

Classifying Injuries in Young Children as Abusive or Accidental: Reliability and Accuracy of an Expert Panel Approach

Douglas J. Lorenz, PhD¹, Mary Clyde Pierce, MD^{2,3}, Kim Kaczor, MS², Rachel P. Berger, MD, MPH⁴, Gina Bertocci, PhD, PE⁵, Bruce E. Herman, MD⁶, Sandra Herr, MD⁷, Kent P. Hymel, MD⁸, Carole Jenny, MD, MBA⁹, John M. Leventhal, MD¹⁰, Karen Sheehan, MD, MPH^{2,3}, and Noel Zuckerbraun, MD, MPH⁴

Objective To assess interrater reliability and accuracy of an expert panel in classifying injuries of patients as abusive or accidental based on comprehensive case information.

Study design Data came from a prospective, observational, multicenter study investigating bruising characteristics of children younger than 4 years. We enrolled 2166 patients with broad ranges of illnesses and injuries presenting to one of 5 pediatric emergency departments in whom bruises were identified during examination. We collected comprehensive data regarding current and past injuries and illnesses, and provided deidentified, standardized case information to a 9-member multidisciplinary panel of experts with extensive experience in pediatric injury. Each panelist classified cases using a 5-level ordinal scale ranging from definite abuse to definite accident. Panelists also assessed whether report to child protective services (CPS) was warranted. We calculated reliability coefficients for likelihood of abuse and decision to report to CPS.

Results The interrater reliability of the panelists was high. The Kendall coefficient (95% CI) for the likelihood of abuse was 0.89 (0.87, 0.91) and the kappa coefficient for the decision to report to CPS was 0.91 (0.87, 0.94). Reliability of pairs and subgroups of panelists were similarly high. A panel composite classification was nearly perfectly accurate in a subset of cases having definitive, corroborated injury status.

Conclusions A panel of experts with different backgrounds but common expertise in pediatric injury is a reliable and accurate criterion standard for classifying pediatric injuries as abusive or accidental in a sample of children presenting to a pediatric emergency department. (*J Pediatr* 2018;■■■:■■■-■■■).

See editorial, p ■■■ and related article, p ■■■

Victims of child abuse are at high risk of future abuse and death.^{1,2} Decision rules for identifying abusive injuries are valuable for settings such as pediatric emergency departments (PEDs). These rules require thorough evaluation to ensure both classification accuracy and agreement among users. A significant challenge in such development and evaluation is that the true nature of the injury, abusive or accidental, often is not definitively known. Therefore, clinicians and researchers alike must depend on empirical and/or corroborative³ evidence to classify injuries.⁴ The availability of corroborative information, such as a confession, is uncommon and the absence of a criterion standard for classifying injuries as abusive or accidental can adversely affect research in child abuse.

A potential approach to establishing a criterion standard classification of injuries is the opinion of a panel of pediatric injury experts—pediatric emergency medicine physicians, child abuse pediatricians, and researchers in the biomechanics of pediatric injury—wherein classification is based on empirical evidence including consistency of history and injury compatibility. Expert panels have been widely used for the classification of uncertain outcomes in diverse clinical settings.⁵⁻⁸ In child abuse research, expert panels have previously been used to evaluate the likelihood of abuse in children with fractures,⁹⁻¹¹ develop guidelines for ordering skeletal surveys,¹² examine differences of opinion among clinicians using

From the ¹Department of Bioinformatics and Biostatistics, School of Public Health and Information Sciences, University of Louisville, Louisville, KY; ²Division of Emergency Medicine, Ann & Robert H. Lurie Children's Hospital of Chicago; ³Department of Pediatrics, Northwestern University Feinberg School of Medicine, Chicago, IL; ⁴Department of Pediatrics, University of Pittsburgh, Children's Hospital of Pittsburgh of UPMC, Pittsburgh, PA; ⁵Department of Bioengineering, J.B. Speed School of Engineering, University of Louisville, Louisville, KY; ⁶Department of Pediatrics, University of Utah School of Medicine, Salt Lake City, UT; ⁷Division of Pediatric Emergency Medicine, University of Louisville, Louisville, KY; ⁸Department of Pediatrics, Division of Child Abuse Pediatrics, Hershey, PA; ⁹Department of Pediatrics, University of Washington, Seattle Children's Hospital, Seattle, WA; and ¹⁰Department of Pediatrics, Yale School of Medicine, New Haven, CT

Supported by the *Eunice Kennedy Shriver* National Institute of Child Health and Human Development (R01HD060997 to M.P.) and by The Grainger Foundation. B.H. received payment for expert witness record review and testimony related to children with concern for abuse. G.B. received payment for expert testimony in cases of pediatric injury. The Yale Department of Pediatrics received payment for J.L.'s expert testimony related to children with concern for abuse. University of Pittsburgh Physicians (UPP) received payment for R.B.'s expert testimony related to children with concern for abuse. The other authors declare no conflicts of interest.

CPS Child protective services
PED Pediatric emergency department

0022-3476/\$ - see front matter. © 2018 Elsevier Inc. All rights reserved.

