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Speaking Out on Safe Sleep: Evidence-Based Infant Sleep Recommendations

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Abstract

The American Academy of Pediatrics (AAP) issued recommendations in 2005 and 2011 to reduce sleep-related infant death, which advise against all bedsharing for sleep. These recommendations overemphasize the risks of bedsharing, and this overemphasis has serious unintended consequences. It may result in increased deaths on sofas as tired parents try to avoid feeding their infants in bed. Current evidence shows that other risks are far more potent, such as smoking, shared sleep on sofas, sleeping next to impaired caregivers, and formula feeding. The emphasis on separate sleep is diverting resources away from addressing these critical risk factors. Recommendations to avoid bedsharing may also interfere with breastfeeding. We examine both the evidence behind the AAP recommendations and the evidence omitted from those recommendations. We conclude that the only evidence-based universal advice to date is that sofas are hazardous places for adults to sleep with infants; that exposure to smoke, both prenatal and postnatal, increases the risk of death; and that sleeping next to an impaired caregiver increases the risk of death. No sleep environment is completely safe. Public health efforts must address the reality that tired parents must feed their infants at night somewhere and that sofas are highly risky places for parents to fall asleep with their infants, especially if parents are smokers or under the influence of alcohol or drugs. All messaging must be crafted and reevaluated to avoid unintended negative consequences, including impact on breastfeeding rates, or falling asleep in more dangerous situations than parental beds. We must realign our resources to focus on the greater risk factors, and that may include greater investment in smoking cessation and doing away with aggressive formula marketing. This includes eliminating conflicts of interest between formula marketing companies and organizations dedicated to the health of children.

Introduction

Reducing sleep-related infant deaths is a national priority, but the current recommendations overemphasize the risks of bedsharing and can have serious unintended consequences. The advice never to bedshare may result in deaths on sofas as parents try to avoid feeding their infants in bed. The emphasis on avoiding bedsharing is also diverting valuable resources away from addressing more potent risks for sleep-related infant death. Finally, recommendations to avoid bedsharing may interfere with breastfeeding,[1,2] which has wide-ranging public health implications.

The American Academy of Pediatrics (AAP) issued recommendations in 2005 and 2011 to prevent sleep-related infant death, which advises that against all bedsharing for sleep.[3,4] This advice has resulted in a proliferation of high-profile local and national initiatives against bedsharing, including frightening ads with headstones and caskets and costly programs to provide free cribs to poor families.

Annually in the United States, there are about 4,000 infant deaths per year related to sleep, 2,200 (55%) of which are due to sudden infant death syndrome (SIDS), with the rest being due to accidental suffocation or strangulation related to sleep, often when a parent or other adult falls asleep next to an infant. These two types of death are distinct entities, with separate but overlapping risk factors, and the AAP recommendation is intended to address both. The leading modifiable risk factors for SIDS are smoking,[5] the baby sleeping prone,[5] formula feeding,[6] the baby sleeping unattended,[5] and poverty.[7,8] Sofas and soft sleep surfaces have been reported.[9] The leading modifiable risk factors for suffocation and smothering are sofa-sleeping[9] and parental use of alcohol and drugs.[9] In Table 1, we have included Class A recommendations that we think the evidence clearly and strongly supports.

Evidence suggests the AAP's recommendation about bedsharing may be counterproductive, directly contributing to infant deaths in at least some cases. A 2010 survey of nearly 5,000 U.S. mothers found ''in a possible attempt to

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Table 1. Class A Recommendations to Reduce the Risk of SIDS

