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The Neonatal Nurse's Role in Preventing Abusive Head Trauma

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Abstract

Background—Abusive head trauma in infants occurs in 24.6 to 39.8 per 100,000 infants in developed countries. Abusive head trauma refers to any type of intentional head trauma an infant sustains, as a result of an injury to the skull or intracranial contents from a blunt force and/or violent shaking.

Clinical Question—What evidence-based interventions have been implemented by neonatal nurses to prevent abusive head trauma in infants?

Search Strategy: PubMed was search to obtain English language publications from 2005 to May 2014 for interventions focused on preventing abusive head trauma using key terms ‘shaken baby syndrome’.

Search Yield—A total of 10 studies were identified that met the inclusion criteria. All of the interventions targeted prevention of abusive head trauma with information about abusive head trauma/shaken baby syndrome and the ‘normal’ infant crying behaviors.

Main Findings—Interventions taught parents why infants cried, how to calm the infants, ways to cope with inconsolable infants, and how to develop a plan for what to do if they could not cope anymore. Parents who participated in the interventions were consistently able to explain the information and tell others about the dangers of shaking infants compared to the control parents. Only two studies calculated the pre-intervention abusive head trauma rate and the post-intervention frequency of abusive head trauma. Each found significant differences in abusive head trauma.

Keywords

infant; neonatal intensive care; shaken baby syndrome; abusive head trauma; trauma; neonate

Abusive head trauma in infants occurs in 24.6 to 39.8 per 100,000 infants in developed countries.[1-3] Abusive head trauma refers to any type of intentional head trauma an infant sustains, including ‘shaken baby syndrome’.[4] This trauma is a result of an injury to the skull or intracranial contents from a blunt force and/or violent shaking.[5] Infants are especially susceptible to injury because they have weak neck muscles and a disproportionately large head.[6] The brain injury that occurs is divided into two stages: primary and secondary injury. The primary injury is a result of the blunt force or the violent shaking (the mechanical insult).[7] These forces can cause brain stem or cervical spinal cord injury with subsequent

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intracerebral injury producing secondary injury.[7] The secondary insult is a complex stage with the release of toxic substances leading to hypoxia-ischemia, brain swelling, and increased intracranial pressures.[7] Abusive head trauma can lead to devastating long-term consequences for the infant. How to prevent abusive head trauma in infants through evidence-based interventions is critical to decrease poor neurological and cognitive outcomes that can result if infants are abused.

Background

Abusive head trauma can result in poor neurological and cognitive outcomes for infants. In one study, infants who were admitted for abusive head trauma (n = 25) at an average age of 2.3 months were followed up to assess their neurological development at 5 years of age had poor outcomes. Six of the infants died, while 36% of the survivors had severe difficulties and were totally dependent on a caregiver, 16% had moderate difficulties, and 16% had mild difficulties on follow-up. The neurological deficits included motor deficits, visual deficits, epilepsy, speech and language abnormalities, and behavioral problems.[8] Infants with an abusive head trauma, who were assessed at 7-8 years of age, had significantly decreased global intelligence quotient (IQ), poorer mental organization, poorer alternation, and poorer inhibition compared to age-matched controls.[9] In addition to the neurological and cognitive deficits, hearing loss has also recently been identified as a possible consequence of abusive head trauma.[10] The high rates of disabilities from brain injuries indicate a need to identify infants at risk of sustaining abuse.

Abusive Head Trauma Risk Factors and Triggers

Infants at high risk for abusive head trauma are often in a stressful environment. Common risk factors include children < 1 year of age, male, and enrolled in Medicaid compared to children with non-abusive head trauma.[1, 11] In military families, one study found that infants (n = 265) are at increased risk of sustaining an abusive head trauma if they have birth defects, male sex, and preterm births. Neonatal nurses often care for infants who are at risk for abusive head trauma including those who have birth defects, male sex, and preterm births.

