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*Pediatrics* 2008;122:788-798

DOI: 10.1542/peds.2007-3010

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<http://www.pediatrics.org/cgi/content/full/122/4/788>

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# Reducing the Risk of Sudden Infant Death Syndrome in Child Care and Changing Provider Practices: Lessons Learned From a Demonstration Project

Rachel Y. Moon, MD<sup>a,b</sup>, Trisha Calabrese, BS<sup>c</sup>, Laura Aird, MS<sup>c</sup>

<sup>a</sup>Division of General Pediatrics and Community Health, Diana L. and Stephen A. Goldberg Center for Community Pediatric Health, Children's National Medical Center, Washington, DC; <sup>b</sup>Department of Pediatrics, George Washington University School of Medicine and Health Sciences, Washington, DC; <sup>c</sup>Early Education and Child Care Initiatives, Division of Developmental Pediatrics and Preventive Services, Department of Community and Specialty Pediatrics, American Academy of Pediatrics, Elk Grove Village, Illinois

The authors have indicated they have no financial relationships relevant to this article to disclose.

## What's Known on This Subject

Many infants die of SIDS in child care settings. Many child care providers continue to place infants to sleep prone, mostly because of lack of awareness of the dangers of sleeping prone and/or misconceptions about the risks of sleeping supine.

## What This Study Adds

A SIDS risk reduction curriculum, using a train-the-trainer model, is effective in improving knowledge and changing sleep-related practices among child care providers.

## ABSTRACT

**OBJECTIVE.** The goal was to evaluate, through an American Academy of Pediatrics demonstration project, the effectiveness of a curriculum and train-the-trainer model in changing child care providers' behaviors regarding safe infant sleep practices.

**METHODS.** Participating licensed child care centers and family child care homes were assigned randomly to intervention and control groups. Observers performed an initial unannounced visit to each site, to watch infants being placed for sleep, to inventory sleep policies, and to administer questionnaires to center staff members. Trainers then used the American Academy of Pediatrics curriculum in educational sessions at intervention sites. Three months later, observers conducted a follow-up observation at each site, and staff members completed a questionnaire about logistic barriers encountered in implementation of safe sleep recommendations.

**RESULTS.** A total of 264 programs and 1212 providers completed the study; the care of 1993 infants was observed. Provider awareness of the American Academy of Pediatrics infant supine sleep position recommendation increased from 59.7% (both groups) to 64.8% (control) and 80.5% (intervention). Exclusive use of the supine position in programs increased from 65.0% to 70.4% (control) and 87.8% (intervention). Observed supine placement increased from 51.0% to 57.1% (control) and 62.1% (intervention).

**CONCLUSIONS.** A sudden infant death syndrome risk reduction curriculum using a train-the-trainer model is effective in improving the knowledge and practices of child care providers. Perceived parental objections, provider skepticism about the benefits of supine positioning, and lack of program policies and training opportunities are important barriers to implementation of safe sleep policies. Continued education of parents, expanded training efforts, and statewide regulations, mandates, and monitoring are critical to ongoing efforts to decrease further the risk of sudden infant death syndrome in child care. *Pediatrics* 2008; 122:788–798

[www.pediatrics.org/cgi/doi/10.1542/peds.2007-3010](http://www.pediatrics.org/cgi/doi/10.1542/peds.2007-3010)

doi:10.1542/peds.2007-3010

### Key Words

Back to Sleep, child care providers, intervention, risk reduction, safe sleep practices, sudden infant death syndrome, sleep position, training

### Abbreviations

AAP—American Academy of Pediatrics  
BTS—Back to Sleep  
CCC—child care center  
FCCH—family child care home  
SIDS—sudden infant death syndrome

Accepted for publication Jan 15, 2008

Address correspondence to Rachel Y. Moon, MD, Children's National Medical Center, 111 Michigan Ave NW, Washington, DC 20010.  
E-mail: [rmoon@cnmc.org](mailto:rmoon@cnmc.org)

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**T**WO THIRDS OF US infants <12 months of age are in nonparental child care.<sup>1</sup> Infants of employed mothers spend an average of 22 hours each week in child care, and 32% of infants are in child care full-time. Approximately one half of the infants in nonparental child care arrangements are in organized child care, such as a child care center (CCC) or family child care home (FCCH).<sup>1</sup>

In the United States, ~20% of deaths attributed to sudden infant death syndrome (SIDS) occur while the infant is in the care of a nonparental provider.<sup>2,3</sup> Despite the remarkable decrease in deaths attributed to SIDS (from 1.2 deaths per 1000 live births in 1992 to 0.53 deaths per 1000 live births in 2000<sup>4</sup>) and the decreased frequency of prone sleeping (from 70% in 1992 to 12.2% in 2006<sup>5</sup>), the proportion of deaths attributed to SIDS that occur while infants are being cared for by someone other than their parents has remained constant.<sup>3</sup> Many of these deaths seem to be associated with the prone sleep position, especially when the infant is unaccustomed to being placed in that position.<sup>2</sup>

Many child care providers continue to place infants to sleep in the prone position. A 1996 study revealed that 43% of licensed CCC staff were unaware of the association between infant sleep position and SIDS,<sup>6</sup> and subsequent surveys of child care providers have documented that, despite increased awareness, 20% to 25% of center employees continue to place infants prone for sleep.<sup>7,8</sup> The primary reasons that child care providers give for placing infants prone are that they are unaware of the dangers of sleeping prone and/or are misinformed regarding the risks and benefits of the various sleep positions.<sup>6-8</sup> Child care providers are more likely to report using the supine position when centers have written sleep policies.<sup>6-8</sup> However, licensed CCCs seldom have adequate written policies regarding infant positioning and other known safe sleep practices.<sup>6-8</sup> In addition, only one half of states have regulations requiring the nonprone sleep position for infants in child care settings, and <20% mandate SIDS risk reduction training for child care providers.<sup>9</sup>

