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CHILD ABUSE IMAGING

Preventing abusive head trauma: can educating parents reduce the incidence?

Mark S. Dias[1] · Kelly M. Cappos[1] · Carroll M. Rottmund[1] · Marie E. Reed[1] · Kim M. Smith[2] · Kathleen A. deGuehery[2] · Ming Wang[3]

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Abstract

Abusive head trauma (AHT) is the most lethal form of child abuse; preventing AHT should be a national priority, but research into this area is woefully underfunded. Prevention programs have primarily focused on universal parent education during the neonatal period, a time when parents are a captive audience of the health care establishment whose focus is on the needs of their newborn infant, and who will soon be exposed to the frustration and anger of infant crying. Research has suggested a strong causal link between infant crying and AHT, and parents — particularly fathers and father figures — have been identified as the most common perpetrators of AHT. A number of studies have suggested that educating parents during the postnatal period about the normalcy of inconsolable infant crying and its evolution over the first several months of postnatal life improves parental knowledge about infant crying and a number of positive parenting behaviors, and decreases emergency room visits for crying. In 1998, we began a pilot program in Upstate New York near Buffalo that led to a 47% reduction in AHT incidence. Similar studies have demonstrated 35–75% reductions in incidence, which has led to enthusiasm for this approach to preventing AHT. We, as well as another group, have enacted statewide programs in Pennsylvania and North Carolina; unfortunately, these two large statewide replication trials failed to demonstrate any impact of such an intervention on AHT rates. Serial messages for parents, provided repeatedly over the period of greatest risk for AHT, might be another avenue of research.

Keywords Abusive head trauma · Child abuse · Crying · Infants · Prevention · Shaken baby syndrome

Abusive head trauma and crying

Abusive head trauma (AHT) is the most lethal form of physical child abuse, with an overall mortality of 15–38% and permanent neurologic deficits in up to 80% of survivors [1, 2]. Preventing AHT should be an important international goal that receives attention from policy makers, clinicians and the scientific community. An effective AHT prevention program would save both lives and money [3]. Unfortunately, research into child abuse in general, and AHT specifically, is woefully underfunded.

A number of research studies appear to link AHT with inconsolable infant crying [4–7]. Barr and colleagues [4] noted that the infant crying and AHT incidence curves are almost identical in shape, with the AHT curve following the crying curve by about 8 weeks (Fig. 1). Potential reasons for this lag might be related to mounting frustration over time from repeated episodes of infant crying, delays in seeking medical care after injuries, and failure to diagnose earlier sentinel injuries [8]. The correlation between AHT and parental frustration and anger over infant crying has led to the proposal that teaching parents about crying and how best to respond to it, as well as increasing their knowledge about the dangers of violent infant shaking, might prevent AHT. Several studies have documented that parent education improves parental knowledge about infant crying as well as positive parenting behaviors; increases walk-away behaviors in response to persistent infant crying; increases parental coping skills toward stress; improves relaxation, decreases anxiety, and increases

✉ Mark S. Dias
mdias@pennstatehealth.psu.edu

[1] Department of Neurosurgery, Penn State College of Medicine, Penn State Health Hershey Medical Center, 30 Hope Drive, Suite 2750, EC110, Hershey, PA 17033, USA

[2] Women and Children's Hospital of Buffalo, University of Buffalo, Buffalo, NY, USA

[3] Public Health Sciences, Penn State College of Medicine, Penn State Health Hershey Medical Center, Hershey, PA, USA

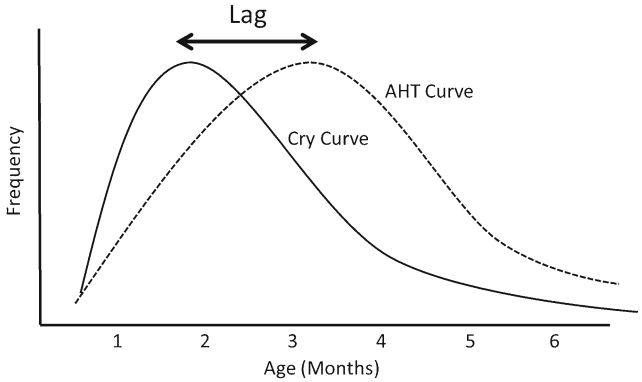

Fig. 1 Illustration of crying and abusive head trauma (AHT) curves. The AHT curve lags behind the crying curve by about 8 weeks

confidence; and decreases emergency room visits for crying [9–13].

