

# PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

## **SIDS and Other Sleep-Related Infant Deaths: Expansion of Recommendations for a Safe Infant Sleeping Environment**

TASK FORCE ON SUDDEN INFANT DEATH SYNDROME

*Pediatrics*; originally published online October 17, 2011;

DOI: 10.1542/peds.2011-2284

The online version of this article, along with updated information and services, is  
located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/early/2011/10/12/peds.2011-2284>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2011 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™





## POLICY STATEMENT

# SIDS and Other Sleep-Related Infant Deaths: Expansion of Recommendations for a Safe Infant Sleeping Environment

## abstract

FREE

Despite a major decrease in the incidence of sudden infant death syndrome (SIDS) since the American Academy of Pediatrics (AAP) released its recommendation in 1992 that infants be placed for sleep in a non-prone position, this decline has plateaued in recent years. Concurrently, other causes of sudden unexpected infant death that occur during sleep (sleep-related deaths), including suffocation, asphyxia, and entrapment, and ill-defined or unspecified causes of death have increased in incidence, particularly since the AAP published its last statement on SIDS in 2005. It has become increasingly important to address these other causes of sleep-related infant death. Many of the modifiable and nonmodifiable risk factors for SIDS and suffocation are strikingly similar. The AAP, therefore, is expanding its recommendations from focusing only on SIDS to focusing on a safe sleep environment that can reduce the risk of all sleep-related infant deaths, including SIDS. The recommendations described in this policy statement include supine positioning, use of a firm sleep surface, breastfeeding, room-sharing without bed-sharing, routine immunizations, consideration of using a pacifier, and avoidance of soft bedding, overheating, and exposure to tobacco smoke, alcohol, and illicit drugs. The rationale for these recommendations is discussed in detail in the accompanying “Technical Report—SIDS and Other Sleep-Related Infant Deaths: Expansion of Recommendations for a Safe Infant Sleeping Environment,” which is included in this issue of *Pediatrics* ([www.pediatrics.org/cgi/content/full/128/5/e1341](http://www.pediatrics.org/cgi/content/full/128/5/e1341)). *Pediatrics* 2011;128:1030–1039

## INTRODUCTION

Sudden infant death syndrome (SIDS) is a cause assigned to infant deaths that cannot be explained after a thorough case investigation, including a scene investigation, autopsy, and review of the clinical history.<sup>1</sup> Sudden unexpected infant death (SUID), also known as sudden unexpected death in infancy, is a term used to describe any sudden and unexpected death, whether explained or unexplained (including SIDS), that occurs during infancy. After case investigation, SUIDs can be attributed to suffocation, asphyxia, entrapment, infection, ingestions, metabolic diseases, arrhythmia-associated cardiac channelopathies, and trauma (accidental or nonaccidental). The distinction between SIDS and other SUIDs, particularly those that occur during an observed or unobserved sleep period (sleep-related infant deaths), such as ac-

## TASK FORCE ON SUDDEN INFANT DEATH SYNDROME

### KEY WORDS

SIDS, sudden infant death, infant mortality, sleep position, bed-sharing, tobacco, pacifier, immunization, bedding, sleep surface

### ABBREVIATIONS

SIDS—sudden infant death syndrome  
SUID—sudden unexpected infant death  
AAP—American Academy of Pediatrics

This document is copyrighted and is property of the American Academy of Pediatrics and its Board of Directors. All authors have filed conflict of interest statements with the American Academy of Pediatrics. Any conflicts have been resolved through a process approved by the Board of Directors. The American Academy of Pediatrics has neither solicited nor accepted any commercial involvement in the development of the content of this publication.

[www.pediatrics.org/cgi/doi/10.1542/peds.2011-2284](http://www.pediatrics.org/cgi/doi/10.1542/peds.2011-2284)

doi:10.1542/peds.2011-2284

All policy statements from the American Academy of Pediatrics automatically expire 5 years after publication unless reaffirmed, revised, or retired at or before that time.

PEDIATRICS (ISSN Numbers: Print, 0031-4005; Online, 1098-4275).

Copyright © 2011 by the American Academy of Pediatrics

**TABLE 1** Summary and Strength of Recommendations

Level A recommendations
Back to sleep for every sleep
Use a firm sleep surface
Room-sharing without bed-sharing is recommended
Keep soft objects and loose bedding out of the crib
Pregnant women should receive regular prenatal care
Avoid smoke exposure during pregnancy and after birth
Avoid alcohol and illicit drug use during pregnancy and after birth
Breastfeeding is recommended
Consider offering a pacifier at nap time and bedtime
Avoid overheating
Do not use home cardiorespiratory monitors as a strategy for reducing the risk of SIDS
Expand the national campaign to reduce the risks of SIDS to include a major focus on the safe sleep environment and ways to reduce the risks of all sleep-related infant deaths, including SIDS, suffocation, and other accidental deaths; pediatricians, family physicians, and other primary care providers should actively participate in this campaign
Level B recommendations
Infants should be immunized in accordance with recommendations of the AAP and Centers for Disease Control and Prevention
Avoid commercial devices marketed to reduce the risk of SIDS
Supervised, awake tummy time is recommended to facilitate development and to minimize development of positional plagiocephaly
Level C recommendations
Health care professionals, staff in newborn nurseries and NICUs, and child care providers should endorse the SIDS risk-reduction recommendations from birth
Media and manufacturers should follow safe-sleep guidelines in their messaging and advertising
Continue research and surveillance on the risk factors, causes, and pathophysiological mechanisms of SIDS and other sleep-related infant deaths, with the ultimate goal of eliminating these deaths entirely

These recommendations are based on the US Preventive Services Task Force levels of recommendation ([www.uspreventiveservicestaskforce.org/uspstf/grades.htm](http://www.uspreventiveservicestaskforce.org/uspstf/grades.htm)).