In 2003, the American Academy of Pediatrics (AAP) Healthy Child Care America program launched its own Back to Sleep (BTS) campaign. The stated goals of the campaign were to provide education and outreach to child care providers regarding sleep recommendations, to promote the BTS message in child care programs, to raise awareness and change practices in child care settings, to disseminate information on new national child care standards related to SIDS risk reduction, and to support states in establishing and improving child care regulations.<sup>10</sup> As part of the Healthy Child Care America BTS campaign, the AAP developed an educational curriculum (*AAP Reducing the Risk of SIDS in Child Care Speaker's Kit*) and a train-the-trainer program for child care providers regarding SIDS risks and safe sleep practices for infants in child care. Research showed that a targeted, educational in-service program for child care providers was effective in increasing awareness and knowledge, changing child care provider behavior, and promoting the development of written safe sleep position policies.<sup>11</sup> However, this conclusion was based on child care provider reports rather than direct observations of practices, and child care provider self-reports may not reflect behavior and practices accurately in this regard. Although there is an extensive body of literature on observation in child care settings, there have been few studies that used direct observation in child care settings to assess health and safety performance after an educational intervention.<sup>12-14</sup> Furthermore, there have been no studies that used direct observations of child care provider practices relating to SIDS risk reduction or sleep safety. Therefore, the AAP developed a project to evaluate the effectiveness of the AAP speaker's kit, with a training and evaluation effort that incorporated direct observation of child care provider practices. The purpose of this study was to evaluate the effectiveness of the curriculum and the train-the-trainer model in changing knowledge, attitudes, and behaviors (reported and observed) of child care providers with regard to sleep position and other elements of a safe sleep environment for infants. A secondary objective was to assess qualitatively

the challenges and barriers to implementing safe infant sleep guidelines and practices in child care settings.

## METHODS

### Study Design

The study was cross-sectional in design and used a model whereby trainers were trained at a central location. Trainers then provided training to child care providers in the local communities. Child care provider behavior was evaluated through both questionnaires and direct observation. The questionnaires used were validated in previous studies.<sup>11,15</sup>

### Institutional Review Board Approval

The institutional review boards of the AAP and Children's National Medical Center approved this study and the accompanying assessment and evaluation tools.

### Site Selection

The AAP conducted the evaluation project from May 2006 through March 2007, in California, Louisiana, Montana, and Pennsylvania. Selection criteria for states were (1) absence of child care regulations mandating a nonprone sleep position for infants, (2) high absolute number of SIDS deaths (>1000 deaths per year) or high SIDS rate (>8 deaths per 1000 live births), (3) absence of any focused SIDS risk reduction training/awareness efforts toward programs identified to participate in the study, and (4) capacity and infrastructure to participate in the project and to report results. These criteria were used to ensure that the training and evaluation occurred in states with a strong need for such training and in locations where existing requirements and training efforts would not affect the study results. A list of 7 states that met the first 3 criteria was generated, and those states were asked to participate in descending order of SIDS rate or absolute number of SIDS deaths. The 3 states that declined stated that they did so because of lack of infrastructure to participate or knowledge of potential/pending changes to child care regulations.

### Training and Curriculum

Each state formed a team that identified professionals who volunteered to be trained to serve as trainers and/or observers for this project. Trainers and observers were nurses, other health care professionals, child care health consultants, and health educators and were compensated for their time on the project. All trainers and observers signed written informed consent forms and attended a 1-day orientation and training session that was coordinated by the AAP and was led by a pediatrician or health educator experienced in child care provider education and reducing the risk of SIDS in child care settings. The orientation and training sessions included introduction to and familiarization with the *AAP Reducing the Risk of SIDS in Child Care Speaker's Kit*, because this was the curriculum to be used in the local training. The curriculum included information about SIDS diagnosis and statistics, risk factors, safe sleep practices, potential barriers to safe sleep practices, and sug-

gestions for developing safe sleep policies. In addition, all observers were trained to conduct direct observations of infant sleep environments and to record their findings by using an observational tool that was designed and created for this project. After feedback from child care providers, SIDS researchers, child care provider trainers, and child care health consultants was incorporated, the tool was pilot-tested in child care sites in the Chicago, Illinois, metropolitan area. It was then validated with observers in this study. During each state's orientation/training session, the observers were shown photographs with various infant sleep scenarios; observers documented the position in which the infant was placed to sleep, sleep location (eg, crib, bassinet, or playpen), and items in the sleep environment. Observers were presented with the different sleep scenarios until an inter-rater reliability of >95% was established.

### Recruitment

The state teams identified and recruited licensed CCCs and FCCHs that cared for infants to participate in the study. A CCC was defined as a nonresidential facility providing care to any number of children. A FCCH was defined as a (nonrelative) home providing care for  $\leq 12$  children, where the care occurred in a setting that the child care providers used both as a residence and as a place where child care was provided. Recruitment of CCCs and FCCHs occurred through a variety of methods, including direct contact by the state team, announcements at child care provider seminars and conferences, and mailings to child care providers. Written informed consent was obtained from the directors at all child care sites before the first observational visit. Because this study involved observation of provider practices and not infant behaviors, sites were not required to inform parents that this study was taking place.

### Randomization

Before the first observation, the child care sites were randomly assigned to an intervention group (that received training on safe sleep practices between the first observation and the follow-up observation) or a control group (that could receive optional training only after the follow-up observation was completed). Observers were blinded to the assignment status of the programs for which they were responsible, and providers were not aware of their assignment status until they were contacted for training.

### Evaluation

An initial unannounced visit to each participating child care program included direct observation of infant sleep practices and an inventory of infant sleep policies. Observers requested a copy of any written infant sleep policies. In addition, each director and infant care provider completed a questionnaire about infant sleep practices. After the initial observational visits, the identified trainer provided SIDS risk reduction training (using the AAP speaker's kit described above) to child care providers in the intervention group. Each trainee completed a

questionnaire before and after the training, to assess their knowledge, attitudes, and stated practices with regard to infant sleep positioning and the sleep environment.

