

Sleep Position in Israeli Jewish Infants Following the “Back to Sleep” Campaign

Riva Tauman MD¹, Solomon H. Reisner MB ChB², Yona Amitai MD³, Janice Wasser MPH³, Haim Nehama MD⁴ and Yakov Sivan MD^{1,2}

¹Institute of Pediatric Pulmonology and Critical Care, Pediatric Sleep Center, Dana Children’s Hospital, Sourasky Tel Aviv Medical Center, Tel Aviv, Israel

²Sackler Faculty of Medicine, Tel Aviv University, Ramat Aviv, Israel

³Department of Mother, Child and Adolescent Health, Public Health Services, Ministry of Health, Jerusalem, Israel

³Department of Public Health, Tel Aviv Municipality, Tel Aviv, Israel

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Abstract

Background: Prone sleeping has been recognized as a risk factor for sudden infant death syndrome. Ten years ago, non-prone sleeping was recommended in many countries around the world including Israel. The rate of infants sleeping prone and the rate of parents’ adherence with the recommendations have not been studied.

Objectives: To study infants’ sleep position and parents’ adherence to recommendations, and to identify risk factors for prone sleeping following the campaign to prevent prone sleeping in the Israeli population.

Methods: We conducted a longitudinal telephone survey with the parents of 608 randomly selected 2 month old infants, repeated at 4 and 6 months.

Results: Non-prone sleeping decreased from 75% to 67% and 63% at 2, 4 and 6 months respectively. There was a significant relationship between prone positioning and the use of a home apnea monitor at 2 months ($P = 0.038$, odds ratio 1.37, 95% confidence interval 0.94–2.15). Other risk factors for prone sleeping were the level of religious practice, with ultra-Orthodox Jews having the highest prevalence (2 months: OR 2.78, 95% CI 1.75–4.55) and higher parity – especially in families with more than five children ($P = 0.041$).

Conclusions: The prone sleeping position is relatively high in Israel. Groups at high risk were closely associated with the level of religiousness and parity. Efforts to promote supine sleeping should be directed towards identifiable groups.

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Despite the decrease in the rate of sudden infant death syndrome in recent years, SIDS is still a leading cause of infant mortality [1]. Epidemiologic studies showed a strong association between SIDS and placing infants to sleep in a prone position [2,3]. This led to the initiation of public health campaigns that endorsed the supine or lateral sleep position. Within 2 years, SIDS decreased significantly in these countries [4–6].

In 1992 the American Academy of Pediatrics issued a recommendation promoting the non-prone sleep position [7]. This was followed by the “Back to Sleep” public education campaign that promoted the back or side position in addition to challenging other

risk factors [8,9]. In 1996 the AAP revised its sleep position statement to emphasize that supine is the preferred position, although lateral is a reasonable alternative [9]. This statement was followed in 2000 by an update that highlighted other modifiable environmental factors to reduce SIDS rates [1] and emphasized that “Back is Best” while removing the term “reasonable alternative” for the side position. The adoption of the message and the subsequent decline in SIDS rates have been rapid in all countries that implemented public education campaigns [5,10,11]. In the United States the incidence of infant prone sleeping decreased from 78% in 1992 to 24% in 1996 with a concomitant 38% decline in the SIDS rate [12].

In addition to prone position, factors that place an infant at increased risk for SIDS include overheating [13–15], parental smoking [16,17], and soft sleep surfaces [6,10]. Hence, the campaign to reduce SIDS rates also includes public education to avoid overheating and parental smoking and to encourage breast-feeding.

Studies have shown that recommendations by a healthcare professional and observation of the infant’s sleep position in the hospital after birth were important determinants in parents’ decision-making and application of infants’ sleep position at home [12,18]. Other factors affecting the implementation of prone sleeping were race, age, socioeconomic status and geographic location [12,19,20]. However, reports from other countries might not be relevant to a specific country where environmental and cultural conditions may be different.