Level A: Recommendations are based on good and consistent scientific evidence (ie, there are consistent findings from at least 2 well-designed, well-conducted case-control studies, a systematic review, or a meta-analysis). There is high certainty that the net benefit is substantial, and the conclusion is unlikely to be strongly affected by the results of future studies.

Level B: Recommendations are based on limited or inconsistent scientific evidence. The available evidence is sufficient to determine the effects of the recommendations on health outcomes, but confidence in the estimate is constrained by such factors as the number, size, or quality of individual studies or inconsistent findings across individual studies. As more information becomes available, the magnitude or direction of the observed effect could change, and this change may be large enough to alter the conclusion.

Level C: Recommendations are based primarily on consensus and expert opinion.

cidental suffocation, is challenging and cannot be determined by autopsy alone. Scene investigation and review of the clinical history are also required. Many of the modifiable and nonmodifiable risk factors for SIDS and suffocation are strikingly similar. This document focuses on the subset of SUIDs that occurs during sleep.

The recommendations outlined herein were developed to reduce the risk of SIDS and sleep-related suffocation, asphyxia, and entrapment among infants in the general population. As defined by epidemiologists, risk refers to the probability that an outcome will occur given the presence of a particular factor or set of factors. Although all of the 18 recommendations cited below are intended for parents, health care providers, and others who care for infants, the last 4 recommendations are also directed toward health policy

makers, researchers, and professionals who care for or work on behalf of infants. In addition, because certain behaviors, such as smoking, can increase risk for the infant, some recommendations are directed toward women who are pregnant or may become pregnant in the near future.

Table 1 summarizes the major recommendations, along with the strength of each recommendation. It should be noted that there have been no randomized controlled trials with regards to SIDS and other sleep-related deaths; instead, case-control studies are the standard.

Because most of the epidemiologic studies that established the risk factors and on which these recommendations are based include infants up to 1 year of age, these recommendations for sleep position and the sleep envi-

ronment should be used consistently for infants up to 1 year of age. Individual medical conditions might warrant that a physician recommend otherwise after weighing the relative risks and benefits.

For the background literature review and data analyses on which this policy statement and recommendations are based, please refer to the accompanying "Technical Report—SIDS and Other Sleep-Related Infant Deaths: Expansion of Recommendations for a Safe Infant Sleeping Environment," available in the online version of this issue of *Pediatrics*.<sup>2</sup>

## RECOMMENDATIONS

1. Back to sleep for every sleep—To reduce the risk of SIDS, infants should be placed for sleep in a supine position (wholly on the back) for every

sleep by every caregiver until 1 year of life.<sup>3-7</sup> Side sleeping is not safe and is not advised.<sup>4,6</sup>

a. The supine sleep position does not increase the risk of choking and aspiration in infants, even those with gastroesophageal reflux, because they have protective airway mechanisms.<sup>8,9</sup> Infants with gastroesophageal reflux should be placed for sleep in the supine position for every sleep, with the rare exception of infants for whom the risk of death from complications of gastroesophageal reflux is greater than the risk of SIDS (ie, those with upper airway disorders, for whom airway protective mechanisms are impaired),<sup>10</sup> including infants with anatomic abnormalities such as type 3 or 4 laryngeal clefts who have not undergone antireflux surgery. Elevating the head of the infant's crib while the infant is supine is not recommended.<sup>11</sup> It is ineffective in reducing gastroesophageal reflux; in addition, it might result in the infant sliding to the foot of the crib into a position that might compromise respiration.

b. Preterm infants are at increased risk of SIDS,<sup>12,13</sup> and the association between prone sleep position and SIDS among low birth weight infants is equal to, or perhaps even stronger than, the association among those born at term.<sup>14</sup> Preterm infants and other infants in the NICU should be placed in the supine position for sleep as soon as the infant is medically stable and significantly before the infant's antici-

pated discharge, by 32 weeks' postmenstrual age.<sup>15</sup> NICU personnel should endorse safe-sleeping guidelines with parents of infants from the time of admission to the NICU.

c. There is no evidence that placing infants on the side during the first few hours of life promotes clearance of amniotic fluid and decreases the risk of aspiration. Infants in the newborn nursery and infants who are rooming in with their parents should be placed in the supine position as soon as they are ready to be placed in the bassinet.

d. Although data to make specific recommendations as to when it is safe for infants to sleep in the prone or side position are lacking, studies that have established prone and side sleeping as risk factors for SIDS include infants up to 1 year of age. Therefore, infants should continue to be placed supine until 1 year of age. Once an infant can roll from supine to prone and from prone to supine, the infant can be allowed to remain in the sleep position that he or she assumes.

2. Use a firm sleep surface—A firm crib mattress, covered by a fitted sheet, is the recommended sleeping surface to reduce the risk of SIDS and suffocation.

a. A crib, bassinet, or portable crib/play yard that conforms to the safety standards of the Consumer Product Safety Commission and ASTM International (formerly the American Society for Testing and Materials) is recommended.<sup>16</sup> In addition, parents and providers should

check to make sure that the product has not been recalled. Cribs with missing hardware should not be used, and the parent or provider should not attempt to fix broken components of a crib, because many deaths are associated with cribs that are broken or have missing parts (including those that have presumably been fixed). Local organizations throughout the United States can help to provide low-cost or free cribs or play yards for families with financial constraints.

b. Only mattresses designed for the specific product should be used. Mattresses should be firm and maintain their shape even when the fitted sheet designated for that model is used, such that there are no gaps between the mattress and the side of the crib, bassinet, portable crib, or play yard. Pillows or cushions should not be used as substitutes for mattresses or in addition to a mattress. Soft materials or objects such as pillows, quilts, comforters, or sheepskins, even if covered by a sheet, should not be placed under a sleeping infant. If a mattress cover to protect against wetness is used, it should be tightly fitting and thin.

c. Infants should not be placed for sleep on beds because of the risk of entrapment and suffocation.<sup>17,18</sup> In addition, portable bed rails should not be used with infants because of the risk of entrapment and strangulation.

d. The infant should sleep in an area free of hazards, such

as dangling cords, electric wires, and window-covering cords, because they might present a strangulation risk.