A follow-up unannounced observation was performed at each participating child care site  $\sim 3$  months after the initial observation (control group) or training (intervention group), to collect and to report on findings regarding the extent to which safe sleep practices and policies were followed and observed. At the end of the follow-up observational visit, the child care providers and directors completed a follow-up questionnaire about issues, concerns, and logistic barriers encountered when implementing infant sleep practices and recommendations. Child care providers in the control group were offered SIDS risk reduction training after the follow-up observational visit was completed.

### Sample Size

Optimal sample size was determined by assuming a 25% difference in knowledge about sleep position before and after the training. On the basis of this assumption, an  $\alpha$  value of .05, and a  $\beta$  value of .90, it was determined that a total sample size of 171 child care providers (86 child care providers per group) was required. To account for anticipated attrition and to have adequate power for stratification according to child care program type (CCC versus FCCH), the initial plan included recruitment of a total of 320 child care programs (40 CCCs and 40 FCCHs in each of the 4 states), with the assumption that most CCCs and some FCCHs would have >1 infant care provider.

### Outcomes and Analyses

The outcome measures included knowledge of the relationship between sleep position and SIDS, knowledge of SIDS risk factors, presence of written CCC/FCCH policies with regard to SIDS risk factors, and actual sleep environment and placed sleep position, as observed directly. Univariate analyses were used to determine demographic and other factors that were associated with outcome measures. In addition, knowledge and reported and observed behaviors before and after training were compared. Statistical analyses, including  $\chi^2$  tests, were performed. Finally, qualitative data regarding common barriers to implementation of safe sleep recommendations and difficulties encountered in changing child care provider behaviors were analyzed through mechanical collection into categorical and conceptual groups and interpretation of the groups.

## RESULTS

### Sites

A total of 343 child care programs were recruited; 264 sites (77.0%) completed the study. Reasons for not completing the project included inability to contact/program closed ( $n = 39$ ), no longer had infants in care ( $n = 29$ ), changed mind about participating in the study ( $n = 8$ ), and forms lost in the mail ( $n = 3$ ). Of the 264 programs that completed the study, 190 were CCCs and 74 were

FCCHs; the number of infants cared for in each program ranged from 1 to 24.

### Staff Members and Observers

A total of 85 professionals attended the project orientation and training sessions in their respective states to become local trainers and observers. A total of 1212 child care professionals (365 child care facility directors and 847 child care providers) participated in the study. Child care providers had been caring for children for a mean of 8.8 years (range: 0–50 years; SD: 8.3 years). Ninety-one percent had a high school diploma, including 23% who had 4-year college degrees. More than one half (55.2%) of child care providers were identified as white, 21.4% black, 14.7% Hispanic, 1.8% Asian, 1.2% Native American, and 5.7% mixed/other/unknown ethnicity. Control and intervention programs were similar with regard to the number of children in care, number of infants in care, provider years of experience, provider education, and racial/ethnic backgrounds of both providers and children.

### Observations

All direct observations were completed between May 25, 2006, and March 25, 2007. Child care providers were observed for 107.2 minutes (range: 30–210 minutes; SD: 28.6 minutes) and 104.1 minutes (range: 15–190 minutes; SD: 29.8 minutes) in the initial and follow-up observations, respectively. Direct observations of the care of 1993 infants (in both initial and follow-up observations) were completed, 1077 in the initial observations and 916 in the follow-up observations. Of those, 627 infants were observed being placed to sleep in the initial observations, and 559 were observed in the follow-up observations. The other 430 infants were not placed for a nap during the observation period. In the initial observations, 1.6 child care providers (range: 0–9 providers; SD: 0.6 providers) were present in the infant room, and 1.5 providers (range: 0–9 providers; SD: 1.0 providers) were present for >1 hour. The follow-up observations had an average of 1.7 child care providers (range: 0–12 providers; SD: 1.1 providers) present, with 1.5 providers (range: 0–12 providers; SD: 1.2 providers) present for >1 hour.

### Sleep Location

Table 1 shows the locations where infants were placed to sleep in both initial and follow-up observations. There was no statistical difference in sleep location between the initial and follow-up observations in either the control or intervention group.

### Sleep Position

In the initial observations, 315 infants (51.4%) were placed to sleep supine, 92 (15.0%) were placed to sleep prone, and 50 (8.2%) were placed on their sides. An additional 156 (25.4%) were placed sitting or standing in the crib. These were infants who generally were older than 6 months and resisted being placed down for sleep (Table 2). Infants were more likely to be placed to sleep

**TABLE 1 Sleep Locations (Direct Observations)**

Sleep Location	n (%)			
	Control		Intervention	
	Initial	Follow-Up	Initial	Follow-Up
Crib	307 (56.5)	281 (58.9)	309 (58.9)	228 (53.3)
Playpen/portable crib	76 (14)	66 (13.8)	58 (11.1)	66 (15.4)
Swing	55 (10.1)	46 (9.6)	42 (8.0)	37 (8.6)
Car seat/bouncy seat	31 (5.7)	31 (6.5)	53 (10.1)	31 (7.2)
Mattress/floor	17 (3.1)	8 (1.7)	24 (4.6)	22 (5.1)
Held by adult	35 (6.5)	30 (6.3)	24 (4.6)	29 (6.8)
Other <sup>a</sup>	22 (4.1)	15 (3.1)	15 (2.9)	15 (3.5)

<sup>a</sup> Includes bassinet, adult bed, cot, and pillows.