In addition to risk factors, triggers have also been identified. A major trigger is inconsolable crying. The crying usually begins around 3-6 weeks for term infants. Hospital admissions of infants with shaken baby syndrome (SBS) peak at 10-13 weeks of life followed by a steady decline after that intense crying period.[12] Crying is a common stimulus that occurs prior to shaking the infant. Thus teaching parents new behavioral techniques to cope with the crying can prevent the shaking when frustration or anxiety occurs; in turn, the abusive head trauma can be prevented. However, a majority of parents may not receive information about abusive head trauma from pediatricians or any other source.[13] Therefore the purpose of this evidence-based review is to determine which interventions are best to provide to parents near discharge of their vulnerable infant from the neonatal intensive care unit (NICU), which are at an increased risk because not only do they have the common risk factors they also likely will have periods of inconsolable crying when they go home.

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Search Strategy

PubMed was search to obtain English language publications from 2005 to May 2014 for interventions focused on preventing abusive head trauma using key terms 'shaken baby syndrome'. The inclusion criteria were clinical studies attempting to decrease the prevalence of inflicted head trauma, abusive head trauma, or shaken baby syndrome. Studies were excluded if they were single case studies.

A total of 10 studies were identified that met the inclusion criteria.[13-22] All of the interventions targeted prevention of abusive head trauma with information about abusive head trauma/shaken baby syndrome and the 'normal' infant crying behaviors. The audience was most often mothers of healthy newborns and less often fathers, other caregivers, and the whole community. The interventions to prevent abusive head trauma were generally a combination of oral, written, or visual information provided by nurses before the parents and infants were discharged from the hospital or within the first several weeks of discharge. The most common standardized intervention presented to parents was called The Period of PURPLE Crying (PURPLE). Table 1 describes the studies, interventions with the specific foci, delivery methods, and outcomes of abusive head injury studies.

Parent participation in the interventions was well received and did not report negative experiences. Most parents reported that the intervention they participated in was relevant and they would recommend others participating in it.[13, 18, 20, 22] In one study,[20] parents suggested follow-up during the peak crying stage of 6-8 weeks after discharge for term infants to provide additional support. Stewart et al. [22] addressed the concern of following-up with parents by having public health nurses contacting parents of newborns and ensuring they received the PURPLE education and materials. The nurses also reinforced the teaching and answered questions that parents had about abusive head trauma. Given that crying continues to increase and peaks at 6-8 weeks for term infants, following-up with parents during that time frame seems critical to prevent abusive head trauma.

The outcomes from the studies were positive. The majority of the outcome measures were focused on knowledge attainment and sharing information with other caregivers. Parents were taught why infants cried,[15, 16] how to calm the infants,[21] ways to cope with inconsolable infants,[17] and developed a plan for what to do if they could not cope anymore.[19, 20, 22] Parents who participated in the interventions were consistently able to explain the information and tell others about the dangers of shaking infants compared to the control parents.

Only two studies were able to calculate the pre-intervention abusive head trauma rate and then the post-intervention frequency of abusive head trauma.[14, 18] Dias et al.[18] found that in the 6 years prior to the abusive head trauma intervention the average number of cases of abusive head trauma was 8.2 cases per year in an eight county region in western New York. During the 5.5 years of the intervention, Dias et al. saw a reduction of the cases to 3.8 cases per year. Altman et al.[14] also had similar results reducing from 14 case in a 5 year period before the intervention was introduced to 2 cases in a 3 year period during the intervention

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period in the Hudson Valley Region outside of New York City at a single Children's hospital. These are significant reductions in abusive head trauma.

Four studies used the *Period of PURPLE Crying* intervention and demonstrated positive results.[15, 16, 19, 22] Based on these findings and the availability of the intervention to parents and healthcare providers, *Period of PURPLE Crying* is recommended for use prior to parent discharge with infants and at follow-up pediatrician visits. *Period of PURPLE Crying* aims to increase parental knowledge of abusive head trauma/shaken baby syndrome and increase coping skills of parents when infants have inconsolable crying. The phase the intervention focuses on is a normal developmental period between 2 weeks and 3-4 months of age in full-term infants, in which some babies cry a lot and often resist soothing. An important part stressed to parents is that it is a ‘period’ meaning it does have a beginning and an ending. The word ‘PURPLE’ also reminds parents of important characteristics to remember (see Table 2).

