

Bed Sharing, Co-sleeping and Sudden Infant Death Syndrome (SIDS): A Selected Annotated Bibliography

Ustunyurt E, Kaymak O, Iskender C, Ustunyurt OB, Celik C, Danisman N, Ruys JH, de Jonge GA, Brand R, Engelberts AC, Semmekrot BA.

Bed-sharing in the first four months of life: a risk factor for sudden infant death.
Acta Paediatr. 2007 Aug 20; [Epub ahead of print].

Aim: To investigate the risk of sudden infant death in the Netherlands during bed-sharing in the first half year of life and the protective effect of breastfeeding on it. **Methods:** During a 10-year period between September 1996 and September 2006 nationwide, 213 cot deaths were investigated. **Results and discussion:** Of 138 cot deaths of less than 6 months of age, 36 (26%) bed-shared. In a reference group of 1628 babies from infant welfare centres only 9.4% were bed-sharing in the night prior to the interview. After correction for smoking of one or both parents the odds ratio for cot death during bed-sharing with parents decreased with age from 9.1 (CI 4.2-19.4) at 1 month, to 4.0 (CI 2.3-6.7) at 2 months, to 1.7 (CI 0.9-3.4) at 3 months and to 1.3 (CI 1.0-1.6) at 4 through 5 months of age. The excess risk (OR > 1) associated with bed-sharing is itself not significantly influenced by the presence or absence of breastfeeding. **Conclusion:** Bed-sharing is a serious risk factor for sudden infant death for all babies of less than 4 months of age. From 4 months onwards bed-sharing did not contribute significantly to the risk of cot death anymore in our study.

Full-text available at: <http://www.blackwell-synergy.com/> (not a U.S. Government site)

Schluter PJ, Paterson J, Percival T.

Infant care practices associated with sudden infant death syndrome: Findings from the Pacific Islands Families study.
J Paediatr Child Health. 2007 May; 43(5):3488-93.

Aim: To report infant care practice prevalence for known modifiable sudden infant death syndrome (SIDS) risk factors among a generally disadvantaged yet low-SIDS rate population of mothers with Pacific infants. **Methods:** The Pacific Islands Families study follows a cohort of Pacific infants born at a large tertiary hospital in South Auckland, between 15 March and 17 December 2000. Maternal self-report of infant care practices was undertaken at interview 6 weeks post-partum. **Results:** Overall, 1376 mothers self-reported upon their care practices for infants with median age of 7 weeks. Current maternal smoking was reported by 29%. Of infants: 50% were fully breastfed; 1% were placed prone to sleep; 50% usually bed-shared with their mother and 12% usually bed-shared with a mother who smoked; and 94% usually and 1% occasionally slept in the same room as their mother. Except for room sharing (P = 0.09), there were significant

differences in these practices between the three major Pacific Island ethnic subgroups (all $P < 0.001$). Conclusion: Adoption of bed-sharing and room-sharing practices appears to be saving Pacific infants' lives, even though the New Zealand Cot Death Association has discouraged bed-sharing and not actively promoted room sharing. Mothers need to receive adequate information antenatally about the risks and benefits of room-sharing, bed-sharing and safe-sleeping practices and environments should they decide or have no option but to bed-share.

Full-text available at: www.blackwell-synergy.com (not a U.S. Government site)

Lahr MB, Rosenberg KD, Lapidus JA.

Maternal-infant bedsharing: risk factors for bedsharing in a population-based survey of new mothers and implications for SIDS risk reduction.

Matern Child Health J. 2007 May; 11(3):277-86.

OBJECTIVES: Maternal-infant bedsharing is a common but controversial practice. Little has been published about who bedshares in the United States. This information would be useful to inform public policy, to guide clinical practice and to help focus research. The objective was to explore the prevalence and determinants of bedsharing in Oregon.

METHODS: Oregon Pregnancy Risk Assessment Monitoring System (PRAMS) surveys a population-based random sample of women after a live birth. Women were asked if they shared a bed with their infant "always," "almost always," "sometimes" or "never."

