ARTICLE

Supine Sleeping Position Does Not Cause Clinical Aspiration in Neonates in Hospital Newborn Nurseries

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Objectives: To determine the frequency and severity of clinically significant events of spitting up in normal newborns during the first 24 hours of life and to correlate the events with sleeping position.

Design: Prospective observational study.

Setting: Children born between August 2003 and October 2004 in newborn nurseries at 2 hospitals.

Participants: Healthy full-term newborns (n=3240) (≥37 weeks estimated gestational age) during the first 24 hours of life.

Outcome Measures: Frequency of, and intervention required for, spitting up in supine, side-lying, and prone positions while asleep and awake.

Results: Of the 3240 infants, 96.6% did not spit up during sleep. A total of 142 episodes of spitting up were documented in 111 newborns during sleep. While the newborns were supine and asleep, there were 130 episodes of spitting up. Of these episodes, 55% did not require any intervention, 37% only required brief suctioning with a bulb syringe, 6% required gentle stimulation, and 2% required wall suction. Both nurseries had a policy that newborns should sleep supine; therefore, only 6 newborns were noted to have spitting up episodes while lying on the side, with 66.7% requiring no intervention and 33.3% requiring bulb syringe. No episodes of apnea, cyanosis, documented aspirations, neonatal intensive care unit admissions, or deaths from spitting up were noted.

Conclusions: We conclude that clinically significant spitting up occurs infrequently in hospital newborn nurseries while the newborns are asleep. Fewer than 4% of newborns spit up while sleeping in the supine position in the first 24 hours of life, and none required significant intervention or experienced serious sequelae.

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SUDDEN INFANT DEATH SYNdrome (SIDS) remains the leading cause of sudden death in infants between the ages of 1 month and 1 year.[1] Although the cause of SIDS is still not known, prone sleeping has been associated with a higher incidence of SIDS.[2,3] Side sleeping also has been shown to be associated with an increased risk of SIDS compared with supine sleeping; however, the risk is not as great as with prone sleeping.[4,5] Dramatic decreases in SIDS rates have been observed in response to "back to sleep" campaigns.[6-9]

Despite this, many nursery nurses do not follow the supine sleep recommendations. Recent studies show that nursery nurses are often reluctant to place newborns on their backs.[10-12] Stastny and coworkers[12] found that at least half of all nursery nurses placed newborns on their sides while in the hospital but told parents to place them on their backs once they went home. This study also found that the nurses were aware that the supine position was safest with regard to risks for SIDS, but they placed infants on their sides for fear of aspiration in the supine position. Several studies have shown that parental choices of sleeping position are influenced by the nurses' examples of nonsupine sleeping in the nursery.[10,12,13]

Because nursery nurses place newborns on their sides due to fear of aspiration, it is important to know if newborns aspirate when they sleep in the supine position. However, the frequency of spitting up in normal newborns that requires any kind of intervention or results in any serious outcomes has not been studied. Therefore, we designed a study to determine the frequency and severity of clinically significant events, such as spitting up, aspiration, and the need for intervention, in healthy newborns during the first 24 hours of life. We hypothesized that nor-

Table 1. Intervention Required for Newborns Who Spit Up While Asleep*

Characteristic	Supine	Side
Infants	105	6
Episodes	130	12
No intervention	72 (55)	8 (67)
Bulb syringe	48 (37)	4 (33)
Stimulation	8 (6)	0
Wall suction	2 (2)	0
Neonatal intensive care unit	0	0

*Data are given as number and number (percentage).

mal newborns would not have frequent clinically significant episodes of aspiration while in the supine position in the first 24 hours of life. If it was determined that clinically significant aspiration occurs infrequently while supine, this should reassure nursery nurses that supine sleeping in newborns is safe and that it does not increase the risk of aspiration.