Parent education program

Based upon these findings, we embarked on a pilot program in eight counties surrounding Buffalo, NY, to educate parents of every newborn, during the immediate postnatal period, about (1) the normalcy of infant crying, (2) techniques to reduce parental frustration and anger and encourage infant calming and (3) the dangers of violent infant shaking. The program contained eight tenets:

- It was a *primary prevention program*, involving parents of all newborn infants (rather than targeting those perceived to be at high risk).
- It sought to educate parents, and especially fathers and father figures, because parents constitute the highest proportion of perpetrators of AHT and also could be effective advocates in spreading this information to other caregivers.
- It was provided during a consistent time frame — the immediate postnatal period — when parents were a captive audience for health care providers and were focused on their newborn, and would soon be exposed to the frustrations of persistent infant crying.
- Materials were provided in multimedia format (written handouts, unit posters and a video) and in various languages.
- It was administered by nurses or other health educators, bringing the imprimatur of the medical establishment to the program.
- It asked parents to view the materials *prior to discharge* to ensure they had participated.
- It asked parents to sign a commitment statement documenting their participation (these commitment statements were returned to us for tracking purposes).
- It was *simple* and *easy to administer*, taking only 5 min of a nurse's and 15 min of a parent's time.

The program involved all 17 maternity units in the eight-county region. Returned commitment statements were used to track program compliance at each of the hospitals, parent and nurse surveys assessed parent knowledge, and AHT admissions to the Women and Children's Hospital (the only children's hospital for this region) tracked the effectiveness of the program in reducing AHT incidence.

Over the first 5½ years, 97% of returned commitment statements were signed by at least one parent, and 75% by a father or father figure. The program resulted in a statistically significant 47% reduction (P=0.02) in AHT incidence compared with historical incidence rates [2]. The early success of this pilot led to other such programs being implemented in other regions. A second identical program established in Downstate New York reported a 75% reduction in incidence (P=0.03) [14]. A third similar program, begun in British Columbia using the "Period of Purple Crying" materials produced by the National Center on Abusive Head Trauma/Shaken Baby Syndrome, resulted in a 35% reduction in AHT incidence over 8 years among children <24 months (P<0.05) [15].

The Upstate New York program was subsequently introduced in Pennsylvania beginning in 2002 within 31 counties of central Pennsylvania, and was extended to the entire state the following year with both state and federal (Centers for Disease Control and Prevention) funding. The results of this state-wide replication effort, published in 2017, unfortunately failed to demonstrate a significant reduction in AHT incidence compared with either historical rates in Pennsylvania or with contemporaneous rates from other states lacking a statewide prevention effort (Fig. 2) [1]. A second statewide intervention, by Zolotor and colleagues [12], begun in North Carolina in 2008 using the "Period of Purple Crying" materials and reported in 2015, also failed to demonstrate an impact on AHT incidence. Finally, the original Upstate New York program, which has been in existence for more than 20 years, has perhaps lost its effectiveness over time [16].