RESULTS: 1867 women completed the survey in 1998-99 (73.5% weighted response rate). Of the respondents, 20.5% reported bedsharing always, 14.7% almost always, 41.4% sometimes, and 23.4% never. In multivariable logistic regression, Hispanics (adjusted odds ratio [ORa] 1.69, 95% Confidence Interval [CI] 1.17-2.43), blacks (ORa 3.11, 95% CI 2.03-4.76) and Asians/Pacific Islanders (ORa 2.14, 95% CI 1.51-3.03), women who breastfed more than 4 weeks (ORa 2.65, 95% CI 1.72-4.08), had annual family incomes less than \$30,000 (ORa 2.44, 95% CI 1.44-4.15), or were single (ORa 1.55, 95% CI 1.03-2.35) were more likely to bedshare frequently (always or almost always). Among Hispanic and black women, bedsharing did not vary significantly by income level. Bedsharing black, American Indian/Alaska Native and white infants were much more likely to be exposed to smoking mothers than Hispanic or Asian/Pacific Islander infants ($p < .0001$). **CONCLUSIONS:** Bedsharing is common in Oregon. The women most likely to bedshare are non-white, single, breastfeeding and low-income. Non-economic factors are also important, particularly among blacks and Hispanics. Campaigns to decrease bedsharing by providing cribs may have limited effectiveness if mothers are bedsharing because of cultural norms.

Horsley T, Clifford T, Barrowman N, Bennett S, Yazdi F, Sampson M, Moher D, Dingwall O, Schachter H, Cote A.

Benefits and harms associated with the practice of bed sharing: A systematic review.

Arch Pediatr Adolesc Med. 2007 Mar; 161(3):237-45.

Objective: To examine evidence of benefits and harms to children associated with bed sharing, factors (eg, smoking) altering bed sharing risk, and effective strategies for

reducing harms associated with bed sharing. Data Sources: MEDLINE, CINAHL, Healthstar, PsycINFO, the Cochrane Library, Turning Research into Practice, and Allied and Alternative Medicine databases between January 1993 and January 2005. Study Selection: Published, English-language records investigating the practice of bed sharing (defined as a child sharing a sleep surface with another individual) and associated benefits and harms in children 0 to 2 years of age. Data Extraction: Any reported benefits or harms (risk factors) associated with the practice of bed sharing. Data Synthesis: Forty observational studies met our inclusion criteria. Evidence consistently suggests that there may be an association between bed sharing and sudden infant death syndrome (SIDS) among smokers (however defined), but the evidence is not as consistent among nonsmokers. This does not mean that no association between bed sharing and SIDS exists among nonsmokers, but that existing data do not convincingly establish such an association. Data also suggest that bed sharing may be more strongly associated with SIDS in younger infants. A positive association between bed sharing and breastfeeding was identified. Current data could not establish causality. It is possible that women who are most likely to practice prolonged breastfeeding also prefer to bed share. Conclusion: Well-designed, hypothesis-driven prospective cohort studies are warranted to improve our understanding of the mechanisms underlying the relationship between bed sharing, its benefits, and its harms.

Full-text available at: <http://archpedi.ama-assn.org> (not a U.S. Government site)

Baddock SA, Galland BC, Taylor BJ, Bolton DP.

Sleep arrangements and behavior of bed-sharing families in the home setting.

Pediatrics. 2007 Jan; 119(1):e200-7.

Objectives: We aimed to provide a quantitative analysis of the sleep arrangements and behaviors of bed-sharing families to further understand the risks and benefits as well as the effects of infant age and room temperature on bed-sharing behaviors. Methods: Forty infants who regularly bed shared with > or = 1 parent > or = 5 hours per night were recruited. Overnight video of the family and physiological monitoring of the infant was conducted in infants' homes. Infant sleep position, potential for exposure to expired air, head covering and uncovering, breastfeeding, movements, family sleep arrangements, responses to the infant, and interactions were logged. Results: All infants slept with their mother. Fathers were included in 18 studies and siblings in 4. Infants usually slept beside the mother, separated from the father/siblings (if present), facing the mother, with head at mothers' breast level, touching, or with mother cradling. Median overnight breastfeeding duration was 40.5 minutes. Mothers commonly faced their infant, but infants were rarely in a position that potentially exposed them to maternal expired air. Fathers were seldom in contact with the infant during sleep. Of the 102 head-covering episodes observed in 22 infants, 80% were because of changes in adult sleep position. Sixty-eight percent of head uncovering was facilitated by the mother; half of these events were prompted by the infant. A 1 degree C increase in room temperature decreased infant head covering by 0.2 hours. Conclusions: The mother-infant relationship is of prime importance during bed sharing, whether the father is present or not. The focus around breastfeeding often dictates the sleep position of the infant and mother, though room temperature may also

influence this. In colder rooms infants tend to spend more time with their face covered by bedding. Frequent maternal interactions rely on the ability of the mother to arouse with little stimulation. Mothers, perhaps impaired by alcohol, smoking, or overtiredness, may not be able to respond appropriately.