**TABLE 2 Sleep Positions (Direct Observations)**

Sleep Position	n (%)					
	Control			Intervention		
	Initial	Follow-Up	P	Initial	Follow-Up	P
Supine	170 (51.8)	161 (57.1)	NS	145 (50.9)	157 (62.1)	.01
Side	25 (7.62)	11 (3.9)	NS	25 (8.77)	11 (4.35)	.04
Prone	53 (16.2)	30 (10.6)	.05	39 (13.7)	15 (5.9)	.003
Other	80 (24.39)	80 (28.4)	NS	76 (26.7)	70 (27.7)	NS

NS indicates not significant.

prone if they were <3 months of age ( $P = .02$ ) or cared for in a CCC rather than a FCCH ( $P < .001$ ). There was improvement in both the control and intervention groups in the follow-up observations. In the control group, supine placement increased to 57.1% (not significant), side placement decreased to 3.9% (not significant), and prone placement decreased to 10.6% ( $P = .05$ ). In the intervention group, supine placement increased to 62.1% ( $P = .01$ ), side placement decreased to 4.4% ( $P = .04$ ), and prone placement decreased to 5.9% ( $P = .003$ ).

### Provider Self-Report

During the initial visit, 65.0% of child care providers stated that they used supine placement exclusively; 26.4% allowed side placement, and 19.6% allowed prone placement. This improved in both the control and intervention groups. In the control group, exclusive supine placement increased to 70.4%, allowing of side placement decreased to 14.1%, and allowing of prone placement decreased to 15.5% ( $P = .01$ ). The intervention group demonstrated more improvement; exclusive supine placement increased to 87.8%, allowing of side placement decreased to 4.5%, and allowing of prone placement decreased to 7.7% ( $P < .001$ ). Stated reasons for infant positioning varied. The most commonly cited reasons included SIDS risk reduction or safety reasons ( $n = 574$ ; 73.5%), fear of suffocation ( $n = 363$ ; 46.5%), fear of choking ( $n = 161$ ; 33.4%), infant sleeps better/longer ( $n = 166$ ; 21.3%), parent request ( $n = 161$ ; 20.6%), previous experience ( $n = 93$ ; 11.9%), and presence of program sleep policy ( $n = 27$ ; 3.5%). Stated reasons for infant positioning also were stratified according to infant position used. In the initial visit, reasons

associated with increased prone placement included fear of choking ( $P < .001$ ), infant sleeps better/longer ( $P < .001$ ), and parent request ( $P < .001$ ). Side placement was more likely if there was concern for suffocation ( $P < .002$ ), and supine placement was more likely if there was concern for safety or SIDS ( $P < .001$ ). In the follow-up visits, these reasons for specific positioning did not change for control programs. In the intervention programs, fear of choking and fear of suffocation were no longer associated with prone or side placement. However, infant sleeps better/longer ( $P < .001$ ) and parent request ( $P < .001$ ) were cited as reasons for intervention programs continuing to place infants prone.

### Characteristics Associated With Sleep Position

Use of prone positioning was more likely if the provider was identified as black ( $P < .001$ ) or if the majority of infants cared for were identified as black ( $P < .001$ ). The use of prone placement was also more likely if the program had a sleep policy that allowed side positioning ( $P < .001$ ). Exclusive use of the supine position was more likely if the provider was identified as white ( $P < .001$ ), if the majority of infants cared for were identified as white ( $P < .001$ ), or if the provider thought that prone positioning increased SIDS risk ( $P < .001$ ) or had knowledge of AAP recommendations ( $P < .001$ ) or BTS ( $P < .001$ ). Child care providers were more likely to state that they used supine placement exclusively if the program had a sleep policy ( $P < .001$ ), if the providers were told about ( $P < .001$ ) or were required to sign ( $P = .05$ ) the policy, or if parents were told about the policy ( $P = .004$ ).

### Reported Barriers to Prone Positioning

Child care providers reported that major challenges to implementing sleep position policies included objections from colleagues and parents and inability of infants to sleep in the supine position. Colleague objections related to concerns regarding choking and aspiration and concerns about the quality of sleep for infants. According to the providers, parental objections related to concerns about the quality of sleep. In addition, infants who usually slept in the prone position at home had difficulty transitioning to supine positioning in child care.

### Provider Knowledge and Beliefs

At the initial visit, 466 child care providers (59.7%) reported that the AAP recommends placing infants to sleep supine only, and 26.6% thought that supine or side positioning is acceptable (Table 3). When asked whether they personally believed that prone positioning places an infant at increased risk for SIDS, 213 child care providers (27.3%) stated that they believed there is a definite risk to the prone sleeping position. An additional 242 (41%) believed that there is possibly a risk, 144 (18.4%) were unsure, and 177 (22.6%) doubted or definitely did not believe that prone sleeping increases the risk of SIDS. Child care providers were more likely to doubt or not to believe the benefits of supine positioning if they were black ( $P = .01$ ), if they had less education

**TABLE 3** Child Care Provider Knowledge About AAP Recommendations

AAP Recommendation	n (%)				
	Initial, All	Follow-Up			
		Control	P	Intervention	P
Supine only	466 (59.7)	229 (64.8)	.03	260 (80.5)	<.0001
Supine/side allowed	208 (26.6)	75 (20.9)		36 (11.2)	
Side only	12 (1.5)	4 (1.1)		0 (0)	
Side/prone allowed	14 (1.8)	3 (0.8)		2 (0.6)	
Prone only	5 (0.6)	2 (0.6)		0 (0)	
Do not know	72 (9.2)	30 (8.4)		10 (3.1)	

( $P < .001$ ), or if black children constituted the majority of children cared for ( $P = .01$ ). Child care providers were more likely to believe that prone placement increases SIDS risk if they had more experience caring for children ( $P = .001$ ). Child care provider awareness of the AAP recommendation of supine as the preferred position for infants increased from 59.7% before the training to 64.8% (control;  $P = .03$ ) and 80.5% (intervention;  $P < .001$ ) after the training. Although there was also an increase in the number of child care providers who believed that prone placement increases an infant's risk for SIDS, from 27.3% to 35.6% (control) and 44.6% (intervention), these increases were not statistically significant.

