



Implementation of a Statewide Program to Promote Safe Sleep, Breastfeeding and Tobacco Cessation to High Risk Pregnant Women

Carolyn R. Ahlers-Schmidt¹ · Christy Schunn² · Matthew Engel¹ · Jolynn Dowling³ · Kim Neufeld⁴ · Stephanie Kuhlmann¹

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Abstract

Infant mortality remains a problem in the United States with sleep-related deaths accounting for a significant portion. Known risk reduction strategies include breastfeeding, avoiding tobacco use and following the American Academy of Pediatrics' safe sleep guidelines. The purpose of this project was to evaluate outcomes of Safe Sleep Instructor-led community baby showers, which included safe sleep promotion, breastfeeding promotion and tobacco cessation education. Certified Safe Sleep Instructors (n=35) were trained on how to plan and host a Community Baby Shower to provide education to pregnant women of low socioeconomic status or with high risk of infant mortality. Eighteen Community Baby Showers were held across two urban and eight rural counties in Kansas. Surveys were administered pre- and post-event to assess participant knowledge, confidence and intentions to follow through with planned action related to safe sleep, breastfeeding and reducing tobacco risk. Matched data were summarized and evaluated for differences using McNemar's and Wilcoxon Signed Rank tests. Significant increases were observed in Baby Shower participants' (n=845) reported plans to follow the AAP Safe Sleep guidelines (all p<0.001), likelihood to breastfeed (p<0.001), confidence in ability to breastfeed for more than 6 months (p<0.001), knowledge of local breastfeeding support resources (p<0.001), knowledge of ways to avoid second-hand smoke exposure (p<0.001) and knowledge of local tobacco cessation services (p=0.004). Based on the result of the pre- and post-event surveys, certified Safe Sleep Instructors were able to plan and host successful events to increase knowledge and confidence related to risk reduction strategies to reduce sleep-related infant deaths.

Keywords Safe sleep · Breastfeeding · Tobacco cessation · Infant mortality · SIDS

Introduction

Infant mortality remains a problem in the United States, with sudden unexpected infant deaths (SUID), including sleep-related deaths accounting for a significant portion. In

2016, there were 3600 deaths classified as SUID, including Sudden Infant Death Syndrome (SIDS), accidental suffocation and strangulation in bed, and unknown causes [1]. In Kansas, SUID is the third leading cause of infant death and accounts for over 18% of deaths [2]. In 2015, child death review found all cases of SIDS had at least one or more elements of unsafe sleep present and 15 of the 17 cases of unintentional asphyxia were sleep-related [3]. Smoking was reported in 21% of deaths compared to less than 12% of live births [2]. Statewide perinatal period of risk (PPOR) analysis further identified targeted interventions for infant mortality reduction, including smoking cessation, promotion of breastfeeding and SIDS risk reduction strategies (J. Kim, personal communication, November 18, 2011). In addition, disparities exist with non-Hispanic black infants three times more likely to die than non-Hispanic whites [2].

The Kansas Infant Death and SIDS (KIDS) Network has adapted evidence-informed intervention strategies to

✉ Carolyn R. Ahlers-Schmidt
cschmidt3@kumc.edu

¹ Department of Pediatrics, Center for Research for Infant Birth and Survival (CRIBS), University of Kansas School of Medicine - Wichita, 3243 E. Murdock, Suite 602, Wichita, KS 67208, USA

² Kansas Infant Death and SIDS (KIDS) Network, Wichita, KS, USA

³ Janice M. Riordan Distinguished Professorship in Maternal Child Health, Wichita State University, Wichita, KS, USA

⁴ Kansas Chapter of the American Academy of Family Physicians, Wichita, KS, USA

promote the American Academy of Pediatrics (AAP) Safe Sleep Recommendations statewide [4]. The KIDS Network has identified a comprehensive strategy to implement consistent safe sleep messages across an educational continuum (Fig. 1). One evidence-informed strategy is community baby showers [5, 6]. The objective of the intervention is to educate high-risk families on safe infant sleep and provide necessary tools for creating a safe sleep environment, including a safety-approved portable crib and wearable blanket. In partnership with the Wichita Black Nurses Association, safe sleep community baby showers have been held in Sedgwick County, one of two urban areas of the state, since 2011 [7, 8]. These events are intended to support African American, Hispanic, and low-income expectant/new mothers.