- e. Sitting devices, such as car safety seats, strollers, swings, infant carriers, and infant slings, are not recommended for routine sleep in the hospital or at home.<sup>19–23</sup> Infants who are younger than 4 months are particularly at risk, because they might assume positions that can create risk of suffocation or airway obstruction. When infant slings and cloth carriers are used for carrying, it is important to ensure that the infant's head is up and above the fabric, the face is visible, and that the nose and mouth are clear of obstructions.<sup>24</sup> After nursing, the infant should be repositioned in the sling so that the head is up, is clear of fabric, and is not against the adult's body or the sling. If an infant falls asleep in a sitting device, he or she should be removed from the product and moved to a crib or other appropriate flat surface as soon as is practical. Car safety seats and similar products are not stable on a crib mattress or other elevated surfaces.<sup>25–29</sup>
3. Room-sharing without bed-sharing is recommended—There is evidence that this arrangement decreases the risk of SIDS by as much as 50%.<sup>5,7,30,31</sup> In addition, this arrangement is most likely to prevent suffocation, strangulation, and entrapment that might occur when the infant is sleeping in an adult bed.
    - a. The infant's crib, portable crib, play yard, or bassinet should be placed in the parents' bedroom close to the parents' bed. This arrangement reduces SIDS risk and removes the possibility of suffocation, strangulation, and entrapment that might occur when the infant is sleeping in the adults' bed. It also allows close parental proximity to the infant and facilitates feeding, comforting, and monitoring of the infant.
    - b. Devices promoted to make bed-sharing "safe" (eg, in-bed co-sleepers) are not recommended.
    - c. Infants may be brought into the bed for feeding or comforting but should be returned to their own crib or bassinet when the parent is ready to return to sleep.<sup>6,32</sup> Because of the extremely high risk of SIDS and suffocation on couches and armchairs,<sup>3,5,6,31,32</sup> infants should not be fed on a couch or armchair when there is a high risk that the parent might fall asleep.
    - d. Epidemiologic studies have not demonstrated any bed-sharing situations that are protective against SIDS or suffocation. Furthermore, not all risks associated with bed-sharing, such as parental fatigue, can be controlled. Therefore, the American Academy of Pediatrics (AAP) does not recommend any specific bed-sharing situations as safe. Moreover, there are specific circumstances that, in epidemiologic studies, substantially increase the risk of SIDS or suffocation while bed-sharing. In particular, it should be stressed to parents that they avoid the following situations at all times:
      - i. Bed-sharing when the infant is younger than 3 months, regardless of whether the parents are smokers or not.<sup>5,7,31–34</sup>
      - ii. Bed-sharing with a current smoker (even if he or she does not smoke in bed) or if the mother smoked during pregnancy.<sup>5,6,34–36</sup>
      - iii. Bed-sharing with someone who is excessively tired.
      - iv. Bed-sharing with someone who has or is using medications (eg, certain antidepressants, pain medications) or substances (eg, alcohol, illicit drugs) that could impair his or her alertness or ability to arouse.<sup>7,37</sup>
      - v. Bed-sharing with anyone who is not a parent, including other children.<sup>3</sup>
      - vi. Bed-sharing with multiple persons.<sup>3</sup>
      - vii. Bed-sharing on a soft surface such as a waterbed, old mattress, sofa, couch, or armchair.<sup>3,5,6,31,32</sup>
      - viii. Bed-sharing on a surface with soft bedding, including pillows, heavy blankets, quilts, and comforters.<sup>3,38</sup>
    - e. It is prudent to provide separate sleep areas and avoid co-bedding for twins and higher-order multiples in the hospital and at home.<sup>39</sup>
  4. Keep soft objects and loose bedding out of the crib to reduce the risk of SIDS, suffocation, entrapment, and strangulation.
    - a. Soft objects, such as pillows and pillow-like toys, quilts, comfort-

