

## Murky Definitions, Missing Data Prevent Meaningful Conclusions

“Sleep Environment Risks for Younger and Older Infants” (Colvin et al, *Pediatrics* 2014-0401) fails to add any useful information to the sudden infant death syndrome (SIDS)/infant mortality dialogue. Like many other articles on sleep-related risks, this article lacks clear, unambiguous definitions of critical variables, omits significant documented risk factors, and conflates SIDS and other unrelated forms of infant death, drawing conclusions that the data do not support.

Specifically: (1) The bed-partner could be human or animal, drunk or sober, smoker or not, adult or child, caring mother or inattentive other. An infant sleeping with an inebriated uncle is different from an infant sleeping next to his sober breastfeeding mother. (2) “Adult bed” included adult bed, water-bed, adult mattress, bunk bed, child’s bed, sofa bed, and air mattress. (We can only presume that sofas and recliners are included. They are common shared-sleep choices, especially for mothers who have been told their bed is unsafe.) An infant sleeping on a soft sofa cushion next to that inebriated uncle is different from an infant sleeping with his breastfeeding mother in a firm, uncluttered bed. The categories “adult bed” and “person” (defined as “sleeping on the chest or in the arms of another person”) were combined as 1 category, though one is inanimate and of varying safety, and the other is animate and of varying safety. (3) Infant feeding method is never mentioned, despite the fact that formula-feeding is a risk factor for SIDS and affects the mother’s behavior during bed-sharing. (4) The words “smoking” and “smoke” do not appear in the article, yet smoking during pregnancy and in an infant’s household is a significant risk for SIDS. The authors

acknowledge that “because there is no comparison group, risk cannot be determined.” Without a control group, actual risk cannot be calculated. (5) SIDS and smothering are conflated. Most SIDS risks have nothing to do with sleep location, whereas smothering and suffocation are entirely location-related. The distinction is especially important when bed-sharing is discussed. SIDS is linked to physiologic problems; suffocation results from environmental problems. (6) Bed-sharing is cited as “the predominant risk factor for younger infants” without reference to other significant risk factors or data from comparison groups. (7) The study refers to “sudden infant death syndrome and other sleep-related causes of infant mortality” but focuses almost exclusively on the “other sleep-related causes.” The combining of safe and unsafe situations in single categories is distressing but not new. The studies on which this article relies (the Ohio child death review for example<sup>1</sup>) tend to do the same, a shortcoming that the authors acknowledge but accept. The conflation of SIDS and suffocation issues is also distressing but not new. The current review, like many before it, fails to provide adequate guidance to health care professionals and is potentially damaging to families making decisions without full information about their options.

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## Study on Sleep Location Flawed, Inconclusive

The article by Colvin et al, “Sleep Environment Risks for Younger and Older Infants,” incorrectly concludes that bed-sharing is the top risk factor for sleep-related deaths.

The authors fail to include any of the other major known risk factors for these deaths in their analysis besides sleep location and position. By far the other leading risk factors for sudden infant death syndrome (SIDS) are maternal smoking,<sup>1</sup> infants sleeping unattended,<sup>1</sup> and formula feeding.<sup>2</sup> The risk of infant death from bed-sharing is strongly potentiated by maternal prenatal and/or postnatal smoking.<sup>3</sup> The use of alcohol and sedating substances by parents/caregivers poses the greatest risk of suffocation death<sup>3</sup> but was not included in the study. The smoking variable was actually available in the authors’ data set, and their failure to use it is inexplicable and concerning, because it would have likely significantly altered their results.

The authors also failed to distinguish adult beds from far riskier types of sleeping surfaces, although the literature clearly reveals that most accidental smothering/entrapment deaths involve sofas, recliners, or chairs.<sup>3</sup>

Because the authors did not use a control group, or population statistics regarding the prevalence of all factors stratified by age and smoking status at a minimum, it is impossible to draw any conclusions about the cause of sleep-related deaths from their study. Furthermore, 25% of the infants in this study actually died in cribs.

Increasing evidence reveals that one of the major risk factors for SIDS is infant formula feeding, but infant feeding was not reported in this article. A 2010 cost analysis links formula feeding to 911 excess infant deaths per year, 447 of which are from SIDS.<sup>4</sup> The best,

most recently conducted meta-analysis on SIDS and infant feeding method indicates that the number of SIDS deaths related to formula feeding is likely much higher than in the 2010 study.<sup>2</sup>

Evidence suggests blanket advice against bed-sharing may be ineffective and may be counterproductive, directly contributing to infant deaths in at least some cases. A survey of nearly 5000 US mothers revealed that sleepy parents are taking nighttime feedings to the sofa to avoid falling asleep with their infants in bed, and large numbers of these parents are unintentionally falling asleep there.<sup>5</sup> Experts agree that sofas pose a much higher risk for infant death than beds.<sup>1,3</sup> Parents of 2 SIDS infants described exactly this scenario, unaware that couches are far more dangerous places for infants to sleep than parental beds.<sup>3</sup>

The conclusions of this flawed study may be used to support the American Academy of Pediatrics' recommendation against all bed-sharing. Instead, public health efforts must address the reality that tired parents must feed their infants at night somewhere, and that sofas are very dangerous for all infants, but especially for those of parents who are smokers or under the influence of alcohol or drugs. Public health messages must also acknowledge that breastfeeding infants and formula feeding infants do not sleep the same way when bed-sharing, and that formula feeding infants have a higher risk of death.

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## Risk Factors and a True Cause of SIDS

The article by Colvin et al is yet another example of a study warning of the risks of sudden unexpected infant death (SUID) including sudden infant death syndrome (SIDS) by exposing infants to unsafe sleeping environments such as cosleeping or the presence of toys and other objects in the sleep area. The study analyzed 8207 cases of SUID categorized as SIDS (35% or 2873 cases), accidental suffocation and strangulation in bed (26% or 2196 cases), and as unknown/undetermined (38% or 3130 cases). The authors conclude that the predominant risk factor for younger infants is bed-sharing, whereas for older infants rolling into objects in the sleep area. However, the study has several shortcomings. No distinction is made between different infant death categories, leaving an impression that all infants were perfectly healthy and died as a result of accidents that are preventable. The study does not take into consideration a possibility that these infants harbor an intrinsic biological (genetic/molecular) defect that according to the triple risk model makes them

vulnerable to extrinsic risk factors such as prone sleeping, mild upper respiratory infection, and maternal smoking (other well documented SIDS risk factors).<sup>1</sup> The number of cases of accidental suffocation/strangulation in bed appears extraordinarily high considering that similar studies revealed that such cases accounted for between 2.8% and 12% of SUID.<sup>2</sup> In addition, the mechanism of suffocation (ie, “rolling over toys and objects”) appears implausible since the actual scene reconstruction studies are often inconclusive in most such cases.<sup>3</sup>

This and similar recent studies create an impression that the cause of SUID including SIDS has now been identified and a simple solution exists to prevent such death implying that further scientific research into biological underpinning of SIDS is unnecessary. This would be a grave mistake given recent advances in molecular studies suggesting that up to one-third of SIDS cases could be based on demonstrable mutations affecting genes involved in neurotransmission, energy metabolism, autonomic control, response to infection, and duration of cardiac action potential.<sup>4</sup> Clearly a more balanced approach is required that on 1 hand provides sound advice to parents on safe sleep environment and on the other hand advocates molecular testing and supports robust scientific research into the true causes of SUID and SIDS. *Pediatrics* and the American Academy of Pediatrics should be active participants in promoting these goals.

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