Class A recommendations to reduce the risk of SIDS, in order of evidence	*Class A evidence to reduce the risk of SASS, in order, for at least the first 4–6 months*
1. Back to sleep for every sleep.[17,49]	1. Avoid feeding infants on sofas or recliners when the adult is likely to fall asleep during feeding. This applies to all caregivers, including breastfeeding mothers. (Most accidental smothering/entrapment infant deaths involve sofas or recliners.)[3,9,10,14]
2. Mothers should not smoke during pregnancy. After birth, avoid smoking in the household, day care settings, and all settings where the infant is cared for. (The more smoke that the baby is exposed to, the higher the risk of SIDS.)[3,5,50]	2. Anyone who has consumed alcohol or sedating substances should avoid lying down next to an infant on any surface. This applies to all caregivers, including breastfeeding mothers. (Most accidental overlying/smothering deaths involve alcohol or sedating substances.)[9,13]
3. Avoid formula feeding.[6,21,51] Breastfeeding should be promoted and supported proactively, including the Baby-Friendly Hospital Initiative and the WHO/UNICEF Code of Marketing of Breast Milk Substitutes.[52]	3. Bedsharing is to be avoided in the following situations: a. Infant is sleeping next to someone *other than* his or her breastfeeding mother.[24] (Breastfeeding mothers and infants instinctively sleep differently when together.) b. Infant is placed on pillows or on thick bedding, near the adult's head.[9] c. Infant is sleeping next to formula-feeding parents or nonparents, including siblings.[9] d. Bed is very soft, overcrowded, or unclean or has places where entrapment could occur.[3,9]
4. Keep sleeping babies in proximity (within visual and auditory distance) of an unimpaired adult for all sleeping periods including naps and at night. This applies to all caregivers, including breastfeeding mothers.[3,34]	4. Cribs, cots, play yards, and other containers for sleeping babies should be free of any objects, including bumper pads that could entrap or suffocate a baby, and have a firm, well-fitted mattress. Any covers should be light, or the baby should wear sufficient clothing to avoid covers or blankets. Any clothing worn by the baby should be free of cords or strings that could strangle or choke.[3]
5. Babies should be dressed in the same amount of clothing as adults, not overheated. Clothing should allow the baby access to his or her arms, hands, and fingers.[3,53]	
6. Formula-fed babies may be offered a pacifier during sleep times.[54]	
7. Sidecars/cosleeper devices should be evaluated for safety both in the home and for use in the hospital and should be regulated as cribs and play yards for infants are regulated.[55]	

SASS, sleep-associated suffocation and strangulation; SIDS, sudden infant death syndrome; WHO, World Health Organization.

avoid bed sharing, 55 percent of mothers feed their babies at night on chairs, recliners or sofas. Forty-four percent (25 percent of the sample) admit that they [are] falling asleep with their babies in these locations.''[10] This is cause for alarm and should have triggered immediate re-evaluation of the AAP 2005 recommendation and further study, but instead the recommendation was reiterated in its 2011 statement.

The Role of Bedsharing and Sofa-Sharing

Experts agree that sofas pose a much higher risk for infant death than beds.[3,9] Parents of two SIDS deaths described exactly this scenario, unaware that sofas are far more dangerous places for infants to sleep than beds.[9] In the United Kingdom, deaths from SIDS have been falling since the early 1990s, but deaths on sofas have nearly tripled since 1996.[9] In the United States, deaths from SIDS has been falling while deaths from accidental suffocation and strangulation in bed (ASSB) has more than tripled between 1996 and 2004, with just over a quarter of those documented to have occurred in a bed.[11] Of concern is the observation in the United Kingdom that ''that smokers may sofa share is not surprising given that they are specifically advised not to bedshare.''[12]

A large problem in the literature is that many studies continue to define ''bedsharing'' as any shared sleep surface, even though it has been increasingly clear that some sleep surfaces, such as sofas, are markedly more risky than others. To make matters worse, the term used in the literature, ''accidental suffocation and strangulation in bed,'' includes deaths related to sleep in *any* sleep location, including sofas and recliners. We therefore propose eliminating ''ASSB'' and replacing it with ''SASS'' (sleep-associated suffocation and strangulation) because a significant proportion of these deaths actually occur on surfaces that have been documented to be highly unsafe for infant sleep: sofas and recliners.

Indeed, the bulk of the literature indicates that sleeping in a parental bed poses little excess risk, absent other risk factors (smoking, formula feeding, prone position, and alcohol/drug use),[1,9,12–14] especially if done routinely.[15] For example, in

an Alaskan study, 94% of infant deaths with bedsharing from SIDS or SASS had at least one of five other risk factors, with maternal smoking being by far the most common (75%).[14]

An emerging consideration is whether bedsharing is planned and routine or accidental and unintentional. Some data show that infants of parents who bedshare intentionally carry no excess risk, when other known risks are absent.[15] More research is needed, but this result is not unexpected if parents are educated about safety issues and plan accordingly. A 2013 article pooling five studies looked closely at bedsharing (as narrowly defined), feeding method, smoking, and drug/alcohol use and found that bedsharing is still a significant risk in unimpaired nonsmoking breastfeeding parents, but only in infants under 15 weeks of age.[16] Although they did use a control group, they did not examine routine versus unplanned bedsharing and did not collect data on partner's alcohol use, prenatal smoking (only postnatal), or prematurity.