Full-text available at: <http://www.pediatrics.org> (not a U.S. Government site)

Thoman EB.

Co-sleeping, an ancient practice: issues of the past and present, and possibilities for the future.

Sleep Med Rev. 2006 Nov 15; [E-pub ahead of print]

Co-sleeping-infants sharing the mother's sleep space-has prevailed throughout human evolution, and continued over the centuries of western civilization despite controversy and blame of co-sleeping mothers for the deaths of their infants. By the past century, "crib death" was recognized, later identified as Sudden Infant Death Syndrome (SIDS), and generally found to occur more frequently during bed sharing. Pediatricians warned parents of the dangers of SIDS and other risks of bed sharing, and the frequency of bed sharing decreased markedly over the years. However, during recent decades, bed sharing began to increase, though major issues were raised, including: whether bed sharing actually exacerbates or is protective against the occurrence of SIDS, whether the practice facilitates breast feeding, whether bed sharing is beneficial for an infant's development, and other concerns. Dissention may soon be diminished by use of a crib which opens at the mother's bed-side and is becoming a popular approach to mother-and-infant closeness through the night.

Full-text available at: <http://www.sciencedirect.com> (not a U.S. Government site)

Ostfeld BM, Perl H, Esposito L, Hempstead K, Hinnen R, Sandler A, Pearson PG, Hegyi T.

Sleep environment, positional, lifestyle, and demographic characteristics associated with bed sharing in sudden infant death syndrome cases: A population-based study.

Pediatrics. 2006 Nov; 118(5):2051-9.

Background: In 2005, the American Academy of Pediatrics Task Force on Sudden Infant Death Syndrome recommended that infants not bed share during sleep. Objective: Our goal was to characterize the profile of risk factors associated with bed sharing in sudden infant death syndrome cases. Design/Methods: We conducted a population-based retrospective review of sudden infant death syndrome cases in New Jersey (1996-2000) dichotomized by bed-sharing status and compared demographic, lifestyle, bedding-environment, and sleep-position status. Results: Bed-sharing status was reported in 239 of 251 cases, with sharing in 39%. Bed-sharing cases had a higher percentage of bedding risks (44.1% vs 24.7%), exposure to bedding risks in infants discovered prone (57.1% vs 28.2%), and lateral sleep placement (28.9% vs 17.8%). The prone position was more common for bed-sharing and non-bed-sharing cases at placement (45.8% and 51.1%, respectively) and discovery (59.0% and 64.4%, respectively). In multivariable logistic-

regression analyses, black race, mother <19 years, gravida >2, and maternal smoking were associated with bed sharing. There was a trend toward less breastfeeding in bed-sharing cases (22% vs 35%). In bed-sharing cases, those breastfed were younger than those who were not and somewhat more exposed to bedding risks (64.7% vs 45.1%) but less likely to be placed prone (11.8% vs 52.9%) or have maternal smoking (33% vs 66%). Conclusions: Bed-sharing cases were more likely to have had bedding-environment and sleep-position risks and higher ratios of demographic and lifestyle risk factors. Bed-sharing subjects who breastfed had a risk profile distinct from those who were not breastfed cases. Risk and situational profiles can be used to identify families in greater need of early guidance and to prepare educational content to promote safe sleep.

Full-text available at: <http://www.pediatrics.org> (not a U.S. Government site)

Mace S.

Where should babies sleep?

Community Pract. 2006 Jun; 79(6):180-3.

An average of six babies dies unexpectedly each week. Sudden infant death syndrome is the predominant cause but many deaths are recorded as unascertained. Medical experts continue to research the causes of these infant deaths, and advice to parents is constantly being evaluated and revised in an attempt to reduce the numbers even further. Bed sharing or co-sleeping is a topic that triggers debate and conflict of advice between health professionals, which may leave parents confused. Bed sharing is known to be dangerous when the mother smokes but there are other factors which are also dangerous and need to be considered before an informed decision is made. This article reviews some of the most relevant research in order to give health professionals the knowledge needed to aid parents in making their decision. Three main areas were studied because of their relevance to bed-sharing and sudden infant death syndrome. These were sleep position, smoking and alcohol consumption and breastfeeding. Recent concerns highlighting sofa sleeping are also considered.

Baddock SA, Galland BC, Bolton DP, Williams SM, Taylor BJ.

Differences in infant and parent behaviors during routine bed sharing compared with cot sleeping in the home setting.

Pediatrics. 2006 May; 117(5):1599-607.

