INFANT SLEEP POSITION AND SIDS: A HOSPITAL-BASED INTERVENTIONAL STUDY

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ABSTRACT

Context. Avoidance of the prone sleeping position is considered an important factor contributing to the decline in the incidence of sudden infant death syndrome (SIDS).

Objectives. To determine infant sleep positioning practices and SIDS awareness before and after a hospital-based Back to Sleep campaign.

Design. A questionnaire-based, descriptive, and cross-sectional before-after trial.

Setting. The pediatric outpatient department of an inner-city hospital in Brooklyn, New York.

Subjects. Two consecutive samples of 250 mothers of healthy infants younger than 6 months old born in and attending the outpatient clinics of the hospital before and after the intervention.

Intervention and Main Outcome Measures. Specific policies promoting Back to Sleep were established in our newborn nursery and outpatient department. Reduction in prone infant sleep positioning was the primary outcome measure. Increased parental SIDS awareness was a secondary outcome.

Results. The proportion of infants sleeping prone was reduced significantly (from 27% to 18%) after the intervention ($P < .005$). Among the mothers who chose the prone sleeping position for their infants, 49.6% worried about choking. Older mothers (>22 years) responded to the intervention by a 45.6% reduction in prone placement ($P < .005$) as opposed to a 11.4% reduction among younger mothers (<22 years) ($P = ns$). Other factors contributing to reduced prone positioning included marriage (adjusted odds ratio [OR] 0.57; 95% confidence interval [CI] 0.93, 0.34) and breast feeding (adjusted OR 0.66; 95% CI 1.1, 0.4). SIDS awareness was 79.6% and 82.4% in the preintervention and postintervention groups, respectively ($P = ns$).

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Conclusions. The Back to Sleep campaign was effective in our hospital setting. Our data indicate the need for special targeting of young, unmarried, and non-breast-feeding mothers. Fear of choking remains an important deterrent to proper infant sleep positioning.

INTRODUCTION

Although the incidence of sudden infant death syndrome (SIDS) has decreased significantly in recent years, it still remains the third leading cause of infant mortality in the US, accounting for about 3,000 deaths annually.¹ Such a trend has been noticed worldwide in countries where nonprone sleep positioning campaigns have been implemented vigorously.^{2,3} This is understandable, since avoidance of the prone sleeping position is now considered to be the single most important factor contributing to the current decline in the incidence of SIDS.⁴

The first initiative against infant prone sleeping in the US was spearheaded by the American Academy of Pediatrics Task Force recommendation in April 1992 for side or back sleeping.⁵ This was followed in 1994 by the Back to Sleep campaign launched by the National Institute of Child Health and Human Development and other SIDS organizations. As a result of these initiatives, the percentage of American babies sleeping prone dropped from 70% in 1992 to 24% in 1996, possibly explaining the 35% reduction in the national SIDS mortality during the same period.⁶

This study was conducted to determine the infant sleep positioning practices and SIDS awareness in our community and to assess the effectiveness of implementing another hospital-based Back to Sleep campaign.

PATIENTS AND METHODS

The study was conducted in the pediatric ambulatory care center of Wyckoff Heights Medical Center (Brooklyn, NY) in three phases. The first (preintervention) phase was conducted from January through April 1997. During this phase, mothers of healthy infants 6 months and younger, born in our hospital and attending the pediatric outpatient clinics, were approached consecutively. After giving informed consent, 250 mothers completed the questionnaire under the direct supervision of the clinic pediatricians. None of the mothers declined to answer the questionnaire, which was available in English and Spanish. The questionnaire contained 15 questions; there were 4 to 5 responses for each question. Mothers could choose one or more appropriate responses. Some questions were designed to collect demographic data. SIDS awareness specifically required a yes or no response. Infant sleep position information was obtained, as was the reason for choosing the position. Mothers were asked about receipt of any advice for correct sleep positioning and the source of such advice. Fourteen mothers of infants

with histories of prematurity, gastroesophageal reflux, or significant chronic illnesses were excluded.

The second (intervention) phase was implemented from May through July 1997. Specific policies were developed in the newborn nursery and in the pediatric clinics to implement the Back to Sleep campaign. All medical and paramedical personnel involved in the care of infants received in-service education as to the importance of teaching mothers proper sleep positioning to avoid SIDS. A Back to Sleep video was played daily in the well baby nursery. Advice against prone positioning was incorporated in the bedside rounds to the parents. At the time of discharge from the nursery, each mother was given Back to Sleep advice by a nurse and a pamphlet about sleep position and SIDS. The same materials and information were offered during each subsequent well baby visit to the clinic. These measures are ongoing presently in the hospital to target all the hospital-born babies and also those attending the pediatric clinics. One of the authors (B.S.) wrote a poem (Appendix) as an added educational tool to be distributed to the mothers.

