

Does Swaddling Decrease or Increase the Risk for Sudden Infant Death Syndrome?

The report by Richardson et al in this issue of *The Journal* adds to their extensive past studies on arousal from sleep in infants.¹ This report on arousal in swaddled infants is an important addition to the literature. As the authors indicate, swaddling is becoming an increasingly common practice in the US. Historically, swaddling was for the most part a universal practice before the eighteenth century. The article is unique in that it reports on arousal to a tactile stimulus as opposed to spontaneous arousal.

Richardson et al address several important issues. First, is a low threshold for arousal necessarily a good thing? This may not be the case, because cortical arousals may be disadvantageous in certain situations.² Cortical arousal in infants is often accompanied by hypoventilation, especially with crying, which can precipitate sudden, severe oxygen desaturation in an infant in an asphyxial rebreathing environment. In some cases, this may precipitate sudden unexpected death.³ Moreover, frequent arousals caused by a low arousal threshold might result in habituation and thereby increase the threshold for arousal, which would be disadvantageous in asphyxia-induced arousals. Fortunately, in the present study, as noted previously, swaddling did not appear to impair subcortical arousals, which are essential for adequate pulmonary function and appear to be the primary mechanism in terminating obstructive apnea in infants.^{2,4}

Does the tactile stimulus used by Richardson et al adequately reflect the arousal caused by asphyxia? This question is highly relevant, because asphyxia and/or hypoxia is widely believed to be the major preceding event leading to sudden infant death syndrome (SIDS). How closely arousal to a tactile stimulus is correlated with arousal caused by asphyxial stimuli remains unclear. Certainly cortical arousal is needed to escape from a life-threatening asphyxiating environment, either through a change in head position or when crying alerts a caretaker to a dangerous situation. Equally relevant is the fact that cortical arousal does not appear to be necessary for terminating central or mixed apnea in infants.⁵⁻⁷ Thus, impairment of cortical arousal associated with swaddling might not be a disadvantage in terminating these types of apnea.

Can swaddling actually increase the risk for SIDS, as the authors suggest? This is certainly true for prone-sleeping infants.⁸ In this case, head-lifting and turning to avoid an asphyxial environment are impeded when the arms are restrained at the infant's side rather than positioned beside his or her head. In contrast, the mechanisms of swaddling's affect on decreasing the risk of SIDS in supine-sleeping infants seem clear. An immobilized infant cannot crawl into

a dangerous asphyxiating environment. Also, swaddling prevents an infant from pulling bedding over his or her head. Both of these are risk factors for accidental suffocation and/or SIDS. The only evidence of an increased risk of SIDS in swaddled infants comes from a non-peer-reviewed abstract.⁹

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Significantly, however, that study did not distinguish between infants swaddled in the prone position and those swaddled while supine. As indicated earlier, prone-swaddled infants are at greatly increased risk for SIDS.⁸ Particularly relevant here is that 2 previous studies have found that swaddling actually reduces the risk of SIDS when infants sleep in the supine position.^{8,10}

The potential dangers of swaddling infants should not be entirely dismissed, however. The authors have confirmed previous studies indicating that swaddling is associated with increased respiratory rate.^{11,12} As the authors surmise, this is likely due to a decreased functional residual capacity resulting from increased extrathoracic pressure. In theory, decreased functional residual capacity might be deleterious in certain situations where pulmonary function is compromised, as in the case of viral pneumonia. Moreover, cough might be expected to be compromised, because forceful coughing must be preceded by inhalation, which increases lung volume. Notably, a popular publication that gives advice to parents has stated that the tighter the swaddling, the greater the calming effects on infants.¹³ Taking all of these factors into account, caretakers need some simple method to determine thoracic pressure in swaddled infants to ensure that the thoracic pressure imposed does not compromise lung function while still providing swaddling's calming effects.

In summary, the article by Richardson et al adds significant new information on arousal thresholds to tactile stimuli in swaddled infants. It should be noted, however, that currently there is insufficient evidence to indicate that infants swaddled while supine are at increased risk for SIDS. All in all, it would appear that the advantages of swaddling supine-sleeping infants outweigh the risks, if any. ■

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SIDS Sudden infant death syndrome

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Keep Your Eyes on the Prize

The prize that I am referring to is keeping as many infants alive and healthy as possible, in both the Northern and Southern Hemispheres. Safe sleep for and breast-feeding of small infants are critical to attaining this prize. However, discussions about their interrelationship create more heat than light. The paper by Santos et al, in this issue of *The Journal*, provides some light.¹ I hope that the heat from the controversy it will provoke could be transformed into the light of additional well-done analyses.

Santos et al are from the southern Brazilian city of Pelotas, a “specific area of a middle-income country.” They show an association between breast-feeding among bed-sharing infants at 3 months of age and continued breast-feeding at 12 months. Infants breast-feeding at 3 months are also stratified into groups that breast-fed exclusively, predominantly, or partially. Among 8 factors significantly associated with breast-feeding at 12 months, their Table I shows that 59% of babies who bed-shared and breast-fed at 3 months were still breast-feeding to some degree. This compared favorably with infants who were not bed-sharing, of whom only 44% still breast-fed at 12 months. The 95% confidence intervals for the adjusted “prevalence ratios” for breast-feeding at 12 months among those bedsharing at 3 months were 0.69 to 0.81 ($P < .001$), with increasing effect among infants breast-feeding more exclusively.

To grasp the full significance of this and similar published reports, we need a more complete understanding of the association between breast-feeding and bed-sharing. For the findings of Santos et al to help us best understand the association, we must turn up the heat and provide some light, with a few questions and comments. The questions and comments posed are both academic (about methods and rhetoric) and seriously practical (about generalizability and safety).

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Possible increased risk for infant death during sleep drives much of the controversy about infant bed-sharing. Epidemiologic studies of deaths diagnosed as sudden infant death syndrome, and thus unexplained, have suggested an association.² However, careful readers should be aware that Refer-

ences 9 and 11 through 13 listed by Santos et al were studies that included many or all deaths diagnosed as accidental suffocation (ie, deaths believed by the official certifying the cause to have been explained by the surrounding circumstances). Therefore, both unexplained deaths (sudden infant death syndrome) and deaths at least partially explained by the sleep microenvironment are at issue if our understanding of bed-sharing’s associations is to be enlightened.

For this report by Santos et al, “bed-sharing was defined as habitually sharing a bed with the child’s mother.” Other descriptors are limited. Embellishing the definition by recording an estimate of the number of nights per week could have suggested a bed-sharing “dose effect.” Even more importantly, reporting whether the bed was shared habitually all night or just for breast-feeding would have enlightened us about the relevance of their results to published findings showing increased risk for death with all-night bed-sharing.³

Another point of concern that I could not resolve was the number of deaths among their cohort. It is not completely clear, but their results suggest that “a total of 82 deaths” occurred among the original cohort of 4231 (19.4 per 1000 infants). Is this number more or less than expected, and how many, if any, who died suddenly and unexpectedly were bed-sharing?