In 2015, the KIDS Network also established a statewide Safe Sleep Instructor program [9]. Twenty-three participants attended a 2-day in person training and received certification as a Safe Sleep Instructor. The training curriculum included how to conduct a safe sleep training and crib demonstration, small group discussions with content experts related to safe sleep, and question and answer sessions. Participants practiced and received feedback on presenting safe sleep information and demonstrating how to set up a safe sleep environment. Pre- and post-tests ensured adequate knowledge prior to certification. Following certification, Safe Sleep Instructors provided training to professionals and families in 12 counties across Kansas.

The following year, the Kansas Department of Health and Environment (KDHE) granted funds to support and expand the Safe Sleep Instructor program. The goals of the year two expansion were threefold: (1) increase the number of Safe Sleep Instructors by at least five; (2) expand Safe Sleep Community Baby Showers across the state; (3) partner with breastfeeding promotion and tobacco cessation experts to connect baby shower attendees with resources.

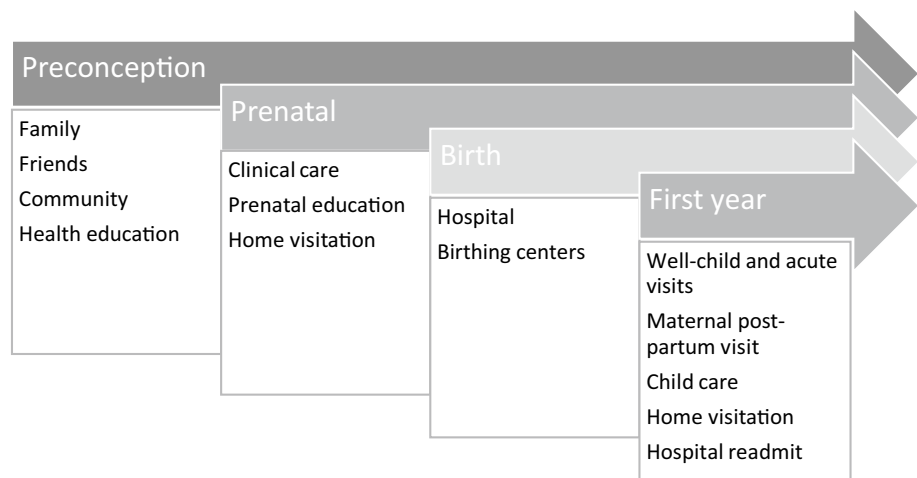
Breastfeeding and tobacco cessation were important components to address during the showers, as they are also key drivers of infant mortality, including sleep-related deaths [4]. Any breastfeeding has been shown to be protective against SIDS, and the protective effect is enhanced when breastfeeding is exclusive [10]. Conversely, smoking increases the risk of SIDS and as many as 1/3 of these deaths might be avoided if smoking during pregnancy were avoided [11]. Experts recommend giving smoking cessation promotion as much attention as safe sleep advice in risk reduction campaigns for sleep-related deaths [12].

The purpose of this study is to evaluate outcomes of leveraging the Safe Sleep Instructor infrastructure to provide enhanced community baby showers, including safe sleep promotion, breastfeeding promotion, and tobacco cessation education, across Kansas.

