

Impact of an Educational Intervention on Caregivers' Beliefs About Infant Crying and Knowledge of Shaken Baby Syndrome

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Received for publication August 10, 2010; accepted August 4, 2011.

ABSTRACT

OBJECTIVE: Shaken baby syndrome (SBS) is the leading cause of traumatic infant death. We examined whether the message about not shaking an infant should be included in the newborn anticipatory guidance provided by pediatric residents. The aim of this study was to determine the impact of an educational intervention (Take 5 Safety Plan for Crying) delivered by pediatric residents at newborn hospital discharge on beliefs about infant crying and knowledge of SBS among caregivers of young infants being treated in an urban primary care center.

METHODS: Structured interviews were done in one convenience sample of caregivers before (historical control group) and in a second set of different caregivers after (intervention group) an educational intervention was implemented at hospital discharge. Logistic regression was used to calculate adjusted associations between the intervention and caregivers' beliefs/knowledge.

RESULTS: One hundred ten caregivers were in the historical control group and 112 in the intervention group. The intervention group had more mothers and the infants were younger. Controlling for these differences, intervention group caregivers were more likely to state they would take a break if frustrated with infant crying (OR 3.10, 95% CI, 1.62–5.93), were more likely to state frustration caused infant shaking (OR 2.21, 95% CI, 1.20–4.20), and to state their knowledge of SBS was from hospital staff (OR 3.39, 95% CI, 1.61–4.20).

CONCLUSION: This targeted postpartum intervention incorporated into newborn anticipatory guidance can influence caregivers' beliefs about infant crying and knowledge of SBS.

KEYWORDS: abusive head trauma; infant crying; parent education; shaken baby syndrome

ACADEMIC PEDIATRICS 2011;11:481–486

WHAT'S NEW

This study demonstrates that a targeted post-partum educational intervention delivered by pediatric residents can positively impact caregivers' knowledge of SBS and beliefs about infant crying.

ABUSIVE HEAD TRAUMA, also known as shaken baby syndrome (SBS), is the leading cause of traumatic death in infancy and causes considerable morbidity in children aged younger than 2 years.^{1,2} The incidence of abusive head trauma is estimated to be 30 cases per 100 000 infants aged younger than 12 months.^{3–5} When a history is obtained, some caregivers admit to shaking the infant because of frustration with the infant's crying.^{6–9}

Helfer¹⁰ described the perinatal period as a window of opportunity “to enhance parent-infant interaction and ultimately lead to a decrease in the breakdown in family interaction commonly seen in cases of abuse, neglect, and sexual exploitation of children.” Several investigators have demonstrated that the postpartum period is conducive to delivering information to caregivers about the dangers of

shaking an infant.^{11–14} These educational interventions, however, require substantial nursing support,¹¹ such as the viewing of a video^{11,14} or the delivery of a DVD for home use by families,^{12,13} resources that not all hospital nurseries may have.

In an effort to use the postpartum period in the hospital to provide focused information to parents about the prevention of a serious form of child abuse, we designed a simple and specific caregiver strategy for managing infant crying (Take 5 Safety Plan for Crying) and then evaluated its effect on the caregivers' beliefs about infant crying and knowledge of SBS. This educational intervention was incorporated into the routine anticipatory guidance delivered by pediatric residents at newborn hospital discharge.

METHODS

STUDY DESIGN

INTERVENTION

In June 2007, the Take 5 Safety Plan for Crying was incorporated into the newborn anticipatory guidance given

to caregivers by pediatric residents from Yale-New Haven Children's Hospital (YNHCH) at hospital discharge. This guidance also included information about feeding, the use of car seats, what to do if the infant developed a fever or jaundice, safe sleep practices, and umbilical cord care. Pediatric residents delivered the Take 5 Safety Plan for Crying to caregivers whose infants were born at Yale-New Haven Hospital (YNHH) and who planned to take their infants for well-child care to the Pediatric Primary Care Center of YNHCH.