METHODS

SUBJECTS

Subjects were full-term newborns (≥37 weeks estimated gestational age) born between October 2003 and September 2004 at 2 participating hospitals: Miller Children's Hospital (Long Beach, Calif) and Kaweah Delta Hospital (Visalia, Calif). Data were collected on newborns born in these hospitals. Newborns who were born with any respiratory distress or other acute illness requiring neonatal intensive care unit (NICU) admission immediately after birth were excluded. However, newborns with other disorders that did not require intensive care, such as neonatal jaundice, were included.

HOSPITAL DATA

The study was an anonymous prospective observational study. Newborns were placed in whatever position the nursery nurses and/or parents placed them. Nursery personnel who watched the newborns were asked to record the birth date, time of birth (to accurately calculate the age for any events), estimated gestational age at birth, and sex for each baby. Because our study was a purely observational study, spitting up was defined as the presence of any visible regurgitation in the oropharynx of formula accompanied by evidence of increased respiratory effort (including coughing or sputtering) that was clinically worrisome to the caregiver. For newborns who had any spitting up in the first 24 hours after birth, the following information was added: time of the event, the newborn's position during the event, wake or sleep state, estimated amount of regurgitation, color changes (duskiness, redness, or cyanosis) and intervention (if any) required (ie, stimulation, "blow-by" oxygen, suction) (**Table 1**). The nurses also recorded the same information from parents when newborns stayed in the same room as their mothers. The collected data from the 2 hospital nurseries were forwarded to the investigators at Childrens Hospital Los Angeles for analysis.

The institutional review boards of all 3 participating hospitals approved the study. A waiver of consent was granted because the study did not involve experimental intervention, and there were no personal identifiers on the data.

RESULTS

A total of 3285 normal neonates were studied, of whom 50.6% were male. Data from 43 newborns were excluded because of incomplete information (no recorded date of birth or time of birth). Two newborns were transferred to the NICU for diagnoses unrelated to aspiration and subsequently excluded from the study.

Of the 3240 newborns, we found that 96.6% did not spit up during sleep. A total of 142 episodes of documented spitting up occurred in 111 newborns while they were asleep. While supine and asleep, 130 episodes of spitting up occurred in 105 newborns. Of these episodes, 55% did not receive any intervention, 37% received suctioning with a bulb syringe, 6% received gentle stimulation, and 2% received wall suction. Two of the newborns who received gentle stimulation were given supplemental blow-by oxygen because nurses described them as "ruddy" but not cyanotic. Because both nurseries had a policy that newborns should sleep supine, only 6 newborns were noted to have spitting up episodes while lying on their sides. These 6 newborns had a total of 12 episodes while lying on their sides. Of these, 66.7% received no intervention, and 33.3% underwent suctioning with a bulb syringe (Table 1).

While awake, 121 newborns had 184 episodes of spitting up. Two episodes of spitting up occurred while the newborns were prone, both of whom received stimulation. A total of 135 episodes occurred while the newborns were awake and in the supine position: 46.6% received no intervention, 42.2% received bulb syringe suctioning, 5.9% received stimulation, and 5.1% received wall suctioning. Seventeen episodes occurred with the newborns in the side-lying position, of whom 47.1% received no intervention and 52.9% received bulb syringe suctioning (**Table 2**).

No apnea, episodes of cyanosis, documented apparent aspirations, NICU admissions, or deaths resulting from spitting up were found in any newborn awake or asleep, regardless of position.

COMMENT

Our study showed that more than 96% of 3240 normal newborns did not have episodes of spitting up during sleep in the first 24 hours after birth. Furthermore, of the 3.4% of newborns who did spit up during sleep while supine, none required significant intervention or had immediate adverse outcomes. Specifically, there were no deaths, NICU admissions, or apparent aspirations. Our study is consistent with previous reports that found no increase in death or in morbidity related to aspiration when sleeping supine. Byard and Beal[14] did not find cases of significant gastric aspiration in infants who were lying on their sides or supine. The 3 newborns with aspiration at postmortem examination were found prone at the time of death. In South Australia, there was no significant increase in infant and early childhood deaths attributed to gastric aspiration as supine sleeping became more common.[14] A prospective study in Tasmania, Australia, was conducted to determine the relationship between sleep-