### Items in Infant Sleep Environment

In the initial observations, the majority of infants were observed being placed to sleep with other items in their sleep environment. Blankets, toys, and stuffed animals were most commonly noted (Table 4). In the follow-up observations, the use of pillows decreased in the control group ( $P = .02$ ), and the use of blankets ( $P = .05$ ), toys and stuffed animals ( $P < .001$ ), and pillows ( $P = .003$ ) decreased in the intervention group. Bibs were observed around the necks of 96 sleeping infants (control:  $n = 40$ ; intervention:  $n = 56$ ) in the initial observations. Bib use increased in the control group ( $P = .05$ ) and decreased in the intervention group ( $P = .02$ ). The presence of blankets ( $P < .001$ ), toys and stuffed animals ( $P = .03$ ), and pillows ( $P = .04$ ) was correlated with supine positioning. The correlations with blankets ( $P < .001$ ) and toys and stuffed animals ( $P < .001$ ) persisted in the follow-up observations. Blankets were more likely to be used in

**TABLE 4** Items Observed in Infant Sleep Environment

Items	n (%)					
	Control			Intervention		
	Initial	Follow-Up	P	Initial	Follow-Up	P
Blanket	413 (75.6)	338 (70.3)	NS	412 (77.9)	289 (66.4)	.05
Toys/stuffed animals	111 (20.3)	74 (15.4)	NS	133 (25.1)	60 (13.8)	<.001
Pillows	25 (4.6)	9 (1.9)	.02	33 (6.2)	10 (2.3)	.003
Bumper pads	23 (4.2)	22 (4.6)	NS	44 (8.4)	18 (4.1)	NS
Bib	40 (7.3)	52 (10.8)	.05	56 (10.6)	28 (6.4)	.023
Pacifier	211 (38.6)	179 (37.2)	NS	185 (35.0)	152 (35.0)	NS

NS indicates not significant.

**TABLE 5** Items Allowed in Infant Sleep Environment by Provider Report

Items	n (%)				
	Initial, All	Follow-Up			
		Control	P	Intervention	P
Blanket	650 (83.2)	274 (76.3)	NS	242 (74.9)	NS
Toys	54 (6.9)	16 (4.5)	NS	7 (2.2)	.01
Stuffed animals	80 (10.2)	21 (5.9)	.01	13 (4)	.0003
Wedges	200 (25.6)	62 (17.3)	NS	44 (13.6)	.0002
Bumper pads	185 (23.7)	64 (17.8)	NS	35 (10.8)	.0002

NS indicates not significant.

FCCHs ( $P = .01$ ). Use of the feet-to-foot rule (the infant's feet are touching the foot of the bed, and a thin blanket is tucked in on the sides and bottom of the mattress, so that the blanket does not extend above the infant's chest), which is recommended if a thin blanket is used,<sup>16</sup> was more common in FCCHs ( $P = .002$ ) or if a bumper pad was present ( $P = .01$ ). In the provider questionnaires, child care providers reported which items were allowed in the sleep environment while the infant was sleeping (Table 5). Blankets were allowed in >80% of programs, and there was no significant change in the follow-up questionnaires for either control or intervention groups. In the intervention group, there was a decrease in the allowing of toys ( $P = .01$ ), stuffed animals ( $P < .001$ ), wedges ( $P < .001$ ), and bumper pads ( $P < .001$ ). The only change in the control programs was a decrease in the use of stuffed animals ( $P = .01$ ). Child care providers reported parental concerns as the primary barrier to implementation of policies about soft bedding and items in the sleep environment. Providers also stated that parents often requested that a comfort item from home be placed with the infant for sleep.

### Pacifier Use

Pacifiers were used by approximately one third of sleeping infants in the initial observations, and this did not change for either the control or intervention groups. Pacifier use was correlated with supine positioning ( $P < .001$ ). Approximately three fourths (74.8%) of child care providers allowed infants to use pacifiers during sleep; this did not change for either the control or intervention groups. When child care providers were asked why they did not use pacifiers, they reported concerns about infection control, parental refusal, or infant refusal.

### Safe Sleep Policies

At the initial visit, 65.0% of child care providers stated that their program had policies or expectations pertaining to a safe sleep environment for infants, and 32.1% stated that they had written policies; 21.6% of programs were able to produce a copy of the written policy for observers. Although the proportion of child care providers stating the presence of written policies increased to 54.4% in control sites and 54.9% in intervention sites, neither change was statistically significant, and there was no increase in the number of programs that shared the written policy with observers. Of the policies (writ-

**TABLE 6** Safe Sleep Policies

Sleep Policy	n (%)				
	Initial, All	Follow-Up			
		Control	P	Intervention	P
Require supine	451 (57.7)	214 (59.6)	NS	219 (67.8)	NS
Require side	72 (9.2)	29 (8.1)	NS	27 (8.4)	NS
Require parent note for nonsupine position	209 (26.8)	111 (30.9)	NS	131 (40.6)	NS
Require physician note for nonsupine position	213 (27.3)	109 (30.4)	NS	151 (46.9)	.01
Require firm sleep surface	423 (54.2)	199 (55.6)	NS	196 (60.7)	NS
Require no soft/loose bedding	319 (40.8)	163 (45.5)	NS	171 (52.9)	NS
No smoking around infants	516 (66.1)	227 (63.4)	NS	219 (67.8)	NS
Require specific room temperature	264 (33.8)	125 (49.6)	.003	131 (58)	.0005
Offer pacifier	136 (17.4)	65 (18.2)	NS	80 (24.8)	NS
Require to check on infants	554 (70.9)	247 (97.2)	NS	240 (97.6)	NS
Parents told about policy	432 (64.6)	214 (73)	NS	221 (80.9)	.02
Require staff members to attend training	214 (27.4)	129 (36.2)	NS	115 (35.6)	NS
Require substitutes to attend training	232 (29.7)	111 (41.3)	NS	124 (50.8)	NS

NS indicates not significant.

