

Evaluation of Period of PURPLE Crying, an Abusive Head Trauma Prevention Program

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Keywords

shaken baby syndrome
abusive head trauma
birthing mother
evaluation
prevention

ABSTRACT

The Period of PURPLE Crying program is used to educate parents and caregivers about normal infant crying and the dangers of infant shaking. We evaluated nurse-led, hospital-based implementation of the program using a nonexperimental, posttest-only design. New mothers rated the program as useful, and the program was effective in teaching mothers about normal infant crying, the dangers of infant shaking, and soothing and coping techniques. The findings support the feasibility and need for broad dissemination of the program.

JOGNN, 43, 752-761; 2014. DOI: 10.1111/1552-6909.12495

Accepted April 2014

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Pediatric abusive head trauma (AHT), a form of inflicted brain injury resulting from violent shaking or blunt impact, is a leading cause of death in children younger than age one year with mortality rates ranging from 15% to 38% (Stewart et al., 2011; Ward, Bennett, & King, 2004). The estimated annual incidence of AHT for infants younger than age one is between 29 and 39 per 100,000 infants, although the actual number of AHT cases is likely underreported. Pediatric AHT and AHT prevention have received increased attention, in part due to substantially higher rates during the recent economic recession in the United States (Berger et al., 2011). Although recent studies indicate the rates of AHT are no longer increasing, AHT remains a pressing public health issue (Niederkröthaler, Xu, Parks, & Sugarman, 2013).

Abusive Head Trauma

The Centers for Disease Control and Prevention (CDC) defined AHT as injury due to inflicted blunt impact and/or violent shaking that results in injury to the skull and/or brain (Parks, Annett, Hill, & Karch, 2012). Abusive head trauma is one of the most deadly forms of child abuse (Scribano, Makoroff, Feldman, & Berger, 2013). It often results in damage to the brain, retinal hemorrhages,

and fractures (Shanahan, Zolotor, Parrish, Barr, & Runyan, 2013). Compared with infants who experience other forms of brain injury, infants who experience AHT are 5 times more likely to die and 8 times more likely to have long stays in the hospital following injury (Niederkröthaler et al., 2013). There is very limited recent information available about the long-term consequences of AHT, but early research suggests infants who experience AHT are more likely to have life-long disability including neurologic, cognitive, visual, and developmental impairment compared with infants who experience other forms of head trauma (Ewing-Cobbs et al., 1998). By the time they reach school age, children who experienced AHT often exhibit significant weaknesses in intelligence quotient (IQ), working memory, mental organization, and inhibition (Stipanovic, Nolin, Fortin, & Gobeil, 2008). Nearly all infants who survive AHT will require some form of ongoing care for the rest of their lives (King, MacKay, Sirnack, & Canadian Shaken Baby Study Group, 2003).

Period of PURPLE Crying

To prevent AHT, several parent-education programs have been developed and implemented among infant caregivers (Barr, Barr, et al., 2009;

The authors report no conflict of interest or relevant financial relationships.



Barr, Rivara, et al., 2009; Dias et al., 2005; Goulet et al., 2009; Stewart et al., 2011). The Period of PURPLE Crying is one parent education program that educates parents and caregivers about normal infant crying and the dangers of shaking an infant. The education program is based on a developmental framework that suggests that infants go through a unique developmental phase beginning at age 2 weeks through age 3 to 4 months. During this phase, infants may cry for hours despite efforts to soothe them. The crying may come and go without any discernable external or internal stimuli and last for more than 5 hours per day (Barr, 2013). The infants may look like they are in pain, even when they are not. Because soothing techniques are generally ineffective for this type of crying, parents may become very concerned and disappointed (Barr, 2013). The Period of PURPLE Crying intervention program was designed to educate parents about this unique developmental phase (Barr, 2013).

The program includes an education session with a trained health professional, educational brochure, 10-minute DVD, refrigerator magnet, bib, and caregiver checklist (National Center on Shaken Baby Syndrome, 2011). The acronym *PURPLE* is used to describe specific characteristics of an infant's crying: **P**eaks in crying that are **U**nexplained, **R**esists soothing, are accompanied by a **P**ain-like face, are **L**ong-lasting, and occur in the **E**vening and late afternoon (National Center on Shaken Baby Syndrome, 2011). It has been implemented in 49 states, eight Canadian provinces, and one territory. Results from a randomized controlled trial evaluating Period of PURPLE Crying showed mothers who completed the program were more knowledgeable about normal infant crying and the dangers of shaking an infant and were more likely to talk to their infant's other caregivers about the dangers of shaking an infant (Barr, Barr, et al., 2009). Researchers confirmed that mothers gained knowledge through the education session and found a high level of satisfaction among nurses implementing the program (Stewart et al., 2011).

Although the effectiveness of Period of PURPLE Crying has been demonstrated through randomized control trials that were conducted in relatively resource-rich infrastructures (Barr, Barr, et al., 2009; Barr, Rivara, et al., 2009), the program has not been evaluated following implementation in a community where a randomized trial may not be desirable or applicable. Measuring how Period of PURPLE Crying could be implemented in the com-

munity and the improvement in participating mothers' knowledge and use of soothing and coping techniques will facilitate broader program implementation and consequently reduce the rate of AHT. The aim of this study was to evaluate Period of PURPLE Crying as implemented in five birthing hospitals located around a Midwest city and to measure the effect of the program on mothers' knowledge of the dangers of shaking an infant and use of techniques for soothing and coping with infant crying.

Methods

Study Design and Participants

We used a nonexperimental, posttest-only design to evaluate the program. Five hospitals were selected and enrolled from a stratified sample pool of 12 hospitals located around a Midwest city. The selected hospitals had annual birth rates ranging from 600 to 3500. Participants included new mothers who received the Period of PURPLE Crying intervention and the nurses who delivered the program. Eligible mothers were those who gave birth in one of the enrolled hospitals from March 15 through August 10, 2011, received the Period of PURPLE Crying intervention, spoke and read English, and agreed to participate in the study through signed informed consent. Eligible nurses were those who received training and delivered the program to mothers during the study period.

Intervention

As part of a state mandate to provide voluntary AHT prevention programs to caregivers of infants and young children, The Period of PURPLE Crying intervention program was implemented in five birthing hospitals with the aim of reducing cases of AHT through a nurse-delivered, in-person, educational program for mothers in the hospital after giving birth (Barr, Barr, et al., 2009). Prior to discharge, all birthing mothers received the Period of PURPLE Crying intervention, including an education session from a trained nurse, a full-color 11-page booklet, and 10-minute DVD to take home. During the education session, nurses used the acronym *PURPLE* to describe characteristics of normal infant crying. Nurses also educated mothers about the dangers of shaking an infant, infant-soothing techniques, and methods for coping with infant crying. Nurses emphasized the importance of walking away when frustrated and educating the infant's other caregivers about the consequences of shaking an infant. After the 10-minute in-person education session, nurses

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