- ers, and sheepskins, should be kept out of an infant's sleeping environment.<sup>40–45</sup>
- b. Loose bedding, such as blankets and sheets, might be hazardous and should not be used in the infant's sleeping environment.<sup>3,6,46–51</sup>
  - c. Because there is no evidence that bumper pads or similar products that attach to crib slats or sides prevent injury in young infants and because there is the potential for suffocation, entrapment, and strangulation, these products are not recommended.<sup>52,53</sup>
  - d. Infant sleep clothing that is designed to keep the infant warm without the possible hazard of head covering or entrapment can be used.
5. Pregnant women should receive regular prenatal care—There is substantial epidemiologic evidence linking a lower risk of SIDS for infants whose mothers obtain regular prenatal care.<sup>54–57</sup>
  6. Avoid smoke exposure during pregnancy and after birth—Both maternal smoking during pregnancy and smoke in the infant's environment after birth are major risk factors for SIDS.
    - a. Mothers should not smoke during pregnancy or after the infant's birth.<sup>1,58–61</sup>
    - b. There should be no smoking near pregnant women or infants. Encourage families to set strict rules for smoke-free homes and cars and to eliminate secondhand tobacco smoke from all places in which children and other nonsmokers spend time.<sup>62,63</sup>
    - c. The risk of SIDS is particularly high when the infant bed-
  7. Avoid alcohol and illicit drug use during pregnancy and after birth—There is an increased risk of SIDS with prenatal and postnatal exposure to alcohol or illicit drug use.
    - a. Mothers should avoid alcohol and illicit drugs periconceptionally and during pregnancy.<sup>64–70</sup>
    - b. Parental alcohol and/or illicit drug use in combination with bed-sharing places the infant at particularly high risk of SIDS.<sup>7,37</sup>
  8. Breastfeeding is recommended.
    - a. Breastfeeding is associated with a reduced risk of SIDS.<sup>71–73</sup> If possible, mothers should exclusively breastfeed or feed with expressed human milk (ie, not offer any formula or other non-human milk-based supplements) for 6 months, in alignment with recommendations of the AAP.<sup>74</sup>
    - b. The protective effect of breastfeeding increases with exclusivity.<sup>73</sup> However, any breastfeeding has been shown to be more protective against SIDS than no breastfeeding.<sup>73</sup>
  9. Consider offering a pacifier at nap time and bedtime—Although the mechanism is yet unclear, studies have reported a protective effect of pacifiers on the incidence of SIDS.<sup>3,7,32</sup> The protective effect persists throughout the sleep period, even if the pacifier falls out of the infant's mouth.
    - a. The pacifier should be used when placing the infant for sleep. It does not need to be reinserted once the infant falls asleep. If the infant refuses the pacifier, he or she should not be forced to take it. In those cases, parents can try to offer the pacifier again when the infant is a little older.
  - b. Because of the risk of strangulation, pacifiers should not be hung around the infant's neck. Pacifiers that attach to infant clothing should not be used with sleeping infants.
  - c. Objects such as stuffed toys, which might present a suffocation or choking risk, should not be attached to pacifiers.
  - d. For breastfed infants, delay pacifier introduction until breastfeeding has been firmly established,<sup>74</sup> usually by 3 to 4 weeks of age.
  - e. There is insufficient evidence that finger-sucking is protective against SIDS.
10. Avoid overheating—Although studies have revealed an increased risk of SIDS with overheating,<sup>75–78</sup> the definition of overheating in these studies varied. Therefore, it is difficult to provide specific room-temperature guidelines for avoiding overheating.
    - a. In general, infants should be dressed appropriately for the environment, with no more than 1 layer more than an adult would wear to be comfortable in that environment.
    - b. Parents and caregivers should evaluate the infant for signs of overheating, such as sweating or the infant's chest feeling hot to the touch.
    - c. Overbundling and covering of the face and head should be avoided.<sup>79</sup>

- d. There is currently insufficient evidence to recommend the use of a fan as a SIDS risk-reduction strategy.
11. Infants should be immunized in accordance with recommendations of the AAP and the Centers for Disease Control and Prevention—There is no evidence that there is a causal relationship between immunizations and SIDS.<sup>80</sup> Indeed, recent evidence suggests that immunization might have a protective effect against SIDS.<sup>81–85</sup> Infants should also be seen for regular well-child checks in accordance with AAP recommendations.
  12. Avoid commercial devices marketed to reduce the risk of SIDS—These devices include wedges, positioners, special mattresses, and special sleep surfaces. There is no evidence that these devices reduce the risk of SIDS or suffocation or that they are safe.
    - a. The AAP concurs with the US Food and Drug Administration and Consumer Product Safety Commission that manufacturers should not claim that a product or device protects against SIDS unless there is scientific evidence to that effect.
  13. Do not use home cardiorespiratory monitors as a strategy to reduce the risk of SIDS—Although cardiorespiratory monitors can be used at home to detect apnea, bradycardia, and, when pulse oximetry is used, decreases in oxyhemoglobin saturation, there is no evidence that use of such devices decreases the incidence of SIDS.<sup>84–87</sup> They might be of value for selected infants but should not be used routinely.
 

There is also no evidence that routine in-hospital cardiorespiratory monitoring before discharge from the hospital can identify newborn infants at risk of SIDS.
  14. Supervised, awake tummy time is recommended to facilitate development and to minimize development of positional plagiocephaly.
    - a. Although there are no data to make specific recommendations as to how often and how long it should be undertaken, supervised, awake tummy time is recommended on a daily basis, beginning as early as possible, to promote motor development, facilitate development of the upper body muscles, and minimize the risk of positional plagiocephaly.<sup>88</sup>
    - b. Diagnosis, management, and other prevention strategies for positional plagiocephaly, such as avoidance of excessive time in car safety seats and changing the infant's orientation in the crib, are discussed in detail in the recent AAP clinical report on positional skull deformities.<sup>88</sup>
  15. Health care professionals, staff in newborn nurseries and neonatal intensive care nurseries, and child care providers should endorse the SIDS risk-reduction recommendations from birth.<sup>89–91</sup>
    - a. Staff in NICUs should model and implement all SIDS risk-reduction recommendations as soon as the infant is clinically stable and significantly before anticipated discharge.
    - b. Staff in newborn nurseries should model and implement these recommendations beginning at birth and well before anticipated discharge.
  16. Media and manufacturers should follow safe-sleep guidelines in their messaging and advertising.
 

Media exposures (including movie, television, magazines, newspapers, and Web sites), manufacturer advertisements, and store displays affect individual behavior by influencing beliefs and attitudes.<sup>89,91</sup> Media and advertising messages contrary to safe-sleep recommendations might create misinformation about safe sleep practices.<sup>92</sup>
  17. Expand the national campaign to reduce the risks of SIDS to include a major focus on the safe sleep environment and ways to reduce the risks of all sleep-related infant deaths, including SIDS, suffocation, and other accidental deaths. Pediatricians, family physicians, and other primary care providers should actively participate in this campaign.
    - a. Public education should continue for all who care for infants, including parents, child care providers, grandparents, foster parents, and babysitters, and should include strategies for overcoming barriers to behavior change.
    - b. The campaign should continue to have a special focus

on the black and American Indian/Alaskan Native populations because of the higher incidence of SIDS and other sleep-related infant deaths in these groups.

