

## Abstract

**Background:** A large community hospital in South Texas began distributing safe sleep baby boxes to reduce sudden unexplained infant death (SUID) in 2017.

**Purpose:** To describe safe sleep practices among new mothers who received a safe sleep baby box at hospital discharge.

**Methods:** An information sheet containing a link to an online survey was mailed to all women who received a safe sleep baby box prior to discharge from the hospital from January 2018 to January 2019.

**Results:**  $N = 84$  women participated. Most reported using the safe sleep baby box only during nap time ( $n = 62, 88.6\%$ ). Only 70.2% of participants reported that baby always slept their back ( $n = 59$ ). Most reported their baby did not use a pacifier ( $n = 62, 73.8\%$ ), and many reported they were not breastfeeding their baby ( $n = 38, 45.2\%$ ).

**Clinical Implications:** Many women were not using the safe sleep baby box as intended and were not following many of the other safe sleep guidelines. Nurses should ask their patients about plans for infant safe sleep after discharge to provide individualized education or recommend specific resources to address the family's needs.

**Key words:** Infant mortality; Newborn; Sleep; Sudden infant death.

# PERCEPTIONS AND USE OF SAFE SLEEP BABY BOXES AT HOSPITAL DISCHARGE BY NEW MOTHERS

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## Background

Sudden unexplained infant death (SUID) describes the sudden, unexplained death of an infant under 1 year of age from an unknown cause prior to an investigation (Centers for Disease Control and Prevention [CDC], 2022b). The United States has one of the highest infant mortality rates in the developed world (United Health Foundation, 2022). In 2019, the SUID rate in the United States was 90.1 deaths per every 100,000 live births and the SUID rate in Texas was 90.4 deaths per every 100,000 live births (CDC, 2022b). The infant mortality rate in Bexar County in where this study was conducted was 6.7 per 1,000 live births in 2018, 6.7 per 1,000 live births in 2018, and 6.4 per 1,000 in 2019, indicating a more than 10% increase between 2009 and 2019 (March of Dimes Foundation, 2020).

Sudden unexplained infant death is the fourth leading cause of infant mortality in the United States and is divided into three subtypes: sudden infant death syndrome (SIDS), accidental suffocation and strangulation in bed (ASSB), and unknown cause (CDC, 2022a). Approximately 3,400 infants died from SUID in 2020 (CDC, 2022b). Sudden infant death syndrome is the leading cause of death in infants ages 28 days to 11 months (Ward & Balfour, 2016). Unknown cause is the second and ASSB is the third leading cause of SUID within the same age group (CDC, 2022b). Sudden infant death syndrome and ASSB are both linked to sleep practices such as bed sharing, prone sleep position, and soft bedding (Ward & Balfour, 2016).

The American Academy of Pediatrics (AAP) published 10 evidence-based safe sleep recommendations to reduce infant mortality due to SUID (Moon et al., 2016). The recommendations include breastfeeding, using a pacifier during sleep, placing the baby to sleep on the back, on a firm surface, and sleeping in the parents' room but on a separate sleep surface (Moon et al., 2016). Moon et al. (2016) outlined potential barriers to implementation of safe sleep recommendations, including the inability to purchase a crib due to financial limitations as well as lack of education on the part of parents and caregivers. These guidelines were recently updated. In addition to the previously stated recommendations, the updated guidelines assert that any infant sleep surface must meet the same federal safety standards as cribs and bassinets (Moon et al., 2022a; Moon et al., 2022b).

Finland has one of the lowest infant mortality rates in the developed world at 1.39 per 1,000 births (World Health Organization, 2019). Finnish women can receive a baby sleep box containing a firm mattress and filled with baby products to encourage safe separate sleep (Blair et al., 2018; Rosenberg, 2016). Safe sleep baby boxes, based on boxes dispensed in Finland, have been promoted as a valid solution for the U.S. SUID rates (Middlemiss et al., 2019). Finland's infant mortality rate decreased significantly following the baby box program; however, the decreased incidence may not be entirely related to safe sleep baby box use (Ridky, 2016). Finnish women must initiate care with a provider before the fourth month of pregnancy to qualify to receive a safe sleep baby box. Finnish women receive 9 months of maternity benefits. Due to the differences in maternity care practices in Finland, it is unclear whether the safe sleep baby box is responsible for the lower SUID rates. The American Academy of Pediatrics has stated there isn't enough evidence to recommend use of the safe sleep baby box, but the safe sleep box may be a safe option if it meets the same federal requirements as cribs and bassinets (Moon et al., 2022b). Despite limited evidence supporting use of safe sleep baby boxes, several U.S. states, including Texas, began distributing boxes in 2017 in attempts to decrease incidence of SUID (Blair et al., 2018; Middlemiss et al., 2019). The boxes contained a fitted, firm mattress as recommended by AAP (Figure 1). The safe sleep baby box contains baby care items such as baby

t-shirt, washcloths, baby wash, a teether, diaper wipes, and diaper cream. The Texas Diaper Bank provided a pack of diapers for each box (Belasco, 2016).