Objectives: To observe the behavior of infants sleeping in the natural physical environment of home, comparing the 2 different sleep practices of bed sharing and cot sleeping quantifying to factors that have been identified as potential risks or benefits. Methods: Forty routine bed-sharing infants, aged 5-27 weeks were matched for age and season of study with 40 routine cot-sleeping infants. Overnight video and physiologic data of bed-share infants and cot-sleep infants were recorded in the infants' own homes. Sleep time, sleep position, movements, feeding, blanket height, parental checks, and time out of the bed or cot were logged. Results: The total sleep time was similar in both groups (bed-sharing median: 8.6 hours; cot-sleeping median: 8.2 hours). Bed-sharing infants spent most time in the side position (median: 5.7 hours, 66% of sleep time) and most

commonly woke at the end of sleep in this position, whereas cot-sleeping infants most commonly slept supine (median: 7.5 hours, 100%) and woke at the end of sleep in the supine position. Prone sleep was uncommon in both groups. Head covering above the eyes occurred in 22 bed-sharing infants and 1 cot-sleeping infant. Five of these bed-sharing infants were head covered at final waking time, but the cot-sleeping infant was not. Bed-sharing parents looked at or touched their infant more often (median: 11 vs 4 times per night) but did not always fully wake to do so. Movement episodes were shorter in the bed-sharing group as was total movement time (37 vs 50 minutes respectively), whereas feeding was 3.7 times more frequent in the bed-sharing group than the cot-sleeping group. Conclusions: Bed-share infants without known risk factors for sudden infant death syndrome (SIDS) experience increased maternal touching and looking, increased breastfeeding, and faster and more frequent maternal responses. This high level of interaction is unlikely to occur if maternal arousal is impaired, for example, by alcohol or overtiredness. Increased head covering and side sleep position occur during bed-sharing, but whether these factors increase the risk of SIDS, as they do in cot sleeping, requires further investigation.

Full-text available at: <http://www.pediatrics.org> (not a U.S. Government site)

McGarvey C, McDonnell M, Hamilton K, O'Regan M, Matthews T.

An 8 year study of risk factors for SIDS: bed-sharing versus non-bed-sharing.

Arch Dis Child. 2006 Apr; 91(4):318-23. E-pub 2005 Oct 21.

Background: It is unclear if it is safe for babies to bed share with adults. In Ireland 49% of sudden infant death syndrome (SIDS) cases occur when the infant is bed-sharing with an adult. Objective: To evaluate the effect of bed-sharing during the last sleep period on risk factors for SIDS in Irish infants. Design: An 8 year (1994-2001) population based case control study of 287 SIDS cases and 831 controls matched for date, place of birth, and sleep period. Odds ratios and 95% confidence intervals were calculated by conditional logistic regression. Results: The risk associated with bed-sharing was three times greater for infants with low birth weight for gestation (UOR 16.28 v 4.90) and increased fourfold if the combined tog value of clothing and bedding was ≥ 10 (UOR 9.68 v 2.34). The unadjusted odds ratio for bed-sharing was 13.87 (95% CI 9.58 to 20.09) for infants whose mothers smoked and 2.09 (95% CI 0.98 to 4.39) for non-smokers. Age of death for bed-sharing and sofa-sharing infants (12.8 and 8.3 weeks, respectively) was less than for infants not sharing a sleep surface (21.0 weeks, $p < 0.001$) and fewer bed-sharing cases were found prone (5% v 32%; $p = 0.001$). Conclusion: Risk factors for SIDS vary according to the infant's sleeping environment. The increased risk associated with maternal smoking, high tog value of clothing and bedding, and low z scores of weight for gestation at birth is augmented further by bed-sharing. These factors should be taken into account when considering sleeping arrangements for young infants.

Full-text available at: <http://adc.bmjournals.com/> (not a U.S. Government site)

Alm B, Lagercrantz H, Wennergren G.

Stop SIDS--sleeping solitary supine, sucking soother, stopping smoking substitutes.
Acta Paediatr. 2006 Mar; 95(3):260-2.

The recognition of prone sleeping and maternal smoking as modifiable risk factors for sudden infant death syndrome (SIDS), has drastically decreased SIDS incidence. However, during the last years other factors have become necessary to consider to further reduce the risk of SIDS. Side sleeping implies a greater risk than supine sleeping but is still common. Bed sharing may increase the risk of SIDS, while use of a pacifier seems to be protective. Replacement of maternal smoking with nicotine substitutes is not harmless. Conclusion: To further reduce the risk of SIDS, exclusive supine sleeping should be encouraged and side sleeping discouraged. When the breast-feeding is established, a pacifier can very well be used at bedtime. Bed sharing can increase the risk of SIDS if the infant is below 2-3 months of age, especially if the mother is a smoker. Any nicotine use should be avoided during pregnancy and breast-feeding.