Table 2. Interventions Required for Newborns Who Spit Up While Awake*

Characteristic	Supine	Prone	Side	Upright
Infants	85	2	11	23
Episodes	135	2	17	30
No intervention	63 (47)	0	8 (47)	21 (70)
Bulb syringe	57 (42)	0	9 (53)	7 (23)
Stimulation	8 (6)	2	0	2 (7)
Wall suction	7 (5)	0	0	0
Neonatal intensive care unit	0	0	0	0

*Data are given as number and number (percentage).

ing position and parental report of cyanosis, pallor, and breathing difficulties. The study showed that infants sleeping supine did not have an increase in cyanosis, pallor, or breathing problems at 1 month of age. In fact, this study reported a higher incidence of cyanosis among infants placed in the prone position.[15] A follow-up report by Dwyer et al,[16] from the same study, found no evidence suggesting increase in short-term morbidity or postneonatal mortality associated with sleeping supine at 1 month of age. A study of infants in England indicated that supine sleeping is not associated with an increase in significant morbidity outcomes, and the risk of respiratory problems was reduced compared with that of prone sleepers.[17] In Asian countries, aspiration is not a problem despite the traditional practice of placing newborns to sleep in the supine position.[18] The review by Malloy[19] of US vital statistics mortality files for the years 1991 to 1996 showed no significant increase in the proportion of postneonatal mortality rate associated with aspiration, asphyxia, or respiratory failure. While our study results are consistent with those cited, ours is the only one, to our knowledge, that focused on the first 24 hours after birth.

Physiologic studies also have shown that healthy infants are able to protect their airways and do not have increased apnea when placed supine.[20] Meyers and Herbst[21] showed that the amount of gastroesophageal reflux in healthy patients was not significantly affected by changes in sleep position. Blumenthal and Pildes[22] studied stomach emptying of 14 healthy neonates in 4 different positions and found no significant differences in the pattern of stomach emptying in the 4 positions.

Stastny and coworkers[12] showed that fear of aspiration was the primary reason that hospital newborn nursery nurses did not place infants in the supine position. Many other studies have shown this to be the primary reason for placing infants in the nonsupine position.[10,12,13] Our study showed that spitting up in the first 24 hours after birth occurs in fewer than 4% of newborns, whether asleep or awake. None of the newborns who had episodes of spitting up required significant intervention.

In our study, more episodes of spitting up were seen while the newborn was supine rather than while lying on its side or in the prone position. This was not unexpected because most newborns are placed on their backs to sleep, as per each hospital's nursery protocol. We did not record the sleeping position of newborns except when they had a spitting up episode. Therefore, we cannot calculate relative rates of spitting up per hour of sleep in any specific position.

Thus, based on this study, we can confirm that healthy newborns in general handle their oral secretions or vomitus to avoid significant aspiration while supine. Concerns about gastric aspiration in normal newborns sleeping in the supine position are not supported by this study.

CONCLUSIONS

We conclude that clinically significant spitting up occurs infrequently in hospital newborn nurseries. About 96% of 3240 newborns in our study did not spit up. Fewer than 4% (3.4%) of newborns spit up while sleeping in the supine position in the first 24 hours of life, but none required significant intervention or experienced adverse immediate outcomes. We speculate that placing newborns in the supine position to sleep does not cause clinical aspiration. The supine sleeping position should be encouraged in hospital newborn nurseries to increase the rate of supine sleeping subsequently in the home.

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In the mummies of early Egypt, arteriosclerosis, pneumonia, urinary infections, stones and parasites have been identified, which may suggest that such conditions also prevailed in earlier unrecorded epochs.

—From *Medicine: An Illustrated History* by Albert S. Lyons, MD, and R. Joseph Petrucelli, MD, 1987.