Nonetheless, other studies continue to be published and reported in the mainstream media that buttress the AAP recommendations, which have overly broad definitions of ''bedsharing'' or do not account for other risk factors. A 2012 meta-analysis included sofa deaths in the bedsharing definition, but nonetheless concluded that infants who bedshared *routinely* were not at increased risk of SIDS.[15] A 2009 German study on sleep environment and a 2003 U.S. study both showed that a significant number of SIDS deaths occurred in the parental bed but collected no data on parental alcohol use, drug use, or smoking, yet nonetheless concluded by supporting the same position as the AAP on bedsharing.[17,18] A similarly designed U.S. study was published in 2014, with the same conclusions.[19]

The Role of Formula Feeding

Increasing evidence shows that one of the strongest risk factors for SIDS is infant formula feeding.[6,20] Formula-fed infants are less arousable than breastfed infants[6] and wake less often for feedings. The best, most recently conducted meta-analysis of SIDS cases showed that in the month before death, the odds of SIDS was 27% among exclusively breastfed infants compared with formula-fed infants and 29% among infants who were mixed-fed.[6] A 2010 cost analysis showed that increasing exclusive breastfeeding in the United States could prevent 911 excess deaths, 447 of which would be due to SIDS.[21] This more recent meta-analysis would indicate the number of deaths related to formula feeding is likely much higher.

Furthermore, some research suggests that when infants are breastfed and when alcohol, drugs, and smoking are not involved, some aspects of bedsharing may be potentially protective against SIDS and suffocation. One survey has found that many parents have discovered acute life-threatening events in their infants only because they were next to them and could stimulate them from prolonged apneic episodes.[22]

Bedsharing breastfeeding mothers and their infants sleep very differently from formula-feeding mothers and do not have the same risks.[23] Breastfeeding mothers and infants sleep in synchrony, with the mother and infant and oriented toward one another.[23,24] Compared with formula-feeding mothers, breastfeeding mothers typically keep their babies away from pillows, placing their babies below their shoulders while raising their own arms above them. Breastfed infants are more likely to be positioned with their faces toward their mothers, minimizing the likelihood that they will be prone.[25] Among breastfeeding infants, bedsharing promotes infant arousals.[26] Breastfeeding mothers but not formula-feeding mothers typically tuck their legs up and lie on their sides to face their infants in ways that can prevent accidental overlying.[27] Bedsharing formula-feeding infants are thus at higher risk of suffocation deaths than breastfeeding infants, as well being at higher risk of SIDS.

In addition, considerable research supports biological evidence that bedsharing may facilitate breastfeeding and that breastfeeding mothers are more likely to share a bed with their infants.[28–30] When breastfeeding mothers bedshare, they get more sleep than if the infant sleeps separately.[31,32] There is also evidence that when breastfeeding mothers try to avoid bedsharing, they either end up giving formula or start bedsharing anyway.[2]

A Closer Look at the AAP Recommendations

Current U.S. safe sleep recommendations against bedsharing come almost exclusively from the AAP position, with far-reaching influence and implications.

It is thus important to examine the sources from which the AAP statement draws its sleep recommendations. The 2011 AAP statement reads, ''Infants should not be placed on beds for sleep due to risk of suffocation or entrapment,'' with two references for support, Ostfeld et al.[33] (published in 2006) and Scheers et al.[18] (published in 2003). Both of these studies have significant flaws. The study of Ostfeld et al.[33] lumps sofas in with adult beds and fails to include alcohol or drug use by parents. The study of Scheers et al.[18] also conflates sofas and other highly risky sleep surfaces with beds and fails to include smoking, alcohol, or drugs or feeding method.

As for its 2011 bedsharing recommendation, the AAP states that ''AAP does not recommend any specific bedsharing situation as safe.'' They use four citations: Blair et al.[34] (published in 1999), Carpenter et al.[13] (published in 2004), Tappin et al.[35] (published in 2005), and Mitchell and Thompson[36] (published in 1995). The study of Blair et al.[34] found that there is no increased risk for any infants of any age of parents who do not smoke. The study of Carpenter et al.[13] noted that ''for mothers who did not smoke during pregnancy, the odds ratio for bedsharing was very small.'' The study of Tappin et al.[35] did not collect data on maternal alcohol use and at times counted a death as bedsharing even when it occurred in a crib, as long as the infant had spent some time in his or her parent's bed earlier that night. The study of Mitchell and Thompson[36] adjusted for all major risks but alcohol and found ''if the mother is a nonsmoker, there appears to be a small increased risk of bedsharing,'' with a relative risk of 2.49 (95% confidence interval, 1.57, 4.29). Thus, two studies had omitted alcohol, and two showed risks too small to arguably justify the AAP's broad recommendations.