### Review of the Literature

PubMed and CINAHL were searched using a combination of search terms: safe infant sleep, baby sleep box, safe sleep practices, and safe sleep education. Studies were limited to English, research, and published after 2015. Ahlers-Schmidt et al. (2017) interviewed a convenience sample of 28 pregnant women to understand their knowledge and perceptions about safe sleep baby boxes. Most participants were white first-time mothers with a median gestation of 29 weeks. They identified three domains: knowledge, positive attributes, and negative attributes and noted participants had varying levels of understanding about the safe sleep baby boxes. After a brief description of the box, half of the participants were willing to consider using the box, but only 7% of participants stated they would consider using the box regularly for both naps and at night sleep (Ahlers-Schmidt et al., 2017).

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Sudden unexplained infant death is the fourth leading cause of infant mortality in the United States.



**FIGURE 1.**



Dalvie et al. (2019) conducted a similar study asking 50 primarily African American and Hispanic postpartum women with infants between 2 and 16 weeks of age their perceptions of the box. Participants were interviewed during a clinic visit, shown a picture of a safe sleep baby box, and asked questions related to potential for use. Half of the participants stated they would use the safe sleep baby box. Three themes were identified on safety, appearance, and planned use. Comments included concerns the lid increased potential for suffocation, cardboard material was not durable enough for use, and felt placing their baby in a cardboard box was socially unacceptable. When asked how they would use the box, answers varied from an infant sleep space to a play space, to a place to store baby items. Middlemiss et al. (2019) conducted a larger study using an online survey with 541 caregivers to determine whether caregivers would use a safe sleep baby box after viewing an image of the box. They found caregivers were unlikely to use a safe sleep baby box.

Heere et al. (2019) evaluated potential association with face-to-face safe sleep education and provision of a safe sleep box in reducing bed sharing by breastfeeding women in the first week of life via a prospective, controlled, interrupted time series study. The study involving a control group, who gave birth between November 1, 2015, and February 7, 2016, and two intervention groups. The first intervention group gave birth between February 8, 2016, and May 3, 2016, and the second intervention group gave birth between May 4 and November 15, 2016. The first intervention group received additional safe sleep education by a select group of nurses under the direction of a pediatrician. The second intervention group also received additional in-person education on safe sleep by the select group of nurses and a safe sleep baby box. All women were contacted by phone 72 hours after hospital discharge. Mothers who received face-to-face education and a safe sleep baby box were less likely to bed share than those who did not receive education. Although 99% of par-

ticipants were pleased with the safe sleep baby box, only 11% used the safe sleep baby box as a primary sleep space.

Given that a large community hospital in South Texas was distributing safe sleep baby boxes to reduce the SUID rate in the surrounding area, it is important to ascertain adherence to safe sleep guidelines by safe sleep baby box recipients and their thoughts on the benefits and barriers to using the safe sleep baby box. The purpose of this study was to describe perceptions of the safe sleep baby box and safe sleep practices by women who received safe sleep baby boxes at hospital discharge.

## Study Design and Methods

A quantitative descriptive study design was used to determine how women were using safe sleep baby boxes, adherence to the safe sleep guidelines, and likes and dislikes of the baby sleep box. The study was reviewed and approved by the institutional review board. The hospital provided a list of names and addresses of women who gave birth from January 2018 to January 2019 and received safe sleep baby boxes at hospital discharge. Women were mailed a study recruitment flyer containing information about the study in English and Spanish and a link to an online survey about infant safe sleep practices. On the information sheet a phone number was provided, so participants without computer access could call and complete the survey online in either English or Spanish. Completion of the survey was considered consent to participate in the study. Participants who completed the survey received a \$10.00 electronic retail store gift card for compensation of their time.

## Setting and Participants

The setting was a large community hospital in South Texas serving a predominately low income, Hispanic population. The hospital received a grant from a private foundation to distribute safe sleep baby boxes to qualifying families beginning in May 2017. Initially, families living in zip codes with higher incidences of SUID were offered safe sleep baby boxes. Distribution was expanded to any family identified by the nurse as needing a safe place for their baby to sleep.