Methods

New and returning Safe Sleep Instructors attended a 2-day training by the KIDS Network on November 3rd and 4th, 2016. Trainees represented nurses, physician assistants, home visitors, coordinators for maternal/child health programs, prenatal/infant care educators, and child care license surveyors. The training covered the newly released AAP safe sleep guidelines [4], updated safe sleep training materials, expert-led breakout sessions and how to host a Safe Sleep Community Baby Shower. New curriculum related to the showers included grant writing, engaging community partners (including local breastfeeding and tobacco cessation experts), promotion of the event to women at high risk for adverse birth outcomes, and administration of pre- and post-event surveys. Surveys tested shower participant knowledge, confidence and intentions to follow through with planned action related to safe sleep; to reflect additions to

Fig. 1 Comprehensive strategy to implement consistent safe sleep messaging across the continuum of preconception, maternal and infant care



the baby shower curriculum, questions were added to assess breastfeeding intention, confidence, and knowledge of local resources and tobacco use and exposure, avoidance of second-hand smoke and knowledge of cessation resources. Participants were also queried regarding satisfaction with the events. Safe Sleep Instructors collected matched of pre- and post-baby shower surveys on paper and entered them into an online repository (SurveyMonkey, Inc.).

Surveys were administered to pregnant and postpartum women attending the Safe Sleep Community Baby Showers. As the primary outcome measures for the shower related to safe sleep knowledge and intention, participants with incomplete responses to this section were removed from analysis. Support people were also encouraged to attend the events, but were not evaluated.

Data were summarized and evaluated for differences in pre- and post-shower intention using McNemar's and Wilcoxon Signed Rank tests.

Results

Thirty-five new and returning Safe Sleep Instructors attended the training. Safe Sleep Instructors hosted eighteen Safe Sleep Community Baby Showers across the state of Kansas in FY17. Half were located in two urban centers and half were held in eight rural counties in Kansas. Some showers were collaborative efforts between multiple Safe Sleep Instructors, especially those in urban locations. All showers included at least one additional collaborator, such as health departments, prenatal education programs, churches or community organizations, and healthcare providers or hospitals. Many Safe Sleep Instructors secured extramural grant funding to support the event, and all events offered portable cribs and/or wearable blankets, either to all attendees or as limited door prizes. All instructors collected pre- and post-event surveys from the pregnant or recently delivered mothers who attended. One returning instructor used the FY16 data forms resulting in missing data ($n=22$) for the breastfeeding and tobacco questions.

In total, 855 pregnant or recently delivered women attended these showers for approximately one hour and participation at individual events ranged from 2 to 130 women. Ten participants neglected to complete the survey across events with all safe sleep questions missing on both pre- and post-shower surveys. In total 845 mothers completed the surveys and were included in analysis. The majority of women identified as non-Hispanic white (52.3%). However women attending the Baby Shower were significantly less likely to report being non-Hispanic white than the cohort of women giving birth in Kansas (70.4%) [13], ($p < 0.001$). In addition, the majority reported being English-speaking, and insured through Medicaid or uninsured (Table 1).

Table 1 Characteristics of baby shower participants, n (%)

Race	
Non-Hispanic White	439 (52.3)
Hispanic	170 (20.2)
Non-Hispanic Black	158 (18.8)
Multiracial/other	73 (8.7)
Language	
English	776 (91.8)
Spanish	69 (8.2)
Relationship status	
Married	405 (48.6)
Single	268 (32.1)
Partnered	145 (17.4)
Separated	10 (1.2)
Divorced	6 (0.7)
Education	
< High school	165 (19.8)
High school/GED	342 (41.0)
Some college, no degree	32 (3.8)
2-year college/vocational	125 (14.9)
4-year college	101 (12.1)
Graduate degree	70 (8.4)
Insurance	
Medicaid	369 (46.9)
Private insurance	215 (27.4)
Military	108 (13.7)
Uninsured	94 (12.0)

Missing data due to non-response: race/ethnicity ($n=5$), relationship status ($n=11$), education ($n=10$), insurance ($n=59$)

Safe Sleep

Prior to the shower, 708 women (85.1%) intended to place their infant on the back to sleep, with others reporting they would place the infant on the side ($n=43$), stomach ($n=18$), or multiple positions ($n=27$) (Table 2). When asked about infant sleep location, 715 women (85.0%) indicated they only intended to place their infant in a safe sleep location (e.g. crib, bassinet, or portable crib). Other sleep locations reported included an adult bed ($n=65$), a swing ($n=31$), a sofa ($n=5$), or unknown ($n=42$). With regard to the condition of the sleep surface, 491 (61.7%) reported intent to place the infant on a firm mattress with a fitted sheet and/or a wearable blanket, and omit any other soft objects. Examples of soft objects reported by the remaining participants were loose blankets ($n=149$), pillows ($n=110$), and bumper pads ($n=109$). Prior to the showers, 559 (68.0%) participants intended to have a conversation with other caregivers who might put their child to sleep about safe sleep practices.