ten and unwritten) at the initial visit, 451 (57.7%) required that infants be placed to sleep supine, and 72 (9.2%) indicated that infants may be placed to sleep on their sides (Table 6). A parent note was required by 209 policies (26.8%) for a sleep position other than supine, and 213 (27.3%) required a physician note. A firm sleep surface was required by 423 policies (54.2%), and 319 (40.8%) stated that no loose or soft materials could be placed in the crib. Smoking around or near infants was prohibited by 516 policies (66.1%), 264 (33.8%) had room temperature requirements to avoid overheating, and 136 (17.4%) encouraged pacifiers to be used when the infants were placed to sleep. More than three fourths (82.5%) of the written policies available for review by observers required supine positioning for sleep. After the intervention, there was an increase from 27.3% to 46.9% in child care providers who reported that a physician note was required for a sleep position other than supine ( $P = .01$ ). There were increases in requirements for specific room temperature in both the control and intervention groups. There was no change in other elements of the sleep policies. Approximately two thirds of child care providers ( $n = 432$ ; 64.6%) reported that parents were informed about the sleep policy, and 504 (64.5%) reported that all child care providers were informed. Approximately one fourth ( $n = 214$ ; 27.4%) stated that staff members were required to attend training on the sleep policy, and 232 (29.7%) stated that substitute staff members also were trained in safe sleep practices. Although there was an increase in parents being informed in the intervention group ( $P = .02$ ), there was no change in child care providers receiving information or training about safe sleep protocols.

## DISCUSSION

The overall objective of this study was to evaluate the effectiveness of a SIDS risk reduction curriculum, using a train-the-trainer model, in changing knowledge, attitudes, and behaviors (reported and observed) of child care providers with regard to sleep position and other elements of a safe sleep environment for infants. The curriculum was effective in improving knowledge and changing sleep-related practices among child care providers.

Although this project demonstrated the potential for training and the curriculum to improve knowledge, attitudes about the validity of safe sleep recommendations were more difficult to change. Although assessment of child care provider attitudes was not one of the primary objectives of this project, it is important to understand personal opinions, beliefs, and concerns, because they may affect behavior.<sup>15,17-19</sup> Child care providers were more likely to remain skeptical of the benefits of supine positioning if they were identified as black, if they had less education, or if the majority of children cared for were black. This skepticism is not unique to child care providers. Parents are more skeptical about sleep position recommendations if they are black or less well educated,<sup>18-20</sup> and infants born to black and/or less well educated parents are at higher risk for SIDS,<sup>21</sup> at least partly because of an increased prevalence of prone positioning.<sup>22-25</sup> Concern regarding the risk of aspiration and choking while supine, an additional barrier to supine positioning in child care programs, is also common among parents and hospital personnel.<sup>19,20,26</sup> There are no data supporting an increased risk of aspiration while supine, and deaths attributable to aspiration have not increased since supine positioning was first recommended.<sup>27-29</sup> Additional efforts to understand and to address barriers to changes in attitudes and behaviors are important if continued progress in achieving safe sleep environments in child care settings is to be achieved.

It is concerning that many child care providers continue to be unaware of the importance of supine positioning. Indeed, before the intervention, only 59.7% of child care providers who participated in this project stated that they were aware that the AAP recommends the supine sleep position for healthy term infants. More than one half (58.2%) indicated that they had never heard of BTS, and 41% were unsure, doubtful, or did not believe that prone sleeping increases the risk of SIDS. It was not uncommon during the training sessions for child care providers to express shock and dismay because they had incorrectly thought that they were already providing a safe sleep environment for the infants in their care.

Child care providers face many issues when trying to implement policies that require supine-only infant sleep positioning. Perceived or stated parental objection is an important and common barrier for child care providers. It is apparent from both the quantitative results and provider comments that child care providers often do not feel empowered to respond to parental requests or demands and often acquiesce in an effort to make the transition to child care as smooth as possible. This may explain why, although 87.8% of the child care providers

in the intervention group indicated that infants were only placed supine, only 62.1% of the infants in the intervention sites were actually placed supine and why there was no correlation between what child care providers reported doing and what positions were actually observed. Therefore, observation is critical in assessing whether provider behaviors change after training in safe sleep practices.

It is likely that an infant will be unaccustomed to sleeping supine if his or her parents object to the supine position (and therefore are placing the infant prone at home). This not only puts the child at increased risk but also creates a difficult transition for the infant and can result in prone placement by the child care provider for the infant to be able to sleep. This is especially a problem with younger infants who are not yet able to roll from the supine position to the prone or side position comfortably. Indeed, prone positioning in this study was more common in younger infants. Child care providers seem to feel more comfortable placing older infants supine and then allowing them to change their own position; this is consistent with AAP recommendations to place infants supine.<sup>16</sup> There are no data suggesting that infants should be repositioned if they can comfortably change their own position.<sup>30</sup> Written sleep policies requiring supine placement unless there is a documented physician note indicating a medical need for a different sleep position can provide the child care provider with more confidence in refusing parental demands.<sup>6-8</sup> Indeed, these results showed that supine placement was more likely in programs with written sleep policies, protocols for informing parents and staff members about the sleep policies, and required training in which sleep policies were discussed. Supine sleep policies may also be important to ensure appropriate practices, particularly among providers who may be skeptical about the benefits of supine positioning. In addition, the information provided in the AAP educational curriculum and training was effective in empowering child care providers, because the intervention programs were more likely to require physician notes for positions other than supine and were more likely to inform parents about sleep policies.

It also is difficult for child care providers to implement a supine sleep policy if their colleagues object. Objections seem to be related to skepticism about the benefits of supine positioning, concerns about the risk of aspiration or choking with supine positioning, or concern about the duration or quality of infant sleep. Staff members who reported that they believed that prone positioning increases SIDS risk were more likely to use supine positioning. It is important that both preservice and inservice training be provided to all staff members, including the center director, supervisors, and owners, and that it be repeated on a regular basis, particularly because child care programs often experience high rates of staff turnover ( $\geq 50\%$  annually).<sup>31-33</sup> Furthermore, it is critical that concerns about risks with supine positioning and doubts about the benefits of supine positioning be addressed. Periodic training of all staff members, however, can be difficult to accomplish. Training must

occur either after hours (with overtime pay) or during work hours (with substitutes to care for the children during training). Indeed, only one fourth of the child care providers in this study indicated that training about safe sleep practices was provided within their program. State mandates for formal training may be necessary to ensure that child care providers, including substitutes and volunteers, are adequately trained.