Prior to discharge, postpartum women who were identified as needing a safe place for their baby to sleep received a safe sleep baby box and viewed online modules about safe sleep. The online modules were created by a commercial organization, The Baby Box Co. The online modules described AAP safe sleep recommendations by Moon et al. (2016). They took 10 to 15 minutes to complete after which the patient had to pass a short quiz to receive a completion certificate. After the modules were completed, and prior to discharge, postpartum women received the safe sleep baby box. All other women received safe sleep education during discharge teaching by the nurse.

Postpartum women were considered eligible to participate in the study if they gave birth and received a safe

sleep baby box at hospital discharge. They needed to read either English or Spanish. A total of 562 flyers were mailed from December 2018 to October 2019; 104 flyers were returned due to incorrect addresses. A reminder flyer was mailed to participants in August.

### Measure

The authors created a 22-item Redcap survey based on the AAP safe sleep guidelines (6 items), safe sleep baby box use (2 items), and participant likes and dislikes about the sleep box (2 items). Participants were asked where they received infant safe sleep information (1 item). Four items addressed where the participant slept, who slept with her, smoking, and pets. Four demographic questions to describe the sample included primary language, participant's age, number of children, and age of the youngest child. A certified Spanish medical interpreter provided translation of the information sheet and the online survey. The survey took approximately 10 to 15 minutes to complete and could be completed using smart phones, tablets, or computers. After completing the survey, participants entered their name and email address on a second Redcap screen to receive the electronic gift card and to ensure the name entered was a match to those in the study population. Safe sleep survey responses were not linked to identifying information.

### Analysis

Quantitative data were analyzed using descriptive statistics, means, standard deviations, and percentages. Qualitative short answer responses to "likes" and "dislikes" of the safe sleep baby box were reviewed, and similar short answer responses were grouped together.

## Results

### Quantitative Data

Eighty-four participants completed the online survey for a response rate of 18.3%. Frequencies and percentages of the participants' demographics and responses to survey items are in Table 1.

### Qualitative Data

Similar responses for aspects that participants liked most and aspects that they disliked most about the safe sleep baby box were grouped together and common ideas were identified. Comments on safety and comfort of the baby were the most common ( $n = 38$ , 45.2%), followed by comments about portability and convenience for the mother ( $n = 31$ , 36.9%). Some participants commented on other uses for the box, such as storage of newborn items ( $n = 5$ , 5.9%) and a few mentioned items in the safe sleep baby box as the most liked aspect ( $n = 4$ , 4.7%). Three noted the appearance of the box as the most liked aspect (3.5%); one participant simply wrote the word "perfect," and another stated that she did not like anything about the box.

When asked about aspects of the safe sleep baby box that participants disliked the most, the most common response was nothing or not applicable ( $n = 23$ , 27%). Many noted that the box could be bigger or more spa-

Although there is limited evidence supporting safe sleep baby boxes, several U.S. states, including Texas, began distributing them in 2017 to decrease the incidence of sudden unexplained infant death.

cious ( $n = 20$ , 23.8%). Many participants thought the box was flimsy or unsteady due to the cardboard material ( $n = 13$ , 15.4%). Five participants listed concerns about the baby's comfort, such as the mattress being too thin or the need for more padding in the corners of the box (5.9%). Two participants wanted a clear box so that they could see the baby through it (2.3%) and one participant did not like the items that came in the box (1.1%).

## Clinical Implications

Understanding the adherence to AAP Safe Sleep guidelines (Moon et al., 2016) and correct use of the safe sleep baby box is an important first step in understanding families' thoughts concerning safe infant sleep. Our findings indicated that only 41.7% of participants were using the safe sleep baby box all or most of the time, as compared with occasional use or no use. American Academy of Pediatrics recommends that infants be placed on their back every time they are put to sleep until they are 1 year of age (Moon et al., 2016; Moon et al., 2022a; Moon et al., 2022b), yet only 70% of participants reported putting their babies to sleep on their back every time. Five mothers wanted a thicker mattress or padded sides in the box, is contradictory to the AAP safe sleep guidelines. American Academy of Pediatrics recommends breastfeeding as studies have shown that breastfeeding is associated with a reduced risk of SIDS (Moon et al., 2016; Moon et al., 2022a; Moon et al., 2022b). Of study participants, 45.2% reported they were not breastfeeding their babies. American Academy of Pediatrics recommends offering a pacifier for sleep as this has shown to be protective against SIDS; however, only 26.2% of participants reported that they give their babies pacifiers when putting them to sleep. Provision of the box did not eliminate unsafe sleep practices by study participants. More research is needed to determine the impact of the safe sleep baby box.