Following the showers, 814 mothers (98.9%) reported intent to place their infant on the back ($p < 0.001$). Further, the number of mothers reporting intention to

Table 2 Safe sleep intentions, n (%)

Safe sleep practice	Pre-shower	Post-shower	P-value*
Position on back	708 (85.1)	814 (98.9)	<0.001
Place in a crib, portable crib, or bassinet	715 (85.0)	812 (97.7)	<0.001
Avoid soft objects in crib	491 (61.7)	737 (90.0)	<0.001
Discuss safe sleep with other caregivers	559 (68.0)	780 (95.5)	<0.001

Missing data due to non-response: pre-shower position (n=13), crib placement (n=4), soft objects (n=49), and discussing with others (n=23); post-shower position (n=22), crib placement (n=14), soft objects (n=26), and discussing with others (n=28)

*McNemar's Test

place their infants in only safe sleep locations increased ($p < 0.001$) to 812 (97.7%). However, ten mothers still intended to bed share after the shower. With regards to objects in the sleep environment, the number of mothers intending to remove unsafe objects from the crib increased ($p < 0.001$) to 737 (90.0%). Thirty-six mothers still reported intent to use bumper pads, and 30 reported intent to place loose blankets in the crib. Significantly more mothers ($p < 0.001$) reported that they intended to talk to other care providers about safe sleep (n = 780, 95.5%).

Mothers received a safety-approved crib at the end of the shower. Most mothers (n = 736, 86.4%) reported their infant would have slept in an alternative safe sleep had they not received the “Cribs for Kids” Pack-N-Play. Most common unsafe locations reported were adult bed (n = 55), car seats and swings (n = 15) or simply that the mother did not know where the infant would sleep otherwise (n = 18).

Breastfeeding

Before the baby showers, the majority of respondents reported they were very likely to breastfeed (78.0%) and intended to breastfeed more than 6 months (56.7%) (Table 3). Fewer respondents reported they were confident they could breastfeed for more than 6 months (44.1%). Approximately 8% reported little to no likelihood, intention or confidence that they would breastfeed. In terms of resources, 31.5% of respondents reported they knew at least three local resources to support breastfeeding.

After the baby showers, 81.5% reported they were very likely to breastfeed ($p < 0.001$). Intention to breastfeed for more than 6 months (59.2%) increased from baseline ($p < 0.001$). Those reporting confidence they could breastfeed for more than 6 months also increased significantly to 53.9% ($p < 0.001$). The proportion of caregivers who knew at least three local resources to support breastfeeding efforts nearly doubled to 60.4% ($p < 0.001$).

Table 3 Breastfeeding intentions, n (%)

Breastfeeding	Pre-shower	Post-shower	P-value*
Likelihood to breastfeed			
Not likely	62 (7.7)	53 (6.6)	<0.001
Somewhat likely	115 (14.3)	95 (11.8)	
Very likely	628 (78.0)	654 (81.5)	
Plan to breastfeed for...			
Not at all	62 (7.8)	51 (6.3)	<0.001
1–2 weeks	15 (1.9)	17 (2.1)	
Up to 3 months	76 (9.5)	74 (9.2)	
Up to 6 months	192 (24.1)	187 (23.2)	
Up to 1 year	333 (41.7)	354 (44.0)	
More than 1 year	120 (15.0)	122 (15.2)	
Confident can breastfeed for...			
Don't plan to breastfeed	54 (6.8)	39 (5)	<0.001
Up to 3 months	151 (19.1)	104 (13.2)	
Up to 6 months	236 (29.9)	219 (27.9)	
Up to 1 year	238 (30.2)	286 (36.4)	
More than 1 year	110 (13.9)	137 (17.5)	
Number of community resources able to identify to support breastfeeding			
0	116 (14.6)	29 (3.7)	<0.001
1	204 (25.6)	85 (10.7)	
2	225 (28.3)	200 (25.2)	
3	152 (19.1)	245 (30.9)	
4	44 (5.5)	86 (10.8)	
5+	55 (6.9)	148 (18.7)	