<https://doi.org/10.1016/j.jpeds.2018.01.033>

different abuse rating scales,¹³ and evaluate the impact of structured decision-making tools on child maltreatment decisions made by child abuse practitioners.¹⁴

The purposes of this study were to examine the interrater reliability of an expert panel with regard to classifying pediatric injuries as abusive or accidental, and to demonstrate the accuracy of the approach in cases with definitive corroborative information. We hypothesized that the expert panel would exhibit substantial interrater reliability and accuracy in the classification of pediatric injuries as abusive or accidental.

Methods

Data came from patients enrolled in a prospective, observational, multicenter study investigating the bruising characteristics of young children and the psychosocial characteristics of their families. Eligible children were less than 4 years of age, presented to a PED participating in the bruising study with any chief complaint, and had bruising identified by a previously described^{15,16} structured skin examination. Excluded children were patients with known coagulation abnormalities, severe neurologic impairments, severe extensive skin disorders, and motor vehicle crash victims. The study was conducted at 5 children's hospitals, each associated with a large, urban, academically affiliated tertiary care hospital: Ann & Robert H. Lurie Children's Hospital of Chicago, University of Chicago Medicine Comer Children's Hospital, Cincinnati Children's Hospital Medical Center, Rady Children's Hospital, and Norton Children's Hospital. The sites cumulatively evaluate over 70 000 children annually in the target age range. Study investigators enrolled patients from participating sites by informed parental consent unless the team providing treatment at the participating PED obtained a child abuse consultation, in which case waivers of authorization were allowed. Institutional Review Board approval was obtained at each site.

Expert Panel and Data Provided for Case Assessment

The expert panel included 9 members: 4 child abuse pediatricians, 4 pediatric emergency medicine physicians, and a bioengineer with expertise in pediatric injury. Panelists had 14-39 years of experience in their respective fields.

Each panelist received deidentified case information in a standardized electronic format, including data from the patient's current visit to a participating PED as well as available data from any previous ED visits for any chief complaint. The following case information was included: patient's age and sex; all notes related to the patient's reason for visit and history, taken verbatim from the medical documentation after redaction of identifiers; additional detailed historical data regarding the injury event; photographs of the skin injuries; and diagnostic imaging that identified any internal injuries (fractures, brain hemorrhages, chest or abdominal injuries) along with the official radiologist's report. Each panelist independently reviewed the case information and was required to answer a structured series of questions regarding history con-

sistency, injury compatibility, and other case characteristics (**Appendix**; available at www.jpeds.com). We blinded panelists to all case data on psychosocial risk factors, including history of domestic violence, substance abuse, criminal activity, etc. Each panelist independently rated the likelihood of abuse on an ordinal scale with 5 levels: "definite abuse," "likely abuse," "indeterminate," "likely accident," and "definite accident." Panelists were given no guidance in distinguishing "definite" from "likely," and exercised full and free judgment in their selections. In addition, each panelist provided a yes or no answer to the question: "Is a report to state child protective services (CPS) indicated?"

Enrollment and case categorization occurred from December 2011 through March 2016. Members of the expert panel evaluated and classified 2166 cases. We randomly selected a subset of 201 test cases to be reviewed by all 9 panelists, representing roughly 10% of the targeted enrollment of 2000 cases. As it was not feasible for each panelist to review all 2166 cases, we randomly assigned the remaining cases so that at least 2 panelists independently reviewed each case. Panelists were not given discretion over which cases to review. All panelists provided ratings for the cases they were assigned with no refusals.

Of the 2166 cases, we found that 584 could be more definitively classified as abuse or accident based on additional corroborative information obtained after the visit to the PED.⁴ Corroborated cases were defined as those in which there was video capture of the event, a confirmed public event, a third party account such as confirmatory documentation from a licensed daycare, a confession of abuse, criminal conviction of abuse, injury from a confirmed domestic violence conflict, or concurrent sibling injury with confession and/or conviction of abuse. Two investigators not on the expert panel coded the presence or absence of corroborative criteria for each case. Corroborative information was in some cases available to panelists through the history of injury, but panelists were not aware of the criteria used to define corroborated cases. For example, if a child fell from a swing set in a confirmed public event, the panelists reviewing the case would know from the injury history that the injury occurred in a public setting, but was not aware that this information qualified the case as a corroborated accident. We used these corroborated case classifications to determine the accuracy of the classifications provided by the expert panel. **Figure 1** (available at www.jpeds.com) provides a diagram of the different subsets of cases and how they were used in analyses of reliability and accuracy.

Statistical Analyses

We summarized panelists' classifications of the likelihood of abuse and reports to CPS with counts and percentages. We assessed the interrater reliability of the expert panel for the 5-level likelihood of abuse by calculating the Kendall coefficient of concordance, a measure of reliability for ordinally scaled variables. We calculated the Fleiss kappa coefficient to assess reliability for the report to CPS, which is appropriate for dichotomous variables. To account for differences in panelists' personal inclinations to use the "definite abuse" and "definite accident" categories, we also calculated reliability statistics for derived

Download English Version:

<https://daneshyari.com/en/article/8812140>

Download Persian Version:

<https://daneshyari.com/article/8812140>

[Daneshyari.com](https://daneshyari.com)