The Ministry of Health in Israel had formally adopted the AAP recommendations in 1993 [21]. Two measures were taken: a national public education campaign was initiated and formal guidelines were distributed to all health professionals who take care of infants and newborns. The campaign included the AAP recommendations for the non-prone sleep position, abstinence from smoking, enhancement of breast-feeding, and control of environmental temperature at 21–23°C during the cold seasons. According to the guidelines distributed by the Ministry of Health, all parents of newborn infants should be instructed and educated individually regarding sleep position before discharge from the

OR = odds ratio

CI = confidence interval

SIDS = sudden infant death syndrome

AAP = American Academy of Pediatrics

Table 1. Information obtained from parents by individual interviews at 2, 4 and 6 months for each infant

Information class	Variable	Score
General information	Infant gender	Male / Female
	Location	Tel Aviv / all other regions
	Age when infant started spontaneous rolling over	Back to abdomen ___ months Abdomen to back ___ months
	Breast-feeding	Exclusively / no / yes plus formula
	Is this your first child	Yes / no If "no", specify how many _____
	Parents' age	Father ___ years Mother ___ years
Cultural factors	Religion	Jewish / Muslim / Christian / other
	Level of religiousness	Non-religious / traditional / Orthodox / ultra-Orthodox
	Parents' education	Elementary and post-elementary technical education High school (12 years) Non-academic (post-high school diploma) Academic (university / academic certified college)
Sleep practice**	Position infant is put to sleep (night)	*Supine / prone / side
	Position found in the morning	Same as when put to sleep / different to position put to sleep If "different" then specify: *supine / prone / side
	Is daytime sleep position same as nocturnal position	Yes / no If "no" then specify: *supine / prone / side
	Where does your infant sleep	Infant's room / crib in parents room / parents' bed
Education of sleep position	Why do you put your infant to sleep prone (in cases where this was the practice) * **	Baby was more comfortable sleeping prone Baby "refuses" to be put supine Habit (prone in older children) Concerned about reflux and suffocation Thought prone was more healthy and safer Were not aware that supine (or non-prone) was recommended Baby turned-over spontaneously to prone
	Where did you receive education or instruction regarding sleeping position	Neonatal department / mother and child clinic / pediatrician or family physician / friends / did not receive / other if "Other" specify _____
	Name of hospital where baby was born	Name _____
	If having children older than 7 years, what sleep position did you use for them	Supine / prone / side
Special measures**	Are you using a home monitor during baby's sleep	No / yes If yes specify trade name
Smoking**	Do you or your spouse smoke	Father: yes / no Mother: yes / no
Environmental temperature**	Do you control or examine room temperature using a thermometer	No / yes If "yes" than what temperature do you aim at ___ °C

* More than one correct answer is possible

** Item assessed repeatedly at 2, 4 and 6 months

neonatal department. In addition, upon their routine postnatal visit to the Mother and Child Health clinics parents are instructed again by the public health staff. These clinics are supervised by the Ministry of Health.

The purpose of this study was to investigate current infant sleep

practices in Israel, to evaluate the changes that occurred since publication of the recommendations in 1993, to assess parents' awareness and adherence to the recommendations, and to identify risk factors for prone sleeping.

Subjects and Methods

The study population comprised Jewish infants of families who were recruited at random from two sources: a) infants visiting the public MCH clinics in Tel Aviv for routine periodic medical examination and immunizations, and b) the database of the Ministry of Health. The latter consisted of infants from the rest of the country who were born on randomly selected days (6th and 15th of the month) from September 2001 to December 2001) where every fourth infant on the list was selected. The parents completed a questionnaire in telephone interviews after providing verbal informed consent [Table 1].

The variables in the questionnaire included demography, family characteristics, cultural and educational factors, sleep habits including nocturnal and daytime sleep position, parents' education and apprehension regarding baby's sleep position, compliance with national recommendations, reasons for not placing babies in a non-prone position when applicable, and application of other measures that decrease SIDS incidence such as breast-feeding, room temperature control and ab-

stinence from smoking. Infants whose parents had received specific recommendations to place the baby prone were excluded.

The family interview using the same questionnaire was repeated

MCH = Mother and Child Health

three times – when the infants were 2, 4 and 6 months old. Each interview was completed by a trained research assistant. The parents were not informed during the first or the second interview that they would be contacted again 2 months later. Since there was no national information regarding sleeping position in Israel before the campaign, we assessed the change in sleep position by comparing the present infants with siblings who were born before the national campaign, i.e., before 1993.

Parental level of education was divided into four categories: a) elementary only and post-elementary technical education, b) high school, c) non-academic post-high school diploma, and d) academic.

Statistical analysis

Statistical analysis was performed using BMDP (Statistical Software 1993, University of California Press), Pearson chi-square, log-linear model and ANOVA. For multivariate analysis we applied stepwise logistic regression to determine those variables most significantly associated with sleeping position. Ninety-five percent confidence intervals for odds ratios were calculated using the test-based method.

