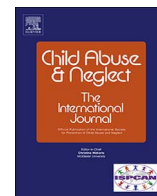


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## Occult abusive injuries in children brought for care after intimate partner violence: An exploratory study

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### ABSTRACT

Children in homes with intimate partner violence (IPV) are at increased risk for physical abuse. We determined the frequency and injury patterns in children who underwent child abuse consultation after IPV exposure by retrospectively analyzing the "Examination of Siblings To Recognize Abuse" cohort of children referred for physical abuse. Children were selected who presented after IPV exposure. Among 2890 children evaluated by child abuse pediatricians, 61 (2.1%) patients presented after IPV exposure. Of the 61, 11 (18.0%) were exposed to IPV, but had no direct involvement in the IPV event, 36 (59.0%) sustained inadvertent trauma during IPV, and 14 (23.0%) were directly assaulted during IPV. Thirty-six patients (59.0%) had an injury: 31 (51.0%) had cutaneous injuries and 15 (24.6%) had internal injuries including fracture(s), intracranial or intra-abdominal injury. Of the 15 patients with internal injuries, 14 (93.3%) were less than 12 months old. Among the 36 patients with injuries, 16 (44.4%) had no report of direct injury, a report of a mechanism that did not explain the identified injuries, or a report of trauma without a specific mechanism. Five (13.9%) did not have physical examination findings to suggest the extent of their internal injuries. Injuries are present in a significant proportion of children presenting to Emergency Departments after IPV exposure. History and physical examination alone are insufficient to detect internal injuries especially in infants. These preliminary results support the need for future, prospective studies of occult injury in children exposed to IPV.

### 1. Introduction

Violence is a disease that often affects households, not just individual patients. Family violence, which includes intimate partner violence (IPV), child abuse, elder abuse and animal maltreatment, refers to violence occurring between family members including, but not limited to, intimate partners. Every year in the United States, 2–4 million women and 0.5–1 million men report IPV and approximately 15 million children are exposed to IPV (McDonald, Jouriles, Ramisetty-Mikler, Caetano, & Green, 2006). Exposure to IPV as a child is a significant source of morbidity and mortality and has been shown to adversely affect both emotional (Kitzmann, Gaylord, Holt, & Kenny, 2003) and physical health in adulthood (Felitti, 2009).

Children in whom physical abuse is missed are at risk for recurrent, escalating abuse, and early recognition and intervention is critical to improve outcomes (Jenny, Hymel, Ritzen, Reinert, & Hay, 1999; Oral, Yagmur, Nashelsky, Turkmen, & Kirby, 2008; Thackeray, 2007; Deans et al., 2013; Thorpe, Zuckerbraun, Wolford, & Berger, 2014; US Department of Health & Human Services

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Administration for Children & Families, 2015). Identification of violence affecting one household member might provide an opportunity for early recognition and mitigation of violence affecting other household members (Campbell, Thomas, Cook, & Keenan, 2013). Multiple studies document an overlap between IPV and child maltreatment (Christian, Scribano, Seidl, & Pinto-Martin, 1997; Appel, 1998; Edleson, 1999; Jouriles, McDonald, Slep, Heyman, & Garrido, 2008; Casanueva, Martin, & Runyan, 2009; Hamby, Finkelhor, Turner, & Ormrod, 2010). In families reported to child protective services (CPS) for child maltreatment or in those living in domestic violence shelters, reports of co-occurring child maltreatment and IPV are as high as 30–60% (Appel, 1998; Jouriles et al., 2008). For this reason and due to reporting mandates in different states nationwide, CPS staff may evaluate some of the children who are identified in homes where there is a report of IPV (Gateway, 2003). Children are also sometimes brought for medical evaluation and care after exposure to IPV (Hazen et al., 2007). However, there is little guidance in the literature about medical evaluation when young children present to emergency departments (EDs) after exposure to IPV.