There was consensus among the study investigators (K.B., J.M.L.) and the 2 nursery attendings, one of whom was an investigator (E.C.), as to the content and the decision to incorporate the safety plan into anticipatory guidance provided to parents prior to discharge. The content of the safety plan was based on work by previous investigators.^{8,11} Prior to beginning the study, we pilot tested the intervention with 10 mothers to receive feedback about acceptability, feasibility, and content. All mothers involved in the pilot testing felt the intervention was acceptable, and minor suggestions for changes were incorporated into the final version of the intervention.

The 2 attending physicians primarily responsible for resident training and patient care in the Well Newborn Nursery were trained by one of the study investigators (K.B.) about how to incorporate the safety plan into the anticipatory guidance given to parents at the time of newborn discharge. The newborn nursery attendings then trained the pediatric residents during their well newborn rotations to incorporate the safety plan into the newborn discharge instructions. Residents were observed by the 2 nursery attendings to help insure that the content of the intervention (all 5 points of the safety plan) was delivered correctly to families at discharge. If the parents' primary language was Spanish, trained hospital Spanish interpreters provided translation of the safety plan, in addition to the rest of the customary anticipatory guidance. Parents were also given refrigerator magnets with the Take 5 Safety Plan for Crying in English or Spanish.

Residents were instructed to use the following script:

- If a caregiver becomes frustrated with an infant's crying:
- The caregiver should put the infant down on his/her back in a safe place, such as the crib or bassinet, or any fixed, firm surface from which the infant would not fall.
- The caregiver should then walk out of the room.
- The caregiver was encouraged to do something to relax or calm down, such as meditating, deep breathing, reading, listening to music, or doing house chores.
- The caregiver was encouraged to call a friend, family member, or the infant's doctor for help in dealing with the infant's crying, or to call someone to come to the house to watch the infant if the caregiver wanted to leave the house in order to calm down.
- The caregiver was advised not to return to the infant's room until he or she was calm enough to safely care for the infant.
- Crying can be a normal part of an infant's development and does not necessarily indicate that there is something

wrong with the infant or with the caregiver's ability to soothe the infant. Crying does not hurt infants, but getting frustrated with crying can lead one to shake an infant.

- The caregiver was reminded never to shake a baby and to remind other caretakers of the baby to never shake a baby.

To assess compliance with delivery of the Take 5 Safety Plan for Crying at newborn discharge, the hospital's electronic medical records of 240 randomly selected infants were searched for resident discharge summaries from the Newborn Nursery for documentation that the Take 5 Safety Plan for Crying was given to families. To successfully complete documentation of newborn discharge, the resident had to indicate that the Take 5 Safety Plan for Crying either was or was not discussed with the caregivers.

STUDY POPULATION

This study used an historical control group and an intervention group. At the time of the interview, both the historical control and intervention groups were convenience samples of caregivers whose infants were born at YNHH and who brought their infants for well-child care to the Pediatric Primary Care Center of YNHCH, a hospital-based clinic that primarily serves Medicaid-eligible patients. Caregivers were enrolled when an interviewer was available to conduct interviews during weekdays when the clinic was open. The historical control group was interviewed between March and December 2006. The caregivers in the intervention group were interviewed from November 2007 to June 2008.

Interviews were conducted on weekdays between 8:30 AM and 4:30 PM. The interviewer approached caregivers of infants who were born at YNHH and at their first well-child appointment as they were waiting to be evaluated by a clinician in the examination room. Caregivers were included if they spoke English or Spanish and gave informed consent to participate in the study.

SAMPLE SIZE

We assumed that 40% of caregivers in the historical comparison group would report that they knew what SBS was and who would walk away if frustrated with infant crying. We hypothesized that the proportion of caregivers in the intervention group who reported SBS knowledge would be 60%. To detect a difference of 20% between groups with respect to these outcomes, with 80% power and $\alpha = .05$ (2 tailed), at least 96 caregivers were needed in each group.