Perceived parental concerns are also important barriers for other policies. Child care providers reported that parents frequently requested that a comfort item from home (generally a blanket, piece of clothing, or stuffed animal) be placed in the crib to facilitate the infant's transition to child care. Again, this situation is made more difficult if the infant is accustomed to sleeping with such items at home. It is possible that many parents do not understand or appreciate the importance of infant safe sleep guidelines, and it is difficult for child care providers to refuse parental requests. Statewide regulations may help in this regard. It is interesting to note that programs in this study had no difficulty enforcing no-smoking policies. All 4 states have statewide regulations limiting the use of tobacco products in CCCs and FCCHs,<sup>34-42</sup> empowering the programs to enforce no-smoking policies despite any objections from staff members. Any objection is countered with a simple statement, "It's the law/regulation." It is hoped that establishment of statewide regulations for infant sleep would result in similar acceptance of supine positioning and decreased use of soft bedding.

Prone placement was more common in sites where side positioning was allowed. Policies allowing side positioning are not recommended. The side position is unstable, and many infants roll more easily into the prone position, which places the infant at extremely high risk for SIDS.<sup>43</sup> In fact, unaccustomed prone position is one of the risk factors originally identified for SIDS in child care.<sup>2</sup> In addition, it is possible that, if side positioning is allowed, then child care providers may be less likely to consider sleep position an important consideration and may be more likely to place infants prone.

The presence of soft bedding in the crib was more likely when the infant was placed supine. It is possible that child care providers are more attuned to the relationship of SIDS and sleep position than they are to the relationship of SIDS and other causes of sudden unexpected infant deaths (such as suffocation, asphyxia, and undetermined causes) with soft bedding. It is also possible that child care providers may have a false sense of reassurance if the infant is sleeping supine and consider it acceptable to use soft bedding in that instance. Although it is true that the risk of SIDS resulting from soft bedding is multiplied almost 12-fold if the infant is placed prone, there is still a 2.8-fold risk of SIDS with soft bedding when the infant is supine.<sup>23</sup>

The frequency of bib use among sleeping infants was an alarming observation. Bibs were noted around the necks of 106 infants. In fact, although there was a decrease in bib use in the intervention group, there was also a statistically significant increase in bib use in the control group. There was no association between bib use

and sleep position. Bibs pose a strangulation risk for sleeping infants and should always be removed before the infant is placed for sleep. Future training efforts about safe sleep practices in child care should include information about why it is important to remove bibs before placing the infant for sleep.

Pacifier use has been associated with a decreased risk for SIDS.<sup>44,45</sup> The mechanism through which pacifiers are protective is unclear but may be related to arousal thresholds, airway patency, and prevention of the prone sleep position in pacifier users.<sup>46-50</sup> Pacifier use in this study was seen for one third of infants and was associated with supine positioning. There was no change in pacifier use or pacifier policies in either the intervention or control group. Concerns about pacifier use included infection control, parental refusal, and infant refusal. The AAP recommends that pacifiers be offered to infants as a SIDS risk reduction measure; however, pacifiers should not be forced on infants who refuse them.<sup>16</sup>

There was an increase in infants being placed supine in both the control and intervention groups while providers were being observed. Although this is the first time direct observations have been used to assess child care provider behavior with regard to sleep position, behavior change during observation has been documented with other health and safety standards in child care.<sup>12</sup> Observations can be helpful in reinforcing the importance of the desired behavior, especially when they are conducted by representatives of agencies responsible for licensing and/or accreditation.

We acknowledge that the 23% dropout rate may be a limitation of this study. The 2 most common reasons for dropout were closing of the program and no longer having infants in care. Most of the closed programs were in Louisiana, which was struck by Hurricane Katrina several months after state representatives agreed to participate in the study. In the aftermath of Hurricane Katrina, many child care programs closed because of physical damage to the child care site or because many families moved out of the area, leading to loss of business. FCCHs constituted all of the programs that dropped out because there was no longer an infant in care. Often there was only 1 infant in care, who either left the program or became >12 months of age, rendering the FCCH ineligible for continuation in the project. However, we think that this dropout rate is not unreasonable for a study involving infants in child care, because typically there are frequent changes in child care arrangements, particularly for infants. Typical infants in child care have an average of >2 child care arrangements by their first birthday, and 36.5% have >3 different arrangements.<sup>51</sup> Despite the dropout rate, there were ample numbers of infant observations and participating child care providers to provide sufficient power to the study.

All of the observers were blinded to group assignment of their designated child care programs. However, it is possible that an observer might see study materials in a facility or comments about the training might be made during the follow-up observation, leading to awareness of group assignment and potential observer bias. In ad-

dition, some of the improvements in both groups might have been a reflection of a Hawthorne effect where there is short-term behavioral change when one is observed. A third observation in control sites after they received training could have been helpful in assessing the impact of the Hawthorne effect. Unfortunately, this was not apparent until after the study was completed, and there was insufficient funding for a third observation.

The most challenging aspect of the study for all state teams was the recruitment and retention of participating FCCCHs and CCCs. The state teams reported that many FCCCHs and CCCs were reluctant to participate in the project because of fear of being cited for not following proper policies, although the states involved in the study did not have policies on safe sleep. As a result, the recruitment process lasted longer and required more effort than anticipated. There were also state-specific challenges that may be relevant for those wishing to implement similar programs. Sparsely populated areas may necessitate that observers and trainers travel long distances to the assigned programs. In addition, although many of the training materials were translated into Spanish, not all of the materials were available in Spanish. Finally, the level of support for each state varied, and the states with less support had more difficulty carrying out the project. Implementation of this study in states with access to child care health consultants or other professionals experienced in training child care professionals seemed to be less challenging at all levels, compared with teams using newly trained professionals as observers and trainers.