Several diagnostic studies (skeletal survey (SS), neuroimaging, retinal exam, liver function tests (LFTs)) can identify occult injuries in children at high risk for physical abuse (Greiner et al., 2013; Lang, Cox, & Flores, 2013; Laskey, Holsti, Runyan, & Socolar, 2004; Lindberg et al., 2013, Lindberg et al., 2014; Lindberg, Beaty, Juarez-Colunga, Wood, & Runyan, 2015; Rubin, Christian, Bilaniuk, Zazyczny, & Durbin, 2003). However, as these tests are associated with some level of cost, time, and risk, they should not be performed unless there is a reasonable risk of occult injury. It is likely that some children presenting to an ED after exposure to IPV will themselves be victims of abuse, but to date, there is no data describing occult injuries in this group of children. Our objective, therefore, was to examine the frequency and patterns of injuries in children where consultation with a child abuse pediatrician (CAP) was initiated because of an episode of IPV.

## 2. Methods

This was a retrospectively planned secondary analysis of the Examining Siblings to Recognize Abuse (ExSTRA) study, methods of which have been published previously (Lindberg et al., 2012a). The ExSTRA study was a prospective, multicenter, observational, cross-sectional study of children < 10 years of age referred to a CAP due to concerns about physical abuse. Similar to the parent study, this secondary analysis examined testing results from both index children (who were brought for concerns of physical abuse) and their contacts (siblings and other children in the household who were not initially brought for care). The parent study recommended physical examination, skeletal survey and neuroimaging in a subset of the contact children (Lindberg et al., 2012b). All other testing, including all testing in the index children, was undertaken at the discretion of the clinical team. No specific testing was recommended or required by research protocol in the children exposed to IPV.

Data were entered prospectively into a web-based data entry form and data collected included demographic information, history of present illness, results of the clinical evaluation and diagnostic work-up, and disposition of the child. Specific data were collected about the presence and patterns of multiple injury types including cutaneous injuries (bruises, burns), fractures, traumatic brain injuries, retinal hemorrhages, intra-abdominal injuries and oro-pharyngeal injuries. Each child abuse team received approval from their respective institutional review boards to participate in the parent study with waiver of informed consent. The Colorado Multi-Institutional Review Board deemed this secondary analysis to be exempt from review as it dealt only with previously collected data that could not be linked to patients.

The ExSTRA data collection instrument included both structured (e.g., yes/no, checkbox) and unstructured (e.g., free-text, narrative) data. Investigators coded the history of present illness using unstructured text as well as the following 6 structured categories for the reported mechanism of injury (No history of trauma, fall, MVC, assault, struck by object, or other). Investigators were asked to code all participants who presented after an episode of IPV within the assault category. For this secondary analysis, a cohort was assembled including all cases with a code for “assault” and all cases in which the following terms were identified by searching the unstructured data: “domestic,” “violence,” “DV,” “IPV,” “intimate,” “family violence,” “assault,” “battery,” “confrontation,” “arson,” “coercion,” “intimidation;” “altercation,” “beat,” “stab,” and “strangle.” Search terms were chosen by using all terms that referred to intimate partner violence from within the unstructured text data of children coded as “assault” and with additional synonyms from the literature. Within this cohort of patients, one investigator (GT) reviewed all unstructured fields, masked to testing results and injury codes, to determine whether the child had presented after an episode of IPV. A second reviewer (DL) independently examined 32 (10%) participants randomly selected from this initial cohort to determine inter-rater reliability.

Next, two investigators (DL and GT) independently reviewed the unstructured data of all the records in the study cohort and grouped cases according to the history provided, into the following 3 mutually exclusive categories: 1) IPV mentioned or observed but child not directly involved (e.g., child was in crib at time of IPV between mother and father); 2) Child involved at the time of IPV with reports of inadvertent trauma to child (e.g., one adult dropped the child when punched by another adult); and 3) Report of direct assault to the child (e.g. one adult was hitting another and started directly hurting the child).

Descriptive statistics were used to describe the prevalence of demographic features, history and injury characteristics, as well as the yield of imaging studies. Inter-rater reliability was determined using the Cohen’s kappa test. Disagreements in grouping cases into the three categories mentioned above were resolved by consensus among all investigators. Narratives of children with identified internal injuries are reported in their entirety.

## 3. Results

Fig. 1 illustrates the selection of cases for this study. Among the 2890 children in the initial ExSTRA cohort, 627 (21.7%) met our research definition of “physically abused.” Three hundred and fifteen (11%) were identified for full review for this study and 61 (2%)

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