- c. The campaign should specifically include strategies for increasing breastfeeding while decreasing bed-sharing and eliminating tobacco smoke exposure.
  - d. These recommendations should be introduced before pregnancy and ideally in secondary school curricula for both boys and girls. The importance of maternal pre-conceptional health and avoidance of substance use (including alcohol and smoking) should be included in this training.
  - e. Safe-sleep messages should be reviewed, revised, and re-issued at least every 5 years to address the next generation of new parents and products on the market.
18. Continue research and surveillance on the risk factors, causes, and pathophysiological mechanisms of SIDS and other sleep-related infant deaths, with the ul-

timinate goal of eliminating these deaths entirely.

and other primary care providers, should be supported and funded.

- d. Improved and widespread surveillance of SIDS and SUID cases should be implemented and funded.
- e. Federal and private funding agencies should remain committed to all aspects of the aforementioned research.

#### LEAD AUTHOR

Rachel Y. Moon, MD

#### TASK FORCE ON SUDDEN INFANT DEATH SYNDROME, 2010–2011

Rachel Y. Moon, MD, Chairperson  
Robert A. Darnall, MD  
Michael H. Goodstein, MD  
Fern R. Hauck, MD, MS

#### CONSULTANTS

Marian Willinger, PhD – *Eunice Kennedy Shriver National Institute for Child Health and Human Development*  
Carrie K. Shapiro-Mendoza, PhD, MPH – *Centers for Disease Control and Prevention*

#### STAFF

James Couto, MA

#### ACKNOWLEDGMENTS

The task force acknowledges the contributions provided by others to the collection and interpretation of data examined in preparation of this report. The task force is particularly grateful for the report submitted by Dr Suad Wanna-Nakamura (Consumer Product Safety Commission).

#### REFERENCES

1. Willinger M, James LS, Catz C. Defining the sudden infant death syndrome (SIDS): deliberations of an expert panel convened by the National Institute of Child Health and Human Development. *Pediatr Pathol*. 1991; 11(5):677–684
2. Moon RY, American Academy of Pediatrics, Task Force on Sudden Infant Death Syndrome. Technical report—SIDS and other sleep-related infant deaths: expansion of recommendations for a safe infant sleeping environment. *Pediatrics*. 2011;128(5). Available at: [www.pediatrics.org/cgi/content/full/128/5/e1128](http://www.pediatrics.org/cgi/content/full/128/5/e1128)
3. Hauck FR, Herman SM, Donovan M, et al. Sleep environment and the risk of sudden infant death syndrome in an urban population: the Chicago Infant Mortality Study. *Pediatrics*. 2003;111(5 pt 2): 1207–1214
4. Li DK, Petitti DB, Willinger M, et al. Infant sleeping position and the risk of sudden infant death syndrome in California, 1997–2000. *Am J Epidemiol*. 2003;157(5):446–455
5. Blair PS, Fleming PJ, Smith IJ, et al. Babies sleeping with parents: case-control study of factors influencing the risk of the sudden infant death syndrome. CESDI SUDI Research Group. *BMJ*. 1999;319(7223):1457–1462
6. Fleming PJ, Blair PS, Bacon C, et al. Environment of infants during sleep and risk of the sudden infant death syndrome: results of 1993–5 case-control study for confidential inquiry into stillbirths and deaths in infancy. Confidential Enquiry Into Stillbirths and Deaths Regional Coordinators and Researchers. *BMJ*. 1996; 313(7051):191–195
7. Carpenter RG, Irgens LM, Blair PS, et al. Sudden unexplained infant death in 20 regions in Europe: case control study. *Lancet*. 2004; 363(9404):185–191
8. Malloy MH. Trends in postneonatal aspiration deaths and reclassification of sudden infant death syndrome: impact of the “Back to Sleep” program. *Pediatrics*. 2002;109(4): 661–665