In addition, the 2011 AAP recommendations omit other compelling data around bedsharing. The data showing 447 excess deaths per year related to suboptimal breastfeeding[21] were not cited, despite the fact that this article was widely publicized in the mainstream media in April 2010. The AAP statement omitted the 2010 survey of nearly 5,000 mothers

showing that large numbers of mothers are unintentionally falling asleep on sofas while attempting to avoid bedsharing.[10] It omits compelling data that recommendations to avoid bedsharing interfere with breastfeeding.[1,2,37]

AAP recommendations also ignore the weight of the evidence pointing toward a physiologic imperative for breastfeeding mothers to sleep with their infants. Infants require frequent feedings around the clock because of the nutritional content of human milk. In addition, as with other mammals, human mothers and their newborns have a need for close physical contact during sleep for thermoregulation, and both experience stress if separated.[27,38–41] Maternal oxytocin released during breastfeeding may induce maternal somnolence. Furthermore, parents' reasons for bedsharing around the world include facilitating breastfeeding, meeting emotional needs of the mother and infant, monitoring and need to protect the infant, tradition, and disagreeing with danger.[37,42,43] In one inner city population, mothers were not influenced by healthcare providers advising them never to bedshare.[42] For all these reasons, advice never to bedshare relies on parents to suppress an overwhelming biologic imperative. Advice never to bedshare is thus unrealistic and unfeasible.

It is not even clear that cribs are indeed the safest place for an infant to sleep. If one examines cribs using an intention-to-treat analysis, the fact that many parents fall asleep on sofas while avoiding feeding their infants in bed in order to use cribs may mean that cribs may ultimately be less safe than their parents' beds. More research is needed.

Future Directions

If routine bedsharing is a risk factor for death in babies of nonsmoking breastfeeding mothers, it is small and greatly overshadowed by more potent risk factors. If we really want to lower the risk of sleep-related infant death in the United States, we must focus instead on those other risk factors: smoking, falling asleep on sofas, formula feeding, sleeping unattended, parental alcohol and drug use, and poverty. Campaigns to discourage bedsharing are taking up a disproportionate amount of resources better spent on addressing these other risk factors. It is important to educate parents on how to share a bed safely, as parents have stated they would appreciate this advice[42] and because bedsharing is widespread.[10,44–46]

Public health efforts must address the reality that tired parents must feed their infants at night somewhere and that sofas are highly risky places for parents to fall asleep with their infants, *especially* if parents are smokers or under the influence of alcohol or drugs. Safe sleep messages must also recognize that breastfeeding infants and formula-feeding infants do not sleep the same way and do not share the same risks when bedsharing.

Safe sleep messages must also take into account the impact they may have on breastfeeding, which has wide-ranging public health impact aside from SIDS. A lack of breastfeeding is associated with childhood obesity, maternal breast cancer, maternal diabetes, and maternal heart disease, all of which are dependent on the duration of breastfeeding.[47,48] Any message that may inadvertently decrease breastfeeding duration or exclusivity for the sake of one disease must take into account the entire public health picture.

The issues around safe sleep are complex. No infant sleep environment is completely safe. The only evidence-based universal advice is that sofas are hazardous places for adults to sleep with infants, that exposure to smoke, both prenatal and postnatal, increases the risk of death, and that sleeping next to an impaired caregiver increases the risk of death.

As with any social marketing campaign, all messaging must be crafted using careful testing and evaluation with the target audience to avoid unintended negative consequences, including impact on breastfeeding rates, or falling asleep in more dangerous situations than parental beds, such as sofas. In addition, there must be plans for periodic re-evaluation of any campaign and a willingness to change the messaging if it is ineffective or having unintended consequences.

Making a real difference in infant deaths will require a completely new way of addressing this issue and may need to go well beyond social marketing on safe sleep. We must prioritize research on the reasons why parents fall asleep on sofas with their infants in order minimize the growing number of these tragic deaths. Although there have been many research studies on bedsharing, to our knowledge, there has not been a single study on the reasons for sofa-sharing despite the growing numbers of these deaths.

Investment in programs to aggressively support maternal smoking cessation and curb substance use and smoking among new parents may be necessary to decrease infant deaths.

Finally, infant deaths could be reduced by stepping up measures to support breastfeeding, including doing away with aggressive marketing of infant formula, especially in hospitals and by healthcare organizations. With hundreds of deaths per year attributable to infant formula, especially due to SIDS, we must eliminate conflicts of interest between formula companies and organizations dedicated to the health of children.

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