DATA COLLECTION

After verbal consent was obtained from caregivers, structured, face-to-face interviews were conducted in either English or Spanish. Answers were recorded using the caregiver's own words when possible. The interviewers (K.L., N.S.) were observed by one of the authors (K.B.) for the first 10 interviews of the historical control and intervention groups to insure that the questions were asked and answers recorded in a consistent manner. The interviewers

were blinded to the intervention and to the group status of the caregivers.

STUDY VARIABLES

DEMOGRAPHIC VARIABLES

Demographic information was collected at the time of the interview via self-report from the caregiver. These variables included the caregiver's age and relation to infant, and the infant's age, birth order, and racial/ethnic group (African American, Caucasian, Hispanic, and other).

BELIEFS ABOUT INFANT CRYING AND KNOWLEDGE OF SBS

Interviewers used the following set of questions for each caregiver interview:

- Do babies cry often?
- Is crying hurtful?
- Should you always be able to calm a crying baby?
- What should someone do when frustrated with a baby's crying?
- Do you know what shaken baby syndrome is?
- If so, from what source?
- Why would someone shake a baby?
- What should one do to prevent someone from shaking a baby?

Responses to the closed-ended questions were "yes" or "no." For open-ended questions, data were coded as the frequency of best-matched responses to predetermined categories by one of the study's authors (N.S.). These categories were determined by the content of the Take 5 Safety Plan for Crying and the most common open-ended responses by caregivers. For example, caregiver responses to the question "What would you do if frustrated with an infant's crying," such as "Leave the room," "Get some fresh air," "Leave the baby alone and get some rest," and "Remove myself from the situation and take a deep breath," would be coded as "Take a break." The lead author (K.B.) reviewed the accuracy of coding for 10% of the interviews.

STATISTICAL ANALYSIS

In bivariate analyses, demographic characteristics of caregivers and infants were compared between the historical control and intervention groups by using chi-square tests for categorical variables or the student's *t* test for continuous variables.

The proportions of caregivers in each group who responded affirmatively to closed-ended questions or gave a specified answer to the open-ended questions were also compared using the chi-square test.

Multivariate logistic regression analyses were used to calculate each adjusted odds ratio and 95% confidence interval for the association between the historical control and intervention groups and each of the outcomes relating to beliefs about infant crying and knowledge of SBS. Each model was adjusted for demographic variables (noted above) to control for any measured differences between the 2 groups. The infant's age was included in these analyses because of the possibility that the time from the intervention might affect the caregiver's response.

For each regression model, we conducted a complete case analysis, meaning that we excluded observations with missing caregiver's age. In secondary analyses, the caregiver's age variable was removed from each model to detect any changes in regression coefficients once the excluded observations were reincorporated into the analysis.

All analyses were conducted using SAS software, Version 9.1 (SAS Institute Inc, Cary, NC). The Institutional Review Board of the Yale University School of Medicine approved this study.

RESULTS

There were 110 caregivers in the historical control and 112 in the intervention groups. No caregiver who was asked to participate declined. The caregiver's age was missing in 17 (7.7%) observations (14 in the historical control group and 3 in the intervention group). We restricted bivariate comparisons between intervention group and outcomes to those observations for which the caregiver's age was reported. Caregivers were primarily mothers but also included fathers and grandmothers. Caregivers were predominantly African American or Hispanic. There were no statistically significant differences between groups with respect to the caregiver's age or ethnicity, but significantly more mothers, compared with other caregivers, were interviewed in the intervention group ($P = .004$; Table 1). At the time of the caregiver's interview, infants in the historical control group were younger ($P = .005$), but there was no difference in the infant's birth order (Table 1).