Missing data due to non-response: pre-shower likelihood (n=18), plan (n=25), confidence (n=34), and resource knowledge (n=27); post-shower likelihood (n=21), plan (n=18), confidence (n=38), and resource knowledge (n=30)

*Wilcoxon Signed Rank Test

Tobacco Cessation

Questions regarding tobacco revealed 110 (13.5%) respondents had used tobacco in the previous 6 months with 73 (8.9%) currently using. Seventeen (2.1%) respondents reported someone uses tobacco in their home or car on a daily basis.

Current smokers were asked about readiness to quit. At baseline 19 reported that they were not ready to quit, 20 reported that they were willing to quit but not now, and 29 reported they were ready to quit in the next 30 days. Following the shower six respondents moved towards being willing to quit but not now and eight moved to being ready to quit in the next 30 days. Five participants did not respond with a readiness to quit response.

Prior to the baby showers, about 3 out of four respondents (77.0%) knew at least three ways to avoid second-hand smoke exposure with 15.7% knowing three or more local

resources to help quit tobacco (Table 4). Respectively these numbers increased to 96.9% ($p < 0.001$) and 37.1% ($p = 0.004$).

Confidence in Engaging in Healthy Behaviors

Confidence improved for most participants following the baby shower (Table 5), with 74.0–86.6% reporting increased confidence related to following safe sleep guidelines, breastfeeding exclusively and avoiding second hand smoke. However, a small number of participants reported decreased confidence across domains (0.5–3.9%).

Satisfaction with Events

Participants reported general satisfaction with the showers. Seven participants (0.8%) reported they were dissatisfied or very dissatisfied with the shower, 12 (1.4%) reported they were neutral, and 802 (95.0%) reported they were satisfied or very satisfied with the shower; 24 participants did not respond.

Discussion

Based on the result of the pre- and post-event surveys, certified Safe Sleep Instructors were able to plan and host successful events to increase knowledge and confidence related to safe sleep, breastfeeding and tobacco cessation/avoidance in high risk populations. Safe Sleep Instructors were able to significantly increase knowledge of the AAP Safe Sleep Guidelines [4], similar to previously reported events [7, 8]. However, a small subset of mothers remained resistant to following the risk-reduction guidelines. In particular, nearly 14% did not indicate plans to avoid soft bedding, such as loose blankets, in the sleep environment and 4–5% did not plan to use a safety-approved sleep environment or supine positioning, respectively. Individual counseling with trusted healthcare providers [14–17] or certified Safe Sleep Instructors may be more beneficial to these mothers as it may allow

Table 4 Tobacco cessation, n (%)

Tobacco	Pre-shower	Post-shower	P-value*
Used tobacco in past 6 months	110 (13.5)	–	–
Current tobacco use			
Never	737 (91.0)	–	–
Monthly	3 (0.4)		
Weekly	9 (1.1)		
Daily	61 (7.5)		
Second-/third-hand smoke exposure			
Never	798 (97.9)	–	–
Monthly	2 (0.2)		
Weekly	2 (0.2)		
Daily	13 (1.6)		
Knows ≥ 3 ways to avoid secondhand smoke	620 (77.0)	769 (96.9)	< 0.001
Number of community resources known about quitting tobacco			
0	349 (45.3)	110 (14.2)	0.004
1	159 (20.6)	162 (20.9)	
2	141 (18.3)	215 (27.8)	
3	81 (10.5)	149 (19.3)	
4	7 (0.9)	45 (5.8)	
5+	33 (4.3)	93 (12.0)	

