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Age-related incidence curve of hospitalized Shaken Baby Syndrome cases: Convergent evidence for crying as a trigger to shaking☆

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Abstract

Objective: To determine whether there is an age-specific incidence of hospitalized cases of Shaken Baby Syndrome (SBS) that has similar properties to the previously reported "normal crying curve," as a form of indirect evidence that crying is an important stimulus for SBS.
Design and setting: The study analyzed cases of Shaken Baby Syndrome by age at hospitalization from hospital discharge data for California hospitals from October 1996 through December 2000.
Patients: All cases of children less than 18 months (78 weeks) of age for whom the diagnostic code for Shaken Baby Syndrome (995.55) in the International Classification of Disease, Ninth Edition, Clinical Modification was assigned.
Results: There were 273 hospitalizations for SBS. Like the "normal crying curve," the curve of age-specific incidence starts at 2–3 weeks, has a clear peak, and declines to baseline by about 36 weeks of age. In contrast to the normal crying curve that peaks at 5–6 weeks, the peak of SBS hospitalizations occurs at 10–13 weeks.
Conclusions: The age-specific incidence curve of hospitalized SBS cases has a similar starting point and shape to the previously reported normal crying curve but the peak occurs about 4–6 weeks later. Of the likely predisposing

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causes, this pattern is only consistent with the properties of early crying. There are numerous explanations for the lag in the peaks between crying and SBS hospitalizations, including the possibility of repeat shakings prior to hospitalization. The importance of crying as a stimulus to SBS may provide an opportunity for preventive intervention.

Keywords: Crying; Shaken Baby Syndrome; Child abuse; Prevention; Battering

Introduction

Shaken Baby Syndrome (SBS) is a form of intentional injury to infants and children inflicted by violent shaking with or without concomitant contact with a hard surface, resulting in head trauma including subdural hematomas, diffuse axonal injury, and retinal hemorrhages but also often fractures of the long bones or ribs, with little or no external evidence of trauma. Although usually attributed to John Caffey (Caffey, 1972, 1974) the first explicit report of shaking resulting in such lesions was published by the British pediatric neurosurgeon Dr. Norman Guthkelch (Guthkelch, 1971). In one of the case histories in Guthkelch's series and occasionally in Caffey's original reports (Caffey, 1974, 1972), crying as a proximal stimulus for the shaking is explicitly mentioned. In subsequent articles and reviews of Shaken Baby Syndrome, crying is often mentioned as a precipitant (Dykes, 1986; Levitt, Smith, & Alexander, 1996; Ludwig, 1984; Reijneveld, van der Wal, Brugman, Sing, & Verloove-Vanhorick, 2004) usually based on anecdotal reports. This is sometimes supported by the observation that the median age of the cases occurs in the first few months of life when crying is greatest. In the first report of incident factors limited to fatal cases garnered from investigative reports in the United States Air Force, Brewster, Nelson, and Hymel (1998) reported that perpetrators mentioned crying as a stimulus in 58% of the cases. The role of crying as a precipitating stimulus for shaking has also been incorporated in policy statements concerning Shaken Baby Syndrome. In the Policy Statement of the American Academy of Pediatrics on "Shaken Baby Syndrome: Rotational Cranial Injuries" (Committee on Child Abuse and Neglect of the American Academy of Pediatrics, 2001), "crying or irritability" is described as "often" the proximal cause of shaking, and pediatricians are encouraged to ask about "response to the crying infant" as part of anticipatory guidance to prevent Shaken Baby Syndrome. Similarly, in the Canadian "Joint Statement on Shaken Baby Syndrome" (2001) co-signed by eight organizations committed to its prevention, infant demands and "especially crying" are cited as triggers for shaking in exhausted or frustrated caregivers.

Despite the reasonableness and acceptance of the assumption that crying is a trigger for shaking, the objective data supporting its role is limited at best. However, in the last 40 years, increasingly careful investigations of infant crying behavior have demonstrated specific and robust properties of crying that contribute to the frustration that caregivers experience in the first few months of life (Barr, Paterson, MacMartin, Lehtonen, & Young, 2005; Barr, St. James-Roberts, & Keefe, 2001). Furthermore, many of these properties have characteristics that provide an opportunity to acquire indirect convergent evidence of the importance of crying as a stimulus for shaking. The most important of these is a robust age-related pattern of crying. This pattern is manifest as increases in the average daily duration of crying in the first few weeks, a peak sometime in the second month of life, and then decreases to more stable levels by about the fifth month.