Moving forward

We are left to ponder the reasons for the ultimate failure of hospital-based parent education programs to reduce AHT incidence. A skeptic would conclude that such a program is simply ineffective — that the results of pilot studies are a statistical aberration that, like so many promising interventions, could not be replicated. A second possibility is that such an initiative cannot be initiated or sustained on a much larger scale such as an entire state. It might also be that direct involvement and leadership from a primary stakeholder is necessary for success; interestingly, the apparent effectiveness of

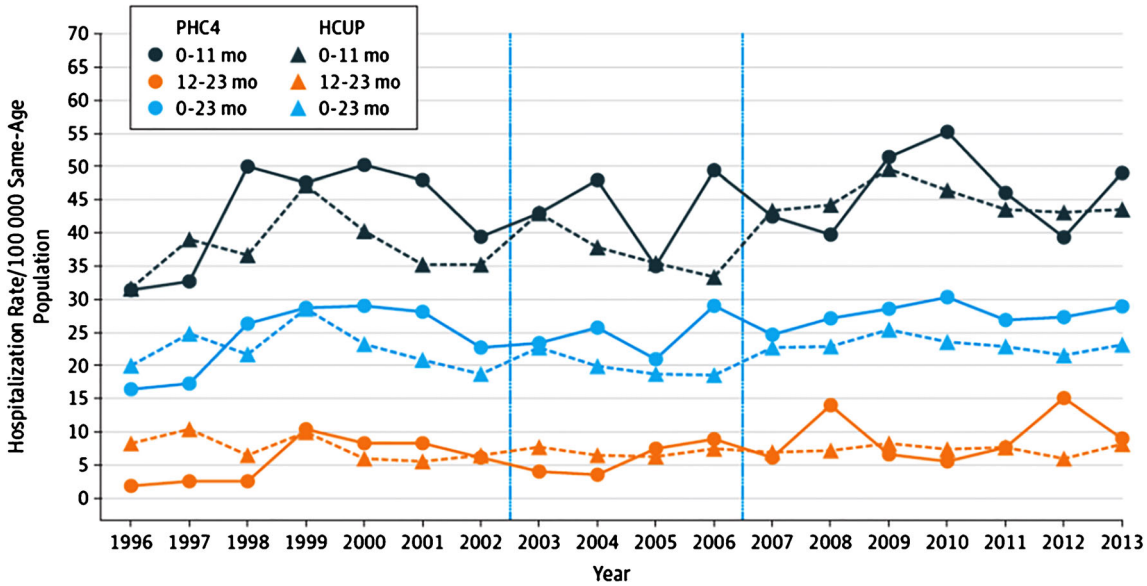

Fig. 2 Abusive head trauma (AHT) incidence rates in Pennsylvania before and during the hospital-based parent education intervention. Rates are calculated among infants and children ages 0–11 months, 12–23 months and 0–23 months, from the Pennsylvania Healthcare Cost Containment Council (PHC4) data set and five other states (Healthcare Cost and Utilization Project [HCUP] data set) before (1996–2002), during (2003–2006) and after (2007–2013) fully implementing the educational intervention. Vertical lines separate the three periods. Reproduced from [1] with permission

the Upstate New York program declined after the primary investigator left the region for Pennsylvania. Whether we should continue to pursue such hospital-based, single interventions is a matter of ongoing debate.

Another approach, and one that we have advocated, is to supplement the initial parent education with follow-up, serial reminders over the first several postnatal months that constitute the period of greatest risk for AHT. We initially approached this by trying to provide information to parents at the time of subsequent postnatal primary care visits. Parents were asked to read a "crying card" with information that reinforced the initial hospital material; we again asked parents to sign a form signifying their receipt of such information. However, in Pennsylvania we were unable to engage enough primary care providers' offices to make this a sustainable approach [1]. We subsequently created a program of serial text messages that reinforced the information, deliverable by smartphone to parents during the first postnatal weeks. Every third message was created as a question to which parents would be asked to respond; we proposed to use these responses as a proxy for program participation. Unfortunately, we could not attain funding for this program, and the effectiveness of such a program has not been studied.

Last, perhaps parent education isn't the best way to address this issue. Recent studies have demonstrated that social supports such as paid family leave after the birth of a child [17] and earned income tax credits [18] have demonstrated a positive impact on AHT rates. Perhaps home visitation to those at greatest risk, as proposed by Olds and colleagues [19–21], would have a greater impact. Whatever the approach moving forward, we still believe that AHT is, at least to some extent, a preventable condition, for which research on prevention strategies should be strongly supported.

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Compliance with ethical standards

Conflicts of interest None

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