Missing data due to non-response: tobacco use ($n = 18$), current use ($n = 23$), second-/third-hand exposure ($n = 18$); pre-shower second-hand smoke avoidance knowledge ($n = 28$), community resource knowledge ($n = 53$); post-shower secondhand smoke avoidance knowledge ($n = 39$), community resource knowledge ($n = 49$)

*Wilcoxon Signed Rank Test

Table 5 Participant confidence change, n (%)

Based on what you have learned at this shower, please rate your confidence for the following:	Less confident	No change	More confident
Get baby to sleep on his/her back	4 (0.5)	106 (12.9)	711 (86.6)
Have baby sleep in my room, but separate bed	12 (1.5)	133 (16.2)	677 (82.4)
Keep loose blankets out of the crib	32 (3.9)	111 (13.5)	677 (82.6)
Avoid secondhand smoke	8 (1.0)	137 (17.3)	649 (81.7)
Breastfeed only	11 (1.4)	193 (24.6)	582 (74.0)

Missing data due to non-response: sleep on back ($n = 24$), same room/separate bed ($n = 23$), keep loose blankets out of crib ($n = 25$), avoid secondhand smoke ($n = 29$), breastfeed only ($n = 37$)

them to identify specific concerns or barriers related to the safe sleep guidelines.

Following the events, mothers reported significant increases in intention to breastfeed, planned duration of breastfeeding, confidence regarding the length of time they would be able to breastfeed and awareness of local resources to support them in their breastfeeding efforts. Research has shown women with high confidence breastfeed longer than women with low confidence, and women with greater access to support choose to breastfeed more frequently and with longer duration. Effective breastfeeding promotion interventions are needed which can empower and enable mothers to solve breastfeeding difficulties. For optimal breastfeeding promotion, continuity of care through multiple settings from inpatient hospital systems to community resources has a positive impact on breastfeeding rates [18].

Regarding tobacco cessation, over 10% of current smokers reported increased willingness to quit smoking following the event. A study by Christiansen et al. [19] showed an approximately 10% increase in willingness to set a quit date following a brief intervention, suggesting our results are in line with previous findings. In addition, Baby Shower participants reported significant increases in knowledge of resources to help with tobacco cessation efforts. The Surgeon General recommends smokers be provided access to resources to help increase their ability to control their addiction and tobacco use [20]. However, while the number of mothers able to identify resources more than doubled, less than 40% of participants were able to identify three or more community resources for tobacco cessation services after the shower. This could be due to the fact that most mothers did not report smoking or exposure to second hand smoke and therefore may have found the information less applicable to them.

Most participants reported increased confidence in their ability to follow safe sleep guidelines, breastfeed exclusively, and avoid second hand smoke. However, a few participants reported decreased confidence. This could be explained by their naivety prior to the shower with regard to healthy behaviors. For example, several participants felt less confident in their ability to keep loose blankets out of the sleep environment, which may be because they now had better understanding of the risk of loose bedding.

Limitations

The results of this study should be interpreted with consideration of its methodological limitations. All data were self-report, and were collected the day of the event. Survey answers may have been influenced by social desirability response bias. In addition, the study only assessed intended behaviors and did not follow up on actual behaviors by the mothers. Finally, some participants were given a version of

the survey without breastfeeding and tobacco cessation questions and therefore > 5% of participants had missing data on these items.

Conclusions

In Kansas, sleep related deaths remain a problem. However, utilizing certified Safe Sleep Instructors to promote the AAP guidelines to high-risk populations appears to improve knowledge and intent of mothers to follow risk reduction strategies. In a state with nearly 40,000 births per year [13], we need to continue to build infrastructure to support dissemination of these messages until a tipping point is reached [21] and the culture of infant care is safe sleep for every baby.

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Compliance with Ethical Standards

Conflict of interest The authors declare that they have no conflict of interest.

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