Table 2 shows the adjusted associations between the intervention and historical control groups' status for beliefs regarding infant crying. Caregivers who received the intervention were significantly more likely to say that they would take a break (OR 3.10, 95% CI, 1.62–5.93) and

Table 1. Demographics of Historical Control and Intervention Groups*

| | Historical Control Group (n = 110) | Intervention Group (n = 112) | P Values |
|-----------------------------|--|------------------------------------|----------|
| Caregiver's Characteristics | | | |
| Age, y | 25.7 ± 8.2 | 25.2 ± 6.6 | .642 |
| Relation to infant | | | .004 |
| Mother | 78 (70.9) | 99 (88.4) | |
| Father | 23 (20.9) | 8 (7.1) | |
| Grandmother | 9 (8.2) | 5 (4.5) | |
| Infant's Characteristics | | | |
| Age, wk | 3.4 (3.1) | 4.8 (3.7) | .005 |
| Race/ethnicity | | | .298 |
| Caucasian | 6 (5.5) | 13 (11.6) | |
| African American | 50 (45.5) | 41 (36.6) | |
| Hispanic | 51 (46.4) | 54 (48.2) | |
| Other | 3 (2.7) | 4 (3.6) | |
| Birth order | | | .915 |
| First | 54 (49.1) | 57 (50.9) | |
| Second | 30 (27.3) | 32 (28.6) | |
| Third | 13 (11.8) | 13 (11.6) | |
| Fourth or higher | 13 (11.8) | 10 (8.9) | |

*Continuous variables are expressed as mean ± SD. Categorical variables are expressed as number (%).

Table 2. Adjusted Associations Between Control and Intervention Groups: Caregivers' Responses to Questions About Beliefs About Infant Crying*

| | Percentage of Caregivers Who Answered | | Adjusted OR† | 95% CI‡ |
|---|---------------------------------------|-------------------------------|--------------|-----------|
| | Historical Control Group n = 96 | Intervention Group n = 109 | | |
| Beliefs regarding infant crying* | | | | |
| Crying is hurtful | 32.3 | 23.8 | 0.54 | .28–1.07 |
| Babies cry often | 51.0 | 56.0 | 1.53 | .82–2.85 |
| One should always be able to calm a crying infant | 52.1 | 56.9 | 1.13 | .59–2.15 |
| What would you do if you were frustrated with infant crying?§ | | | | |
| Take a break | 26.0 | 51.4 | 3.10 | 1.62–5.93 |
| Continue to calm a crying infant | 20.8 | 6.4 | 0.27 | .10–0.72 |
| Call someone to help | 45.8 | 50.5 | 1.04 | .58–1.88 |
| Calm down | 10.4 | 12.8 | 1.67 | .64–4.33 |
| Why would someone shake an infant?§ | | | | |
| Frustration with crying | 58.3 | 73.4 | 2.21 | 1.16–4.20 |
| Caregiver inexperience | 13.5 | 18.4 | 1.34 | .59–3.06 |
| Caregiver mental health problems | 26.0 | 28.4 | 1.26 | .65–2.49 |
| What could one do to prevent shaking an infant?§ | | | | |
| Take a break from the infant's crying | 6.3 | 19.3 | 3.54 | 1.27–9.87 |
| Get help taking care of the infant | 44.6 | 56.3 | 1.82 | .99–3.33 |
| Get education about SBS¶ | 24.0 | 19.3 | 0.97 | .45–2.06 |

*Percentages represent the proportion of caregivers who agreed with the listed beliefs regarding infant crying.

†OR = odds ratio. Adjusted for caregiver's age and relationship to infant and infant's age, race, and birth order.

‡CI = confidence interval.

§Percentages represent the proportion of caregivers who gave the responses to the listed questions. Responses were not mutually exclusive.

