of the five 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 that 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 *Pediatric Critical Care Medicine*, Hymel et al (14) describe the derivation of a CDR to help pediatric ICU (PICU) physicians determine which children aged 3 yrs or younger with non-vehicle-associated TBI do not need an evaluation for AHT. 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 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 our praise of this study, the authors have a difficult time accepting that in a population in which the pretest 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 pretest 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 we feel that 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

*See also p. 210.

Key Words: abusive head trauma; child abuse; clinical decision rule

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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. Whereas we are willing to admit that the approach of Hymel et al may be more realistic, we wish we 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 than the needs of the children for whom they care.

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The Blind Physicians and the Elephant on Extracorporeal Membrane Oxygenation*

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Coagulation is, in general, a poorly understood biologic system that is influenced by many patient factors, including inflammation, endothelial function, temperature, acidosis, hemoglobin concentration, and genetic influences (1, 2). It is a very complex and dynamic process that under physiologic conditions maintains blood in a liquid phase, but allows for rapid clot formation under pathologic conditions, such as blood vessel disruption.

*See also p. e77.

Key Words: anticoagulation; critical care; extracorporeal membrane oxygenation; pediatric

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The monitoring of coagulation is just as complex. Because it is a biologic system and not a single entity, it is not as simple as determining a specific parameter, such as the partial pressure of oxygen or the concentration of hemoglobin that can be interpreted and treated directly. The goal in monitoring coagulation is to determine either the potential to form a clot or to evaluate clot strength depending upon the scenario. Although specific contributors to coagulation can be measured in isolation, such as pro and anticoagulation factors (Factor V and AT III), platelet concentration, and measures of drug activity (anti-Xa), these do not provide information regarding overall clot strength. Partial functional measures of coagulation that assess time to fibrin formation (international normalized ratio/partial thromboplastin time, activated coagulation time) provide information on one aspect of coagulation without incorporating platelet function and as a result may not accurately reflect a complete quantitative assessment of clot strength. For example, the use of heparin can reduce thrombin and fibrin formation that would be evidenced by a prolonged partial thromboplastin time, but if the patient's platelets remain activated the patient may still have increased clot strength and be at risk for adverse thrombotic events. Discordance between partial and global functional measures of coagulation has been documented recently, where global measures appeared to be more accurate according to multiple specific measures of coagulation (3). Therefore, although it is informative to measure the specific effects of a therapy with