Results

Demographic and subject characteristics

The cohort comprised 670 Jewish infants selected randomly. Nineteen families were not located, 29 did not cooperate and 14 families that entered the study were lost for the 4 or 6 months interview. Thus, 608 infants completed the study (compliance rate 93.4%, 608/651). There were 326 (54%) males. Twenty-eight percent of the infants were recruited from Tel Aviv and 72% from the rest of the country. Since no differences were found regarding the demographic variables and the rate of the sleeping positions between Tel Aviv and the rest of the country, the data were combined. With regard to religiousness, 139 (22.9%) were traditional, 65 (10.7%) were Orthodox, 88 (14.5%) ultra-Orthodox and 316 (52.0%) non-religious. Mean parental age was 30.7 ± 5.3 years for mothers and 33.7 ± 5.9 for fathers. Regarding parent's level of education, 6% of mothers and 5% of fathers had elementary and post-elementary technical education, 38% and 39% completed high school, 19% and 20% had a diploma, and 37% and 36% had an academic degree respectively. The present baby was the first child in the family in 36.5% with a mean of 2.55 ± 1.78 children per family (range 1–13). By age 4 months (the second parent interview), 53% and 60% of infants already rolled-over (abdomen to back and back to abdomen, respectively). Seventy-five percent of the infants ($n=454$) were breast-fed at any time for an average of 3.6 ± 1.7 months; 114 (19%) also received formula feeding. In 25% of families at least one parent smoked.

The environmental temperature in the baby's room was measured in 355 of the 608 (58.4%) families. The mean temperature was $22.7 \pm 1.7^\circ\text{C}$. Only 217 of 355 families (61.1%) stated that they strictly adhered to the recommendations of $21\text{--}23^\circ\text{C}$ environmental temperature.

Public education

With regard to information received, 37.2% of parents reported that they had been given instructions on sleeping position specifically and recommendations regarding the other components of the campaign in the neonatal department before discharge, 17.8% in the MCH clinics, and 17.2% recalled that they had received instructions in both services. Other sources of education (8.0%) were the baby's physician, the media, and friends or other family members. In contrast, 19.8% responded that they never received any education or instructions regarding sleeping position. The rate of parental education was not affected by level of religiousness, nor by the number of children in the family. There was no difference in the prevalence of infants' prone position according to the hospital of birth.

Sleep habits

At the age of 4 months 57% of infants slept in a crib in their parents' room, 37% in their own room and 6% in the parents' bed (bed-sharing). In 173 of the 608 infants (28.4%) a home apnea monitor that can be purchased over the counter was used.

Sleep position

The rate of infants sleeping exclusively in the supine position did not change significantly throughout the first 6 months of life and ranged from 41.9 to 44.4%. The overall non-prone position gradually decreased from 75.0% (456 infants) at 2 months to 67.1% (408 infants) at 4 months and 62.7% (381 infants) at 6 months. This was due mainly to a decrease in side position sleeping in favor of prone positioning as infants grew. Figure 1 shows the distribution of all sleep positions during night sleep at 2, 4 and 6 months of age.

Eighty percent of the infants studied were found in the morning in the position they were put to sleep while 20% changed their position during sleep. The most common sleeping position that changed during night was the side position (35% changed position, 79% of them to the prone position) followed by supine (21%) and prone (11%) ($P < 0.001$).

There was a significant association between nocturnal and daytime sleeping position for all ages studied ($P < 0.001$). Nevertheless, in 124/608 (20.4%) the sleep position during daytime

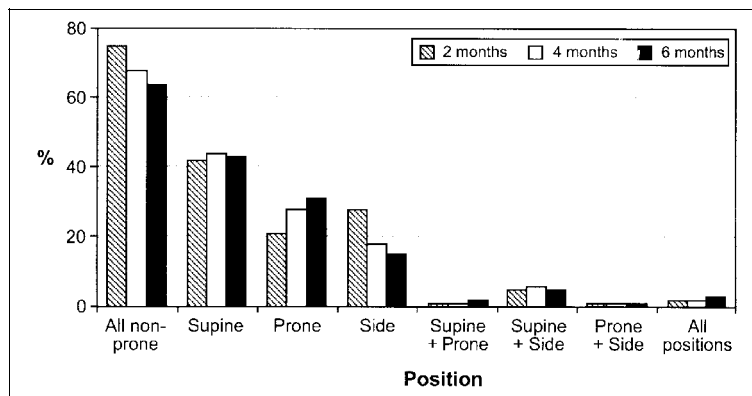


Figure 1. Nocturnal sleep position at age 2, 4 and 6 months. "All positions" represents infants who were placed in all types of positions without any preference. "All non-prone" includes all infants in whom prone position was never utilized (supine + side + supine and side).