### Limitations

The main limitation to the study was the response rate. This may be due in part to incorrect participant addresses, thus not reaching all eligible parents. Other potential limitations may be recall or social desirability biases. For some participants, a year or more had elapsed from receipt of the safe sleep baby box to data collection. We developed the data collection tool but did not evaluate the tool psychometrically.

**TABLE 1. SAFE SLEEP SURVEY RESPONSES**

|                                             | Mean (SD)  |
|---------------------------------------------|------------|
| <b>Maternal Data</b>                        |            |
| Mother's age                                | 28.7 (6.1) |
| Total number of children                    | 2.2 (1.3)  |
| Focus child age (months)                    | 9.6 (2.9)  |
|                                             | % (n)      |
| <b>Frequency of Baby Box Use</b>            |            |
| All of the time                             | 11.9% (10) |
| Most of the time                            | 29.8% (25) |
| Occasionally                                | 41.7% (35) |
| Not at all                                  | 16.7% (14) |
| <b>Uses Baby Box For<sup>a</sup></b>        |            |
| Naptime                                     | 73.8% (62) |
| Bedtime                                     | 27.4% (23) |
| <b>Anyone Smoke in Home</b>                 |            |
| No                                          | 2.4% (2)   |
| Yes                                         | 97.6% (82) |
| <b>Pets Roam in the Home</b>                |            |
| No                                          | 86.9% (73) |
| Yes                                         | 13.1% (11) |
| <b>Baby Sleeps in Your Room<sup>b</sup></b> |            |
| No                                          | 4.8% (4)   |
| Yes                                         | 94.0% (79) |
| <b>Frequency Breastfeeding</b>              |            |
| Exclusive                                   | 16.7% (14) |
| Mostly, <3 supplements daily                | 20.2% (17) |
| Sometimes, >3 supplements daily             | 17.9% (15) |
| Not at all                                  | 45.2% (36) |
| <b>Baby's Sleep Position</b>                |            |
| Back                                        | 70.2% (59) |
| Side                                        | 16.7% (14) |
| Stomach                                     | 13.1% (11) |
| <b>Baby Uses Pacifier</b>                   |            |
| No                                          | 73.8% (62) |
| Yes <sup>c</sup>                            | 26.2% (22) |
| Pacifier at naptime                         | 40.9% (9)  |
| Pacifier at bedtime                         | 45.4% (10) |
| Pacifier used for soothing                  | 72.7% (16) |

<sup>a</sup>Percentages sum to more than 100 because participants could select multiple responses

<sup>b</sup>Total N for variable does not add up to 84 due to missing responses

<sup>c</sup>Frequencies and percent limited to 22 participants responding Yes but can sum to over 100% because participants could select multiple responses.

## CLINICAL IMPLICATIONS

- Model and reinforce safe infant sleep practices while in the hospital.
- Ensure mother–baby nurses understand the AAP safe sleep recommendations and stay current on updates to the safe sleep guidelines.
- Along with providing written safe sleep information, mother–baby nurses must have ongoing safe sleep conversations with their patients during the postpartum stay in a respectful and nonjudgmental fashion.
- Nurse–patient conversations about safe sleep should include a discussion about the facilitators and barriers for families and address any potential cultural beliefs on infant sleep.
- Mother–baby nurses should provide guidance on strategies for parents to get adequate sleep without bed sharing.
- Based on understanding the family's plans for safe infant sleep, nurses should provide additional recommendations to improve knowledge, address concern, and correct misconceptions. This could include the American Academy of Pediatrics website for parents on safe infant sleep.
- Mother–baby nurses should be aware of community resources within their area to aid families in meeting their own needs related to infant safe sleep after discharge from the hospital.

## Conclusions

Discharge teaching for new parents prior to leaving the hospital after childbirth is one of the most important safety aspects of care for mother–baby nurses. Along with a review of maternal and infant warning signs, when to call the primary care provider, and when to come in for the postpartum and newborn clinic visits, sharing information about safe sleep is essential to promote infant health. Mother–baby nurses and social workers should discuss safe sleep guidelines with families prior to discharge and ask new families where their babies will sleep at home. Families without safe sleep spaces should be referred for support and resources. Nurses can direct patients to the AAP website for parents where safe sleep information and videos are provided for more information. Despite receiving education on safe infant sleep, women in this study were not adhering to all safe sleep recommendations. Other ways to supplement patient teaching as part of preparation for hospital discharge that emphasizes the importance of parents following the safe sleep guidelines from AAP need to be explored to minimize risk of SUID. ✚

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