Despite these and other challenges, all participating states considered participation in this project to be a positive experience. Overall, the state teams reported that this study provided an opportunity for them to connect with many child care programs and professionals that might not otherwise have received services. These types of partnerships are essential in continuing to provide education to child care programs in the states. In addition, the participants reported that this study allowed them to collaborate with various programs in the community and to develop, to maintain, and to enhance those relationships. Two states (California and Montana) plan to continue offering this training to child care programs statewide, as part of their infant and toddler training course, and 1 state has already procured funding to do so. Montana has developed and Louisiana is developing state regulations requiring a safe infant sleep environment and safe sleep training for child care providers. In addition, after multiple requests from child care providers, the AAP has developed a template for developing safe sleep policies that has been made available to child care programs interested in creating written policies consistent with AAP guidelines<sup>16</sup> and national child care standards.<sup>52</sup> In addition, the *AAP Reducing the Risk of SIDS in Child Care Speaker's Kit* has been revised and updated with information obtained from this study, and it is available online ([www.healthychildcare.org](http://www.healthychildcare.org)) for use in child care training. Such state mandates and continued training should encourage additional programs to

develop safe sleep policies, even in the absence of state-wide regulation.

Overall, the *AAP Reducing the Risk of SIDS in Child Care Speaker's Kit* curriculum and the train-the-trainer model were effective in improving the knowledge of child care providers and empowering them to modify their practices. Perceived parental objections, child care provider skepticism about the benefits of supine positioning and other safe sleep recommendations, and lack of training opportunities continue to be important barriers to implementation of safe sleep recommendations. Heightened public education about the risks of soft bedding and the need to place infants consistently in the supine position for sleep, beginning at birth, not only should reduce the risk of SIDS but also should help infants sleep more comfortably in the supine position, assisting them in their transition to child care and assisting child care providers in following safe sleep policies. In addition, child care provider training that includes observations and addresses barriers to changing provider practices would be more effective. Finally, use of safe sleep policies, continued education of parents, expanded training efforts for child care professionals, statewide regulations and mandates, and increased monitoring are critical to future efforts to reduce further the risk of SIDS in child care.

#### ACKNOWLEDGMENTS

This project was supported in part by the Administration for Children and Families Child Care Bureau and the Health Resources and Services Administration Maternal and Child Health Bureau, through cooperative agreement U46MC04436 and contract HHS240200435006C.

We extend our heartfelt appreciation to the child care providers who participated in the study and to the professionals who were observers and trainers in this study. In addition, we thank the state teams, as follows: City of Long Beach, Department of Health and Human Services (Tracy Hollingsworth and Jennifer Lipman, PNP); Kern County Public Health Department (Carol Goff, RN, and Janet Goon, RN); Agenda for Children-Louisiana (Tracy Hubbard, MPH, MCE); Montana Child Care Association (Susan Held and Shelly Meyer, RN); and Pennsylvania Chapter, AAP Early Childhood Education Linkage System Program (Susan Aronson, MD, FAAP, Rosemary Johnston, RN, and Libby Ungvary, MEd). Finally, we thank Kendria Hall, MD, for assistance in data collection and database management, Dana Best, MD, FAAP, V. Fan Tait, MD, FAAP, Elaine Donoghue, MD, FAAP, and John Kattwinkel, MD, FAAP, for their thoughtful reading of the manuscript, Lauren Kotch, MPH, for assistance with the study design, and Renee Jarrett and Elizabeth Jarvis for administrative assistance.

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#### HOSPITAL FOR SICK CHILDREN MANUAL OF PEDIATRIC TRAUMA\*

**Editors:** Mikrogianakis, Angelo, Valani, Rahim, Cheng, Adam,

**Publisher:** Lippincott Williams & Wilkins

**List Price:** \$54.95

**Reviewer:** Mary Louise Seymour, M.D. (Ochsner Clinic Foundation)

**DESCRIPTION:** This manual of pediatric trauma, written in an outlined, bulleted format, uses algorithms, tables, diagrams, and excellent radiographs. It is organized primarily by system trauma, then specific types of injury and includes chapters on pediatric imaging, procedures, pain management, transport, and prevention.

**PURPOSE:** The stated purpose is to further educate emergency physicians on the management of pediatric trauma to ensure that children, no matter where they present, receive excellent, informed care and achieve the best possible outcomes.

**AUDIENCE:** This manual is particularly valuable for emergency staff physicians and residents but also will be of interest to surgical specialists, specifically residents, who must manage pediatric trauma victims. Emergency department nurses, EMTs, and medical students will benefit as well.

**FEATURES:** Each chapter is similarly organized and covers epidemiology, pediatric pathophysiology, primary and secondary examination, immediate interventions, procedures, imaging, laboratory, and definitive management. Each chapter uniquely concludes with a section of clinical pearls as well as extensive references. There are two particularly excellent chapters on pediatric imaging and craniofacial injuries with very nice 3D CT images.

**ASSESSMENT:** This is a superb manual, one of the best, written by very experienced physicians from a highly regarded institution. The information is grounded in the most recent literature and is evidence based. This detailed and comprehensive yet concise manual will be useful clinically and as a study guide for examination. It is, however, a little large for the pocket of a lab coat.

\*Review provided by ©Doody's Review Service™. [www.medinfonow.com](http://www.medinfonow.com)

# Reducing the Risk of Sudden Infant Death Syndrome in Child Care and Changing Provider Practices: Lessons Learned From a Demonstration Project

Rachel Y. Moon, Trisha Calabrese and Laura Aird

*Pediatrics* 2008;122:788-798

DOI: 10.1542/peds.2007-3010

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