sleep was different from the nocturnal position, with fewer infants sleeping in the supine and side positions. There was a significant relationship between nocturnal prone positioning and the use of a home apnea monitor at 2 and 4 months. At 2 months, 32% of the infants who were put to sleep in the prone position used a home monitor compared to 27.3% who slept supine or side only ($P = 0.038$, odds ratio 1.37, 95% confidence interval 0.94–2.15). At 4 months, the rate was 33% versus 26% ($P = 0.018$, OR 1.44, 95% CI 1.03–2.17) respectively. This association disappeared at 6 months of age.

The main reasons parents gave for not adhering to the recommendations are summarized in Table 2. No correlation was found between parents' adherence with non-prone sleeping and breast-feeding, compliance with room temperature of 21–23°C and parents' level of education. Smoking was more frequent among parents who complied with the recommendation of the non-prone position in all three periods compared to parents who used the prone position (30.1% vs. 21.8% respectively, $P = 0.05$; the probability of an infant whose parents smoked to be placed prone was: OR 0.59, 95% CI 0.041–0.98).

Adherence to the entire campaign assessed by the application of part or all components showed that at 4 months of age 68% were put to sleep according to the recommendations and only 50% adhered with both correct position and breast-feeding. When room temperature of 21–23°C was added, the rate was 37% and decreased to 25% for full application of the recommendations including sleep position, breast-feeding, room temperature and avoidance of smoking.

Altogether, 124 families had older children born before the national campaign. There was a significant change in sleeping position between the two eras [Figure 2]. A significant relationship was found between religious practice and sleep position: the more religious the parents, the higher the rate of prone positioning.

Table 2. Reasons provided by parents for not adhering to the national recommendations for infants' sleep position: questioned at age 4 months ($n = 252$ infants, 32%)

Reason	Percent (No. of infants)
Baby was more comfortable sleeping prone	46 (116)
Concerned about suffocation	10 (25)
Were not aware that supine (or non-prone) was recommended	9 (23)
Baby rolled over spontaneously to prone	8 (20)
Baby "refuses" to be put supine	8 (20)
Habit (used to putting prone from experience with older children)	7 (18)
Thought prone was more healthy and safer	2 (5)
Combinations of the above	10 (25)

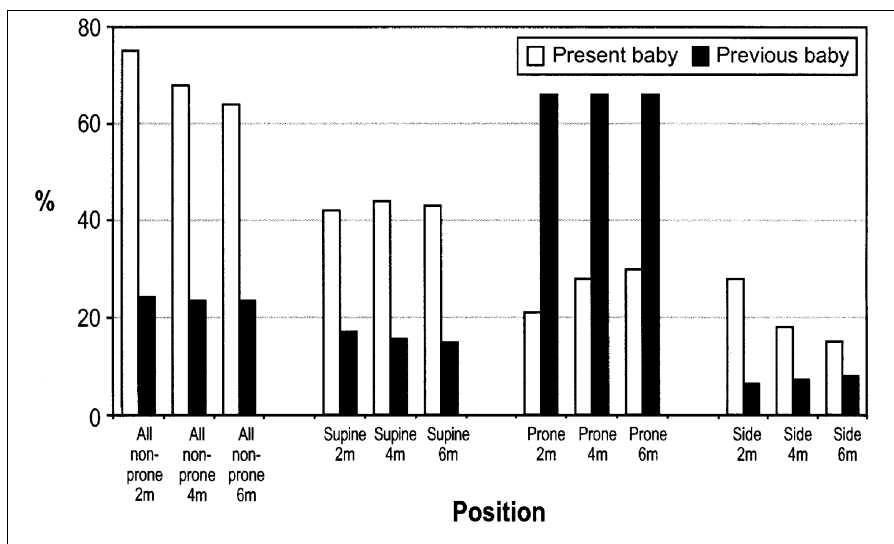


Figure 2. Sleep position. Present baby versus previous baby born before the campaign at 2, 4 and 6 months of age. "All non-prone" includes all infants in whom prone position was never utilized (supine + side + supine and side).