9. Tablizo MA, Jacinto P, Parsley D, Chen ML, Ramanathan R, Keens TG. Supine sleeping position does not cause clinical aspiration in neonates in hospital newborn nurseries. *Arch Pediatr Adolesc Med.* 2007;161(5):507–510
10. Vandenplas Y, Rudolph CD, Di Lorenzo C, et al. Pediatric gastroesophageal reflux clinical practice guidelines: joint recommendations of the North American Society for Pediatric Gastroenterology, Hepatology, and Nutrition (NASPGHAN) and the European Society for Pediatric Gastroenterology, Hepatology, and Nutrition (ESPGHAN). *J Pediatr Gastroenterol Nutr.* 2009;49(4):498–547
11. Tobin JM, McCloud P, Cameron DJ. Posture and gastro-oesophageal reflux: a case for left lateral positioning. *Arch Dis Child.* 1997;76(3):254–258
12. Malloy MH, Hoffman HJ. Prematurity, sudden infant death syndrome, and age of death. *Pediatrics.* 1995;96(3 pt 1):464–471
13. Sowter B, Doyle LW, Morley CJ, Altmann A, Halliday J. Is sudden infant death syndrome still more common in very low birthweight infants in the 1990s? *Med J Aust.* 1999;171(8):411–413
14. Oyen N, Markestad T, Skjaerven R, et al. Combined effects of sleeping position and prenatal risk factors in sudden infant death syndrome: the Nordic epidemiological SIDS study. *Pediatrics.* 1997;100(4):613–621
15. American Academy of Pediatrics, Committee on Fetus and Newborn. Hospital discharge of the high-risk neonate. *Pediatrics.* 2008;122(5):1119–1126
16. US Consumer Product Safety Commission. *Crib safety tips: use your crib safely.* Washington, DC: US Consumer Product Safety Commission. CPSC Document No. 5030. Available at: <http://www.cpsc.gov/cpscpub/pubs/5030.html>. Accessed September 30, 2011
17. Ostfeld BM, Perl H, Esposito L, et al. Sleep environment, positional, lifestyle, and demographic characteristics associated with bed sharing in sudden infant death syndrome cases: a population-based study. *Pediatrics.* 2006;118(5):2051–2059
18. Scheers NJ, Rutherford GW, Kemp JS. Where should infants sleep? A comparison of risk for suffocation of infants sleeping in cribs, adult beds, and other sleeping locations. *Pediatrics.* 2003;112(4):883–889
19. Bass JL, Bull M. Oxygen desaturation in term infants in car safety seats. *Pediatrics.* 2002;110(2 pt 1):401–402
20. Kornhauser Cerar L, Scirica CV, Štucin Gantar I, Osredkar D, Neubauer D, Kinane TB. A comparison of respiratory patterns in healthy term infants placed in car safety seats and beds. *Pediatrics.* 2009;124(3). Available at: [www.pediatrics.org/cgi/content/full/124/3/e396](http://www.pediatrics.org/cgi/content/full/124/3/e396)
21. Côté A, Bairam A, Deschesne M, Hatzakis G. Sudden infant deaths in sitting devices. *Arch Dis Child.* 2008;93(5):384–389
22. Merchant JR, Worwa C, Porter S, Coleman JM, deRegnier RA. Respiratory instability of term and near-term healthy newborn infants in car safety seats. *Pediatrics.* 2001;108(3):647–652
23. Willett LD, Leuschen MP, Nelson LS, Nelson RM Jr. Risk of hypoventilation in premature infants in car seats. *J Pediatr.* 1986;109(2):245–248
24. US Consumer Product Safety Commission. *Infant Deaths Prompt CPSC Warning About Sling Carriers for Babies* [press release]. Washington, DC: US Consumer Product Safety Commission; 2010. Available at: [www.cpsc.gov/cpscpub/prerel/prhtml10/10165.html](http://www.cpsc.gov/cpscpub/prerel/prhtml10/10165.html). Accessed August 27, 2011
25. Desapriya EB, Joshi P, Subzwari S, Nolan M. Infant injuries from child restraint safety seat misuse at British Columbia Children's Hospital. *Pediatr Int.* 2008;50(5):674–678
26. Graham CJ, Kittredge D, Stuemky JH. Injuries associated with child safety seat misuse. *Pediatr Emerg Care.* 1992;8(6):351–353
27. Parikh SN, Wilson L. Hazardous use of car seats outside the car in the United States, 2003–2007. *Pediatrics.* 2010;126(2):352–357
28. Pollack-Nelson C. Fall and suffocation injuries associated with in-home use of car seats and baby carriers. *Pediatr Emerg Care.* 2000;16(2):77–79
29. Wickham T, Abrahamson E. Head injuries in infants: the risks of bouncy chairs and car seats. *Arch Dis Child.* 2002;86(3):168–169
30. Mitchell EA, Thompson JMD. Co-sleeping increases the risk of SIDS, but sleeping in the parents' bedroom lowers it. In: Rognum TO, ed. *Sudden Infant Death Syndrome: New Trends in the Nineties.* Oslo, Norway: Scandinavian University Press; 1995:266–269
31. Tappin D, Ecob R, Brooke H. Bedsharing, roomsharing, and sudden infant death syndrome in Scotland: a case control study. *J Pediatr.* 2005;147(1):32–37
32. McGarvey C, McDonnell M, Chong A, O'Regan M, Matthews T. Factors relating to the infant's last sleep environment in sudden infant death syndrome in the Republic of Ireland. *Arch Dis Child.* 2003;88(12):1058–1064
33. McGarvey C, McDonnell M, Hamilton K, O'Regan M, Matthews T. An 8 year study of risk factors for SIDS: bed-sharing vs. non bed-sharing. *Arch Dis Child.* 2006;91(4):318–323
34. Vennemann M, Hense HW, Bajanowski T, et al. Bed sharing and the risk of SIDS: can we resolve the debate? *J Pediatr.* In press; ePub ahead of print August 21, 2011
35. Arnestad M, Andersen M, Vege A, Rognum TO. Changes in the epidemiological pattern of sudden infant death syndrome in south-east Norway, 1984–1998: implications for future prevention and research. *Arch Dis Child.* 2001;85(2):108–115
36. Scragg R, Mitchell EA, Taylor BJ, et al. Bed sharing, smoking, and alcohol in the sudden infant death syndrome. New Zealand Cot Death Study Group. *BMJ.* 1993;307(6915):1312–1318
37. Blair PS, Sidebotham P, Evason-Coombe C, Edmonds M, Heckstall-Smith EM, Fleming P. Hazardous cosleeping environments and risk factors amenable to change: case-control study of SIDS in south west England. *BMJ.* 2009;339:b3666
38. Fu LY, Hauck FR, Moon R. Bed sharing among black infants and sudden infant death syndrome: interactions with other known risk factors. *Acad Pediatr.* 2010;10(6):376–382
39. Tomashek KM, Wallman C; American Academy of Pediatrics, Committee on Fetus and Newborn. Cobedding twins and higher-order multiples in a hospital setting [published correction appears in *Pediatrics.* 2008;121(1):227]. *Pediatrics.* 2007;120(6):1359–1366
40. Chiodini BA, Thach BT. Impaired ventilation in infants sleeping facedown: potential significance for sudden infant death syndrome. *J Pediatr.* 1993;123(5):686–692
41. Kanetake J, Aoki Y, Funayama M. Evaluation of rebreathing potential on bedding for infant use. *Pediatr Int.* 2003;45(3):284–289
42. Kemp JS, Livne M, White DK, Arfken CL. Softness and potential to cause rebreathing: differences in bedding used by infants at high and low risk for sudden infant death syndrome. *J Pediatr.* 1998;132(2):234–239
43. Kemp JS, Nelson VE, Thach BT. Physical properties of bedding that may increase risk of sudden infant death syndrome in prone-sleeping infants. *Pediatr Res.* 1994;36(1 pt 1):7–11
44. Patel AL, Harris K, Thach BT. Inspired CO<sub>2</sub> and O<sub>2</sub> in sleeping infants rebreathing from bedding: relevance for sudden infant death syndrome. *J Appl Physiol.* 2001;91(6):2537–2545
45. Sakai J, Kanetake J, Takahashi S, Kanawaku Y, Funayama M. Gas dispersal potential of bedding as a cause for sudden infant death. *Forensic Sci Int.* 2008;180(2–3):93–97
46. Brooke H, Gibson A, Tappin D, Brown H. Case-control study of sudden infant death syn-