The education portion of the training teaches parents about abusive head trauma, why infant's cry, and what increases an infant's risk of trauma. The training specifically provides parents with skills on how to sooth the baby, management of frustration and anger, how to protect their infant, and practical skills to deal with crying. Many states also have hot lines that parents can call if they are feeling stressed and overwhelmed. Most importantly parents need to know that they can call someone and have a plan to handle the stress, anxiety, anger, or frustration that comes with having an inconsolable infant.[23]

Recommendations for Practice

Primary prevention efforts should be undertaken for all parents of infants discharged from the intensive care unit. Infants who have required hospitalization in the neonatal intensive care unit or extended hospitalization during the newborn period may not have bonded with their parents as much and may have medical conditionals that put them at risk for abusive head injury. Nurses in the neonatal care unit can help prevent abusive head trauma through primary and secondary prevention mechanisms. Primary prevention of abusive head trauma targets involving parents in the care of their infant and teaching parents about the normal developmental outcomes tailored to their infant. Parental involvement in the care of the infant is to help parents feel less helpless or inadequate as parents. Holding and providing care also allows the parents to understand the development of the infant and what to expect as the infant continues to grow. Discussions about normal expectations and normal feelings to expect when taking home a newborn should also be discussed with new parents. Nurses also need to discuss techniques on dealing with inconsolable crying and help parents create a concrete emergency action plan that can be implemented if parents begin to feel overwhelmed, frustrated, or angry when their infant is inconsolable. Secondary prevention interventions may be necessary if needs are identified during family meetings. This would include identification of high-risk families and providing additional interventions. For premature infants or infants with neurological conditions, high-risk families may lack understanding about normal expectations for development or have unrealistic insights into the behaviors of preterm infants. Further investigation and monitoring of these families is important to prevent abusive head trauma.[24]

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Prevention of abusive head trauma is critical. Most studies report that parents had a good understanding of abusive head trauma. Parents however showed the most improvement in identifying methods to cope with inconsolable crying and understanding that crying is part of normal development. While the studies demonstrated positive pre- and post-intervention knowledge improvement, decreases in the rates of abusive head trauma were only shown in two studies. Truly showing decreased rates in the population is necessary to assess whether the interventions are successful. Continued research and follow-up is warranted to determine if the rates of abusive head trauma can be reduced and stay reduced with the interventions.

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Table 1

Abusive Head Trauma Study Findings

Author/Date Program	Program Foci	Delivery of Intervention	Results
Goulet/2009 PSBSPP*	Infant crying, parental anger, and knowledge about SBS	Delivered orally by nurses using written cue cards with information on them about each focal point.	Parents reported intervention was highly relevant and appreciated the intervention. Parents reported the intervention should be continued.
		Parents also created a written action plan to cope with continuous crying and signed the document.	Parents disagreed about timing of the intervention. Parents reported that the information on the cue cards was useful and agreed the amount of information was appropriate. Parents found the action plan useful, but did not report signing the plan necessary.
Bechtel/2011 Take 5 Safety Plan for Crying	Beliefs about infant crying and knowledge of SBS	Delivered by pediatric residents using a standardized script.	Caregivers who received the intervention were more likely to state they would take a break when the infants were crying compared to the control group and less likely to say they would continue to try to soothe the infant if they were frustrated. There was no difference between groups about knowledge of SBS.
Altman/2011	Dangers of shaking infants and how to cope safely with an infant's crying	Delivered by nurses providing a written leaflet explaining abusive head trauma and how to prevent it along with an 8-minute video and parents signing a statement acknowledging being given the information.	A total decrease from 2.8 injuries/year to 0.7 injuries/year, which is a 75% reduction in abusive head injuries.
Dias/2005	Dangers of violent infant shaking and ways to handle persistent infant crying	Delivered by nurses providing information about violent infant shaking through a 1-page leaflet, having parents view a video about the dangers of shaking and suggesting ways to handle persistent infant crying. Then have parents sign a commitment statement acknowledging receiving and understanding of information provided on SBS. Posters were also displayed throughout the wards to provide information to families and visitors.	Majority of parents had prior knowledge of dangers of infant shaking. Most parents reported the information was helpful and should be provided to all new parents. Prior to the implementation of the study, the average number of abusive head trauma cases per year was 8.2. After the intervention the number of cases was reduced by 42%, down to 3.8 cases per year, which was statistically significant.
Meskauskas/2009	Reasons for crying and ways to soothe infant crying, impact SBS can have on family life, and ways to prevent SBS	Delivered by nurses providing oral information to parents about reasons infants cry and techniques to help soothe the infant and ways to cope if the infant does not stop. Parents also shown a short video about how a family was affected after SBS. Nurses then reviewed a written brochure with to offer additional tips to soothe a crying infant and provided the phone number of the Parental Stress Line. Once the training was complete, the parents signed a form acknowledging receipt and understanding of information about SBS.	At follow up, parents reported remembering the dangers of shaking a baby and how to calm the infant. They called reading the brochure and also reported sharing the information with others.
Barr/2009 PURPLE	Infant crying behaviors and how to cope	Public health nurses provided parents with the PURPLE materials (intervention group), which include an 11-page booklet and a DVD. Control group received information about infant safety via a booklet and a DVD.	Mothers who received the PURPLE materials had higher crying knowledge than the mothers who received the control materials. Mothers who received the PURPLE materials had more knowledge of how to respond to crying than mothers who received the control materials. More mothers in the PURPLE group shared information with other caregivers about how to cope with inconsolable crying than mothers receiving control material.
Deyo/2008	Information about SBS, typical	Parents watched a video *Portrait of a Promise: Preventing Shaken Baby Syndrome,*	Majority of participants had previous knowledge of SBS, but thought that SBS