The third (postintervention) phase was conducted 3 months after the intervention was implemented, to assess its effectiveness. The same questionnaire used during the first phase was administered to another 250 mothers of healthy term infants less than six months of age born consecutively in our hospital. Exclusion criteria remained the same as in the first phase; 13 mothers were excluded. None of the mothers who were approached refused to participate in this phase.

The hypothesis tested was that fewer mothers would place their infants in a prone sleeping position after the intervention. The primary dependent variable consisted of the proportion of mothers who stated that their infants slept in a prone position. Stated awareness of crib death was examined as a secondary outcome. Individual independent associations were analyzed using chi-square analysis. The effects of multiple independent variables were examined using logistic regression. Data from both the groups (preintervention and postintervention) were pooled for this analysis. Stepwise entry was used to identify significant covariates at *P* values of .05 and .1. Statistical analyses were performed using JMPTM software package (version 3.2) and the SAS software package (version 6.04) (SAS Institute, Cary, NC).

RESULTS

The demographic characteristics of the preintervention and postintervention groups are summarized in Table I. The study population was predominantly Hispanic and belonged to lower socioeconomic groups. Age, marital status, and

TABLE I Demographic Data

	Preintervention (N = 250)	Postintervention (N = 250)
Mean maternal age	25.44 years	24.67 years
Mean infant age	1.69 months	1.49 months
Married mothers	86 (34.4%)	80 (32%)
Mean number of children/mother	2.0	2.0
Male:female ratio	1.2:1	1.06:1
WIC/Medicaid eligible	238 (95.2%)	240 (96%)
Breast Feeding	85 (34%)	75 (30%)
Race	191 (76.4%) Hispanic, 24 (9.6%) African-American	198 (79.2%) Hispanic, 30 (12%) African-American
Maternal education	34 (13.6%) Primary 161 (64.4%) High school 54 (21.6%) College	38 (13.2%) Primary 148 (59.2%) High school 53 (21.2%) College

education of the mothers in both the groups were comparable. Approximately one-third of mothers in both groups were breast feeding either exclusively or in addition to formula feeding. They had an average of two children; the sex distribution of these children was even. There were no statistically significant differences in the demographic characteristics of the two groups.

The results of the study are summarized in Table II. Before intervention, 27% of the infants were being placed prone; after intervention, the proportion decreased to 18%, resulting in a 34% reduction in prone positioning (crude odds ratio [OR] 0.59; 95% confidence interval [CI] 0.90, 0.38) ($P < .005$, chi-square analysis). The number of infants in other nonprone positions was not significantly

TABLE II Results

	Preintervention	Postintervention	Percentage Change	P
Prone position	68/250 (27.2%)	45/250 (18%)	-34%	<.005
Supine position	51/250 (20.4%)	56/250 (22.4%)	+10%	ns
Side position	99/250 (39.6%)	112/250 (44.8%)	+13%	ns
Alternate side/supine position	32/250 (12.8%)	37/250 (14.8%)	+15.6%	ns
Young mothers (<22 years) placing infants prone	25/98 (25.5%)	24/106 (22.6%)	-11.4%	ns
Older mothers (>22 years) placing infants prone	43/160 (26.8%)	21/144 (14.5%)	-45.6%	<.005

different in the two groups (see Table II). The overall reasons for prone placement in both preintervention and postintervention groups were "fear of choking" (56/113, 49.5%), "prefers stomach" (67/113, 59.2%), "worried about shape of baby's head" (2/113, 1.8%), and "other reasons" (5/113, 4.4%).

Before intervention, 40.4% of the mothers reported receiving advice about proper infant sleep positioning from a medical source. After intervention, this increased to 52.4% ($P < .005$).