- drome in Scotland, 1992–5. *BMJ*. 1997; 314(7093):1516–1520
47. L'Hoir MP, Engelberts AC, van Well GTJ, et al. Risk and preventive factors for cot death in the Netherlands, a low-incidence country. *Eur J Pediatr*. 1998;157(8):681–688
  48. Markestad T, Skadberg B, Hordvik E, Morild I, Irgens L. Sleeping position and sudden infant death syndrome (SIDS): effect of an intervention programme to avoid prone sleeping. *Acta Paediatr*. 1995;84(4):375–378
  49. Ponsonby AL, Dwyer T, Couper D, Cochrane J. Association between use of a quilt and sudden infant death syndrome: case-control study. *BMJ*. 1998;316(7126):195–196
  50. Beal SM, Byard RW. Accidental death or sudden infant death syndrome? *J Paediatr Child Health*. 1995;31(4):269–271
  51. Wilson CA, Taylor BJ, Laing RM, Williams SM, Mitchell EA. Clothing and bedding and its relevance to sudden infant death syndrome: further results from the New Zealand Cot Death Study. *J Paediatr Child Health*. 1994;30(6):506–512
  52. Thach BT, Rutherford GW, Harris K. Deaths and injuries attributed to infant crib bumper pads. *J Pediatr*. 2007;151(3):271–274
  53. Yeh ES, Rochette LM, McKenzie LB, Smith GA. Injuries associated with cribs, playpens, and bassinets among young children in the US, 1990–2008. *Pediatrics*. 2011;127(3):479–486
  54. Getahun D, Amre D, Rhoads GG, Demissie K. Maternal and obstetric risk factors for sudden infant death syndrome in the United States. *Obstet Gynecol*. 2004;103(4):646–652
  55. Kraus JF, Greenland S, Bulterys M. Risk factors for sudden infant death syndrome in the US Collaborative Perinatal Project. *Int J Epidemiol*. 1989;18(1):113–120
  56. Paris C, Remler R, Daling JR. Risk factors for sudden infant death syndrome: changes associated with sleep position recommendations. *J Pediatr*. 2001;139(6):771–777
  57. Stewart A, Williams S, Mitchell E, Taylor BJ, Ford R, Allen EM. Antenatal and intrapartum factors associated with sudden infant death syndrome in the New Zealand Cot Death study. *J Paediatr Child Health*. 1995; 31(5):473–478
  58. MacDorman MF, Cnattingius S, Hoffman HJ, Kramer MS, Haglund B. Sudden infant death syndrome and smoking in the United States and Sweden. *Am J Epidemiol*. 1997;146(3): 249–257
  59. Schoendorf KC, Kiely JL. Relationship of sudden infant death syndrome to maternal smoking during and after pregnancy. *Pediatrics*. 1992;90(6):905–908
  60. Malloy MH, Kleinman JC, Land GH, Schramm WF. The association of maternal smoking with age and cause of infant death. *Am J Epidemiol*. 1988;128(1):46–55
  61. Haglund B, Cnattingius S. Cigarette smoking as a risk factor for sudden infant death syndrome: a population-based study. *Am J Public Health*. 1990;80(1):29–32
  62. American Academy of Pediatrics, Committee on Environmental Health; Committee on Substance Abuse; Committee on Adolescence; Committee on Native American Child. Policy statement—tobacco use: a pediatric disease [published correction appears in *Pediatrics*. 2010;125(4):861]. *Pediatrics*. 2009;124(5):1474–1487
  63. Best D; American Academy of Pediatrics, Committee on Environmental Health; Committee on Native American Child Health; Committee on Adolescence. Technical report—secondhand and prenatal tobacco smoke exposure. *Pediatrics*. 2009;124(5). Available at: [www.pediatrics.org/cgi/content/full/124/5/e1017](http://www.pediatrics.org/cgi/content/full/124/5/e1017)
  64. Rajegowda BK, Kandall SR, Falciglia H. Sudden unexpected death in infants of narcotic-dependent mothers. *Early Hum Dev*. 1978; 2(3):219–225
  65. Chavez CJ, Ostrea EM Jr, Stryker JC, Smialek Z. Sudden infant death syndrome among infants of drug-dependent mothers. *J Pediatr*. 1979;95(3):407–409
  66. Durand DJ, Espinoza AM, Nickerson BG. Association between prenatal cocaine exposure and sudden infant death syndrome. *J Pediatr*. 1990;117(6):909–911
  67. Ward SL, Bautista D, Chan L, et al. Sudden infant death syndrome in infants of substance-abusing mothers. *J Pediatr*. 1990;117(6):876–881
  68. Rosen TS, Johnson HL. Drug-addicted mothers, their infants, and SIDS. *Ann NY Acad Sci*. 1988;533:89–95
  69. Kandall SR, Gaines J, Habel L, Davidson G, Jessop D. Relationship of maternal substance abuse to subsequent sudden infant death syndrome in offspring. *J Pediatr*. 1993;123(1):120–126
  70. Fares I, McCulloch KM, Raju TN. Intrauterine cocaine exposure and the risk for sudden infant death syndrome: a meta-analysis. *J Perinatol*. 1997;17(3):179–182
  71. Ip S, Chung M, Raman G, Trikalinos TA, Lau J. A summary of the Agency for Healthcare Research and Quality's evidence report on breastfeeding in developed countries. *Breastfeed Med*. 2009;4(suppl 1):S17–S30
  72. Vennemann MM, Bajanowski T, Brinkmann B, et al; GeSID Study Group. Does breastfeeding reduce the risk of sudden infant death syndrome? *Pediatrics*. 2009;123. Available at: [www.pediatrics.org/cgi/content/full/123/3/e406](http://www.pediatrics.org/cgi/content/full/123/3/e406)
  73. Hauck FR, Thompson J, Tanabe KO, Moon RY, Vennemann M. Breastfeeding and reduced risk of sudden infant death syndrome: a meta-analysis. *Pediatrics*. 2011;128(1): 103–110
  74. American Academy of Pediatrics, Section on Breastfeeding. Breastfeeding and the use of human milk. *Pediatrics*. 2005;115(2): 496–506
  75. Fleming P, Gilbert R, Azaz Y, et al. Interaction between bedding and sleeping position in the sudden infant death syndrome: a population based case-control study. *BMJ*. 1990; 301(6743):85–89
  76. Ponsonby AL, Dwyer T, Gibbons LE, Cochrane JA, Jones ME, McCall MJ. Thermal environment and sudden infant death syndrome: case-control study. *BMJ*. 1992;304(6822): 277–282
  77. Ponsonby AL, Dwyer T, Gibbons LE, Cochrane JA, Wang YG. Factors potentiating the risk of sudden infant death syndrome associated with the prone position. *N Engl J Med*. 1993; 329(6):377–382
  78. Iyasu S, Randall LL, Welty TK, et al. Risk factors for sudden infant death syndrome among northern plains Indians. *JAMA*. 2002; 288(21):2717–2723
  79. Blair PS, Mitchell EA, Heckstall-Smith EM, Fleming PJ. Head covering: a major modifiable risk factor for sudden infant death syndrome: a systematic review. *Arch Dis Child*. 2008;93(9):778–783
  80. Stratton K, Almario DA, Wizemann TM, McCormick MC, eds; Immunization Safety Review Committee. *Immunization Safety Review: Vaccinations and Sudden Unexpected Death in Infancy*. Washington, DC: National Academies Press; 2003
  81. Mitchell EA, Stewart AW, Clements M, Ford RPK. Immunisation and the sudden infant death syndrome. New Zealand Cot Death Study Group. *Arch Dis Child*. 1995;73(6): 498–501
  82. Jonville-Béra AP, Autret-Leca E, Barbeillon F, Paris-Llado J; French Reference Centers for SIDS. Sudden unexpected death in infants under 3 months of age and vaccination status: a case-control study. *Br J Clin Pharmacol*. 2001;51(3):271–276
  83. Fleming PJ, Blair PS, Platt MW, Tripp J, Smith IJ, Golding J. The UK accelerated immunisation programme and sudden unexpected death in infancy: case-control study. *BMJ*. 2001;322(7290):822
  84. Hodgman JE, Hoppenbrouwers T. Home monitoring for the sudden infant death