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Author/Date Program	Program Foci	Delivery of Intervention	Results
Love Me…Never Shake Me	patterns of infant crying, soothing techniques for infant crying, and self-coping techniques	reviewed educational materials with the nurse, and signed a personal commitment statement.	education was helpful and would recommend it to all new parents. A total of 62% of participants reported they did not receive other information about SBS from their pediatrician or any other source, following the birth of their infant. At follow-up, 94% of participant knew what to do when they become stressed when caring for their infant.
Barr/2009 PURPLE	Infant crying behaviors and how to cope	Parents were mailed the material including PURPLE materials (intervention group), an 11-page booklet and a DVD. Control group received information about infant safety via two booklets and a DVD.	Knowledge of crying was significantly higher in mothers who received the intervention. Self-talk was significantly higher in mothers who received the intervention compared to the mothers in the control group. Mothers in the intervention group were more likely to share information about walking away from the infant if they become frustrated with crying compared to mothers in the control group.
Stewart/2011 PURPLE	Infant crying behaviors and how to cope	Nurses provided parents with PURPLE materials including an 11-page booklet and a DVD, followed by a scripted discussion with the nurses. Public health nurses then followed up with parents to ensure they received the information and answered any questions. Finally a media campaign was launched to normalize infant crying as normal development.	Most parents reported the program as useful. The parents found that information about what to do when the crying becomes frustrating as the most important information. In the public health nurse follow-up, only 6.3% of families reported not receiving the information in hospital.
Fujiwara/2012 PURPLE	Infant crying behaviors and how to cope	Parents were mailed the material including PURPLE materials (intervention group), an 11-page booklet and a DVD. Control group received information about infant safety via a booklet and a DVD.	Mothers receiving the PURPLE intervention had more knowledge of crying compared to the control mothers. Mothers in the PURPLE group shared more information about walking away if frustrated with crying to other caregivers compared to control mothers. Mothers in the PURPLE group walked way more often when the child had unsoothable crying compared to control mothers.

*PSBSPP = Perinatal Shaken Baby Syndrome Prevention Program; SBS = shaken baby syndrome; PURPLE = The Period of PURPLE Crying

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Table 2

Period of PURPLE Crying

P: peak of crying (Baby may cry more each week, the most in month 2, then less in months 3-5)
U: unexpected (Crying can come and go and you don't know why)
R: resists soothing (Baby may not stop crying no matter what you try)
P: pain-like face (A crying baby may look like they are in pain, even when they are not)
L: long-lasting (Crying can last as much as 5 hours a day, or more)
E: evening (Your baby may cry more in the late afternoon and evening)
From Barr M. The Period ofPURPLE Crying. National Center on Shaken Baby Syndrome, 2014.