Number of children

There was a significant inverse relationship between the number of children and compliance with non-prone sleeping at 2 months. Non-prone position occurred in 81% of families (179/221) where the present baby was the first child and decreased to 73% (204/278) in families with two to three children, 76% (55/72) in families with four to five children and 61% (25/41) in families with more than five children ($P = 0.041$). This relationship did not reach statistical significance at 4 and 6 months of age.

Overall, the number of children in the family correlated with the level of religiousness ($P < 0.001$). An analysis of the relative effect of the number of children versus the level of religiousness showed that the latter was the major contributory factor ($P < 0.001$ for all age groups). The inverse relationship between the number of children and sleeping non-prone did not reach significance when the ultra-Orthodox group was omitted. This was true at all three evaluation periods ($P = 0.08, 0.3$ and 0.6 for 2, 4 and 6 months respectively).

Discussion

During the last decade recommendations in favor of supine sleeping were publicized widely, despite the fact that different countries have different health systems and varying methods of public education. The longitudinal design of our survey provides an opportunity to observe changes in sleep position as children grow. All infants in Israel are born in hospitals and almost all infants visit the Mother and Child clinics regularly.

The rate of prone sleeping in Israel was relatively high before the campaign and the response to the campaign was poor compared to other countries. The results were far from the original American goal of less than 10% prone sleeping [9], which has not been achieved in the U.S. either [20]. Indeed, in 1995–96 the U.S. rate of prone position at the age of 3 months, the age of maximal risk for SIDS, was 29%, comparable to our series of 28–35% at 2 and 4 months, respectively. In contrast to Israel and the U.S., the success

rates in other countries that conducted a public education campaign were significantly higher, and the prevalence of prone sleeping decreased substantially following the campaign to below 10% [5,6,11,22,23].

In the present study, the success rate was lower, with 21%, 28% and 31% still sleeping exclusively prone at 2, 4 and 6 months, respectively. Efforts aimed at reducing the rate of prone sleeping have been least successful among parents who are religious (ultra-Orthodox), have other children, or use a home monitor. Several theories may explain this finding. The rate of SIDS in Israel was relatively low before the campaign (0.5–0.9:1,000 live births) [24], therefore public reaction was less enthusiastic. The baby's comfort might affect parents' motivation more than the possible minor reduction of the SIDS rate that was already low. Mothers choosing the prone position reported that this decision was significantly influenced by the infant's behavior. These were also the common causes reported in studies from other countries [19,22,25]. Infants who sleep prone have fewer spontaneous arousals, are less likely to be awakened from startling to loud noises, and sleep longer. Thus, parents may place their babies prone in order to "improve" sleep and family comfort.

Like other reports [19], we found that placing infants in the prone sleeping position was more common among mothers with older children. There was a direct relationship between the rate of prone position and parity. Ten percent of parents did not put their infant to sleep in a non-prone position because they were concerned about suffocation during sleep. Since infant sleeping position has changed to non-prone in several countries, no increase in disorders such as aspiration, life-threatening events and vomiting has been observed. Thus, education for parents should specifically relate to parents' concern about suffocation from reflux and regurgitation.

A clear association was found between religious practice and non-compliance with the recommendations. One possible explanation is that these families, especially ultra-Orthodox Jews, have more children. Therefore, parents are more experienced and tend to follow their previous uneventful experience and continue with prone positioning in subsequent babies. The results showed that the level of religiousness rather than the number of children was the more significant variable. Also in the general population was an effect of the number of children observed, but it was much less pronounced. Another explanation is that ultra-Orthodox parents relate events and fate to God's will that human beings cannot affect. This may explain why none of the ultra-Orthodox families used a home monitor.