- syndrome: the case against. *Ann NY Acad Sci.* 1988;533:164–175
85. Ward SL, Keens TG, Chan LS, et al. Sudden infant death syndrome in infants evaluated by apnea programs in California. *Pediatrics.* 1986;77(4):451–458
  86. Monod N, Plouin P, Sternberg B, et al. Are polygraphic and cardiopneumographic respiratory patterns useful tools for predicting the risk for sudden infant death syndrome? A 10-year study. *Biol Neonate.* 1986; 50(3):147–153
  87. Ramanathan R, Corwin MJ, Hunt CE, et al. Cardiorespiratory events recorded on home monitors: comparison of healthy infants with those at increased risk for SIDS. *JAMA.* 2001;285(17):2199–2207
  88. Laughlin J, Luerssen TG, Dias MS; American Academy of Pediatrics, Committee on Practice and Ambulatory Medicine, Section on Neurological Surgery. Clinical report—prevention and management of positional skull deformities in infants. *Pediatrics.* 2011; In press
  89. Willinger M, Ko CW, Hoffman HJ, Kessler RC, Corwin MJ. Factors associated with caregivers' choice of infant sleep position, 1994–1998: the National Infant Sleep Position Study. *JAMA.* 2000;283(16):2135–2142
  90. Brenner R, Simons-Morton BG, Bhaskar B, et al. Prevalence and predictors of the prone sleep position among inner-city infants. *JAMA.* 1998;280(4):341–346
  91. Von Kohorn I, Corwin MJ, Rybin DV, Heeren TC, Lister G, Colson ER. Influence of prior advice and beliefs of mothers on infant sleep position. *Arch Pediatr Adolesc Med.* 2010;164(4):363–369
  92. Joyner BL, Gill-Bailey C, Moon RY. Infant sleep environments depicted in magazines targeted to women of childbearing age. *Pediatrics.* 2009;124(3). Available at: [www.pediatrics.org/cgi/content/full/124/3/e416](http://www.pediatrics.org/cgi/content/full/124/3/e416)

**SIDS and Other Sleep-Related Infant Deaths: Expansion of Recommendations  
for a Safe Infant Sleeping Environment**

TASK FORCE ON SUDDEN INFANT DEATH SYNDROME

*Pediatrics*; originally published online October 17, 2011;

DOI: 10.1542/peds.2011-2284

**Updated Information &  
Services**

including high resolution figures, can be found at:  
<http://pediatrics.aappublications.org/content/early/2011/10/12/peds.2011-2284>

**Permissions & Licensing**

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:  
<http://pediatrics.aappublications.org/site/misc/Permissions.xhtml>

**Reprints**

Information about ordering reprints can be found online:  
<http://pediatrics.aappublications.org/site/misc/reprints.xhtml>

PEDIATRICS is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. PEDIATRICS is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2011 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 0031-4005. Online ISSN: 1098-4275.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