¶SBS = shaken baby syndrome.

significantly less likely to say that they would try to continue to soothe the infant if frustrated with crying (OR 0.27, 95% CI, 0.10–0.72). There were no differences between groups with respect to the number of caregivers who stated that babies cry often and that one should always be able to calm a crying infant. There were also no differences between groups in the percentages that would call someone for help or calm down if frustrated with infant crying. Caregivers in the intervention group were more likely to report that frustration with crying led one to shake an infant (OR 2.21, 95% CI, 1.61–4.20) and to state that taking a break when frustrated with a crying infant would prevent SBS (OR 3.54, 95% CI, 1.27–9.87).

There was no difference between groups with respect to the proportion of caregivers who had knowledge of SBS

(Table 3). Caregivers in the intervention group, however, were more likely than those in the historical control group to report that their source of knowledge was hospital personnel (OR 3.39, 95% CI, 1.64–7.01).

On review of the electronic medical records of the 240 randomly selected infants who were discharged during the study period after the Take 5 Safety Plan for Crying educational intervention was introduced, 95.6% of the records had documentation that the pediatric resident delivered this information at the time of hospital discharge.

DISCUSSION

This study demonstrates that, in a sample of caregivers of an urban primary care center, a brief educational

Table 3. Adjusted Associations Between Control and Intervention Groups: Knowledge of SBS*

| | Percentage of Caregivers Who Answered | | Adjusted OR† | 95% CI‡ |
|-------------------------|---------------------------------------|-------------------------------|--------------|-----------|
| | Historical Control Group N = 96 | Intervention Group N = 109 | | |
| Knowledge of SBS | 74.0 | 82.6 | 1.83 | .83–4.04 |
| Source of SBS knowledge | | | | |
| Hospital | 19.1 | 42.0 | 3.39 | 1.64–7.01 |
| Media | 43.6 | 37.5 | 0.64 | .33–1.24 |
| Family/friends | 11.8 | 9.8 | 0.93 | .33–2.66 |
| Parent program (school) | 10.9 | 5.4 | 0.49 | .16–1.56 |

Percentages represent the proportion of caregivers who gave the responses to the listed questions. Responses were not mutually exclusive.

*Percentages represent the proportion of caregivers who agreed with the listed beliefs regarding infant crying. SBS = shaken baby syndrome.

†OR = odds ratio. Adjusted for caregiver age, caregiver relation to infant, infant age, infant race, and birth order.

‡CI = confidence interval.

intervention provided by pediatric residents as part of the postpartum anticipatory guidance to parents led to important differences in caregivers' beliefs about infant crying. Caregivers were more likely to report that frustration led to infant shaking, and if frustrated, they would take a break from the infant and would not continue to try to soothe the infant. Although the majority (74% in the historical control group and 82.6% in the intervention group) knew about SBS, more caregivers in the intervention group stated that their source of knowledge about SBS was from hospital personnel.

Educational programs to disseminate information to parents and caregivers about the dangers of shaking an infant and about crying as a frequent trigger for shaking are one method of primary prevention to reduce the incidence of abusive head trauma. This study was an effort to test the effect of an educational program on caregivers' beliefs about infant crying, so that caregivers would find it more acceptable to take a break from an infant when frustrated with an infant's crying. We targeted caregivers' frustration with crying because we believe that changing caregiver's beliefs about infant crying would be an important first step to ultimately reduce the incidence of abusive head trauma. During the study period, there were no other hospital-based or statewide educational initiatives regarding a safety plan for parents' frustration with infant crying or the dangers of shaking an infant to which caregivers in our study would have been exposed. Thus, it is likely that changes in beliefs of the caregivers in the intervention group were due to our postpartum educational intervention.

The goal of including the intervention in the anticipatory guidance given on the postpartum ward was to ensure that it could be delivered in a short period of time as part of routine newborn anticipatory guidance. We chose to use pediatric residents because, as part of their educational curriculum, they learn how to deliver newborn anticipatory guidance to caregivers who will bring their infants to the Pediatric Primary Care Center for well-child care. We believed that adding a safety plan for infant crying was an important component of the anticipatory guidance provided to parents prior to discharge from the postpartum unit.