Prone and supine positions were much more stable than the side sleep position. This was also shown in other studies [12]. The instability of the side position – with 20 to 30% changing position during sleep, mainly to prone – is of concern. Hence, side position puts infants at a higher risk for SIDS. Indeed, increased risk for SIDS among infants in the side position was shown in the UK (1.84 times) and New Zealand. In 2000, the American Academy of Pediatrics updated its statement, removing the reference to side position as a "reasonable alternative" and emphasizing that supine "confers the lowest risk and is preferred" [1]. However, in Israel, there has not

been any such action to raise awareness among the public and health professionals of the risks of the side position. This may explain the relatively high rate of side sleeping in our study. The use of a commercial over-the-counter home monitor has become popular in Israel over the last few years, despite the Health Ministry's objection to the uncontrolled use of the monitor for the general infant population. The higher rate of home monitor use in infants who sleep prone may be explained by parents' conception that the monitor compensates for the increased risk of the prone position. The uncontrolled use of home monitoring by the general healthy population has never been shown to provide any benefit or to decrease the risk for SIDS.

The Health Ministry has instructed all hospitals that nurses should inform parents upon discharge of the recommendations and the importance of putting babies to sleep in the non-prone position. However, only 15.7% recalled that they were instructed both in the neonatal departments and the MCH clinics. With a total rate of about 70% of families recalling having received instructions on sleep position from either source, a substantial failure rate may be assumed even if a recall bias is present. Our data and other reports have shown that the rate of prone position increases in the first 6 months of life [20]. It should be recognized that neonatal strategies intended to influence the initial choice of sleep position may be insufficient to maintain non-prone sleeping after a few months. This emphasizes the importance of routine re-education and continuing visits to the MCH clinics.

Prone positioning was found in other studies to be more common in low socioeconomic classes [19] and in infants of mothers with lower levels of education. In our survey, no effect was found for the level of formal education. Socioeconomic status was not controlled for because of the concern that inquiring about personal income and discrete issues would discourage parents' cooperation.

Maternal smoking has consistently been found to increase the risk of SIDS. A possible explanation for the higher rate of smoking among parents who better complied with the non-prone recommendation is that parents who smoked may have been concerned about the increased risk for their babies due to their habit and were more determined to apply other measures such as non-prone position as compensation.

There are several limitations to this study. Data for only one year are presented which does not allow for evaluation of trends in changing sleep position. Also, data about sleep practices before the recommendations were issued are very sparse. The only comparison to the pre-recommendation period was based on parents' recall of their practice for children born before the campaign. This may introduce a bias. However, a report on sleep position in one area in Israel showed that 78% of infants were put to sleep prone before the recommendations were publicized, indicating that our data are, nevertheless, reliable.

This survey dealt only with Jewish infants. The reason for not including non-Jewish infants was that after collecting data from the non-Jewish population we realized that several factors made this information very unreliable. This included: a low response rate, low compliance rate with the interviewers, and inability to locate a

significant proportion of this subpopulation due to unavailable telephones or incorrect telephone numbers and addresses. Information for non-Jewish infants should be obtained in a different study using different methodology.

It may be argued that after having been asked about the sleeping position of their baby, parents were more aware of the recommendations and therefore more likely to implement them, which would affect the results at the time of the following interview. However, the parents were not informed during the first or second interview that they would be contacted again 2 months later. The results show that compliance with the recommendations decreased over time rather than increased, indicating that such an effect did not take place.

The population in Israel is not large and healthcare reaches almost every family. This should have resulted in a better response to efforts taken to decrease prone sleeping compared to other populations. A major explanation may be that unlike the situation in the U.S. where the AAP has published three updates since its original recommendations in 1992 (1994, 1996, 2000) [1,8,9], no formal updates, campaigns or statements by the Health Ministry or the Israeli Pediatric Association have been released since their first publicized recommendations in 1993.

Conclusions and recommendations

An intensive national campaign to educate child health professionals and the public is required. The message should be tailored towards certain groups, such as ultra-Orthodox Jews and parents with other children, especially those with five or more, that may rely more on personal experience and belief than on healthcare provider advice. Health professionals should emphasize the instability of the side sleep position and promote the supine position instead. An update of the official recommendations and boosting the campaign are most important. Education for parents should specifically relate to parents' concern about suffocation from reflux and regurgitation. Because the incidence of prone sleeping increases during the first 6 months of life, parents should be consistently reinforced to put their baby supine throughout the first half-year.

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Correspondence: Dr. Y. Sivan, Director, Pediatric Intensive Care, Pulmonology and Sleep Center, Dana Children's Hospital, Sourasky Tel Aviv Medical Center, 6 Weizmann Street, Tel Aviv 64239, Israel.
Phone: (972-3) 697-4614
Fax: (972-3) 697-4434
email: sivan@post.tau.ac.il