Stepwise logistic regression analysis showed that the reduction in prone placement was influenced by other variables in addition to the educational intervention. Other significant covariates included marriage (OR = 0.57; 95% CI 0.93, 0.34) ($P < .05$) and having been advised about nonprone positioning by medical personnel irrespective of the intervention (OR = 0.49; 95% CI 0.77, 0.32) ($P < .005$). After adjusting for these covariates, the adjusted odds ratio for prone sleep positioning in mothers in the postintervention group continued to be significant (0.60; 95% CI 0.92, 0.38) ($P < .05$). Age of the mother, educational status, breast feeding, awareness of crib death, and number of children were not associated significantly with nonprone positioning and did not figure in the logistic regression analysis. Using a more liberal entry criterion ($P = .1$ for covariate selection), breast feeding also influenced prone positioning (OR = 0.66; 95% CI 1.1, 0.4). After adjusting for breast feeding, marital status, and prior advice, mothers in the postintervention group still placed fewer infants in a prone sleeping position (odds ratio 0.59; 95% CI 0.9, 0.37).

Analysis of maternal age as a continuous variable revealed no correlation with infant sleep positioning. However, after stratifying the ages of the mothers into two categories, above or below 22 years, analysis revealed a 45.6% reduction ($P < .005$) in prone positioning among the mothers 22 years and older in the postintervention group (crude data). Mothers 22 years and younger responded with a reduction of 11.4% ($P = ns$) in prone placement after the intervention.

SIDS awareness was claimed by 79.6% and 82.4% of mothers in the preintervention and postintervention groups, respectively. This difference was not significant statistically. Logistic regression analysis of SIDS awareness as a secondary outcome revealed significant positive correlation with married maternal marital status (data not shown).

COMMENTS

By pursuing a Back to Sleep campaign actively, the number of mothers reporting receipt of proper infant sleep positioning advice increased significantly (by 29.7%). This correlated with a statistically significant (34%) reduction in prone

positioning. The secular trend of decreasing prone sleep positioning during the study period may have contributed partly to this decline. The exact effect of the trend could not be determined due the lack of a control sample in our study. This achievement, as well as current US statistics, still falls far short of that of many other countries where such campaigns have been pursued aggressively. By comparison, the percentages of infants sleeping in a prone position in Denmark, Norway, and Tasmania have been reported to be 3.4%, 4.8%, and 4.3%, respectively.²

Our data revealed a high level of SIDS awareness both before and after intervention. However, they did not correlate with infant sleep positioning on logistic regression analysis. This lack of association indicates that the public education campaigns to date have not succeeded entirely in conveying the protective effects of nonprone positioning. Moreover, 49.7% of mothers who chose prone positions for their infants during sleep worried about the children choking in other positions.

Maternal marital status significantly influenced the choice of infant sleep position and SIDS awareness in our study population. Married mothers were less likely to place their infants in the prone position to sleep and were more likely to be aware of SIDS. Similar experiences have been reported from Norway and Tasmania.^{7,8}

Maternal age had some influence on infant sleep positioning. A highly significant reduction in prone placement was achieved among mothers 22 years and older after intervention. Similar results were recorded in two studies in which a maternal age greater than 25 years was found protective against SIDS,⁸ and teenage motherhood was associated with SIDS nonawareness.⁹

Breast feeding is known to have a protective effect in reducing SIDS.¹⁰ The exact mechanism is unknown.¹¹ It is possible that the breast-feeding mothers select themselves into a group with low risk factors for SIDS. In our study, breast feeding correlated with avoidance of prone infant sleep positioning. This finding may be of interest as we are unaware of any similar reports in the literature. We speculate that the protective effects of breast feeding for SIDS prevention may be mediated in part by preference for nonprone infant sleep positioning among these mothers.

In conclusion, our study has demonstrated that a hospital-based Back to Sleep campaign can reduce the number of infants placed in prone sleeping positions significantly. This study further suggests the special targeting of young, unmarried, and non-breast-feeding mothers and the need to dispel the fear of choking in the supine position. We believe that to reduce further the number of prone-

sleeping infants in the US, Back to Sleep campaigns must be continued, not only in hospital and medical office settings, but also in the public sector.

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APPENDIX

BACK TO SLEEP

A simple secret I want you to keep;
put your baby on his back to sleep.
On her stomach place the baby never;
in a cot or a crib, to sleep wherever.
Crib death or SIDS call it what you may;
is very tragic, causing horror and dismay.
It is related to the way babies sleep;
and can be reduced by back to sleep.
What about choking? You surely do wonder;
a thought about which many do ponder.
Be rest assured and please pay attention;
it just does not happen by changing position.
Back to sleep is the safest way to go;
until the cause of SIDS surely we'll know.
A simple secret I want you to keep;
put your baby on her back to sleep.

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