Teaching caregivers to take a break when frustrated with infant crying may reduce the likelihood of behaviors that may lead to infant shaking.¹²⁻¹⁴ Although we did not use a video to teach these alternative behaviors and instead relied on the provision of this information during verbal anticipatory guidance, we were still able to demonstrate a change in caregivers' beliefs toward infant crying. These results are similar to those found by Barr and colleagues,^{12,13} who showed that mothers who had received the "Period of Purple Crying" materials were significantly more likely to state that they would walk away during inconsolable infant crying. Teaching caregivers that it is okay to take a break from an infant when frustrated with the infant's crying is important due to the fact that not all marketed soothing techniques may reliably reduce daily episodes of infant crying.¹⁵

There are several strengths to this study. The first is that the intervention was tested in a ethnically diverse population of parents, with the majority of the sample (>90%) identifying themselves as either Hispanic or African American. These demographics are different from those of the populations in previous studies and are important demographic groups to receive this information.¹⁶⁻¹⁸ The second strength is that the Take 5 Safety Plan for Crying program is easy to implement and does not require substantial staff effort, as demonstrated by the residents' compliance (95.6%) in documenting in the electronic medical record that this anticipatory guidance was given at newborn discharge. The fact that the majority of residents documented that this information was given at hospital discharge does not necessarily mean that the information was given out in a consistently standardized fashion. However, caregivers had a significant change in beliefs with respect to what they would do if frustrated with infant crying. This suggests some degree of fidelity among residents in dispensing the safety plan to caregivers. Since the intervention is brief, we expect that it could be easily incorporated into the anticipatory guidance that pediatric clinicians deliver to new parents prior to discharge from the postpartum ward.

There are at least 5 limitations to this study. First, this was not a randomized controlled trial. Although more methodologically sound, the use of a randomized controlled trial was felt to be problematic because of the difficulty of having the same pediatric residents give the standard newborn anticipatory guidance to the control group of caregivers and then give anticipatory guidance plus the Take 5 Safety Plan for Crying to the intervention group. A study design similar to the one we used during the postpartum hospital stay (historical control and intervention groups) has been used successfully to examine changes in caregivers' behaviors about safe infant sleep positions.¹⁹ The second limitation was the statistically significant demographic differences between the historical control and intervention groups. We used logistic regression analyses to control for these demographic differences when examining the effects of the intervention. A third limitation was that mothers were the majority of caregivers interviewed in both groups. Thus, the effectiveness of this anticipatory guidance on changing beliefs about infant crying and knowledge of SBS was not assessed in male caregivers, who are more likely than females to be perpetrators of abusive head trauma.^{6,22} A fourth limitation is that we did not assess beliefs at later points after delivery. Thus, there may be degradation of the effect of this intervention on caregivers. Using other health care providers to deliver this safety plan for crying to caregivers in the newborn nursery or during well-child visits may help to reinforce the message and should serve as the basis for future study of this program's effectiveness in influencing caregivers' beliefs about infant crying and knowledge of SBS, as well as reducing the incidence of SBS. A final limitation was that there was no formal process evaluation of the implementation of the anticipatory guidance by the residents in comparison with other modes of delivery, such as by nurses

or by having families view a video as other investigators have done.^{11–13}

CONCLUSION

Implementation of the Take 5 Safety Plan for Crying as part of anticipatory guidance at newborn hospital discharge was associated with important differences in caregivers' beliefs about infant crying. This population of caregivers of an urban primary care center were more likely to report that frustration with crying led to infant shaking and if frustrated, they would take a break from the infant. Such information should be useful to help devise primary prevention programs to reduce the incidence of abusive head trauma.

ACKNOWLEDGMENT

This study was funded by the Connecticut Children's Trust Fund, Hartford, Connecticut (principal investigators John M. Leventhal and Kirsten Bechtel).

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