Full-text available: <http://taylorandfrancis.metapress.com> (not a U.S. Government website)

Glasgow JF, Thompson AJ, Ingram PJ.

Sudden unexpected death in infancy: place and time of death.

Ulster Med J. 2006 Jan;75(1):65-71.

In recent years, many babies who die of Sudden Unexpected Death in Infancy (SUDI) in Northern Ireland are found dead in bed--i.e. co-sleeping--with an adult. In order to assess its frequency autopsy reports between April 1996 and August 2001 were reviewed and linked to temporal factors. The day and month of death, and the place where the baby was found were compared to a reference population of infant deaths between one week of age and the second birthday. Although the rate of SUDI was lower than the UK average, 43 cases of SUDI were identified, and two additional deaths with virtually identical autopsy findings that were attributed to asphyxia caused by suffocation due to overlaying. Thirty-two of the 45 (71%) were less than four months of age. In 30 of the 45 cases (67%) the history stated that the baby was bed sharing with others; 19 died sleeping in an adult bed, and 11 on a sofa or armchair. In 16 of the 30 (53%) there were at least two other people sharing the sleeping surface, and in one case, three. SUDI was twice as frequent at weekends (found dead Saturday-Monday mornings) compared to weekdays ($p < 0.02$), and significantly more common compared to reference deaths ($p < 0.002$). Co-sleeping deaths were also more frequent at weekends. Almost half of all SUDI (49%) occurred in the summer months--more than twice the frequency of reference deaths. While sharing a place of sleep per se may not increase the risk of death, our findings may be linked to factors such as habitual smoking, consumption of alcohol or illicit drugs as reported in case-control studies. In advising parents on safer childcare practices, health professionals must be knowledgeable of current research and when, for example, giving advice on co-sleeping this needs to be person-specific cognisant of the risks within a household. New and better means of targeting such information needs to be researched if those with higher risk life-styles are to be positively influenced.

Lahr MB, Rosenberg KD, Lapidus JA.

Bedsharing and maternal smoking in a population-based survey of new mothers.

Pediatrics. 2005 Oct; 116(4):e530-42.

Objective: Sudden infant death syndrome (SIDS) remains the number 1 cause of postneonatal infant death. Prone infant sleep position and maternal smoking have been established as risk factors for SIDS mortality. Some studies have found that bedsharing is associated with SIDS, but, to date, there is only strong evidence for a risk among infants of smoking mothers and some evidence of a risk among young infants of nonsmoking mothers. Despite the lack of convincing scientific evidence, bedsharing with nonsmoking mothers remains controversial. In some states, nonsmoking mothers are currently being told that they should not bedshare with their infants, and mothers of infants who died of SIDS are told that they caused the death of their infant because they bedshared. The objective of this study was to explore the relationship between maternal smoking and bedsharing among Oregon mothers to explore whether smoking mothers, in contrast to nonsmoking mothers, are getting the message that they should not bedshare. **Methods:** Oregon Pregnancy Risk Assessment Monitoring System surveys a stratified random sample, drawn from birth certificates, of women after a live birth. Hispanic and non-Hispanic black, non-Hispanic Asian/Pacific Islander and non-Hispanic American Indian/Alaskan Native women, and non-Hispanic white women with low birth weight infants are oversampled to ensure sufficient numbers for stratified analysis. The sample then was weighted to reflect Oregon's population. In 1998-1999, 1867 women completed the survey (73.5% weighted response). The median time from birth to completion of the survey was 4 months. Women were asked whether they shared a bed with their infant "always," "almost always," "sometimes," or "never." Frequent bedsharing was defined as "always" or "almost always"; infrequent was defined as "sometimes" or "never." **Results:** Of all new mothers, 35.2% reported bedsharing frequently (always: 20.5%; almost always: 14.7%) and 64.8% infrequently (sometimes: 41.4%; never: 23.4%). Bedsharing among postpartum smoking mothers was 18.8% always, 12.6% almost always, 45.1% sometimes, and 23.6% never; this was not statistically different from among nonsmoking mothers. Results for prenatal smokers were similar. When stratified by race/ethnicity, there was no association between smoking and bedsharing in any racial or ethnic group. In univariable and multivariable logistic regression, there were no statistical differences in frequent or any bedsharing among either prenatal or postpartum smoking mothers compared with nonsmokers; the adjusted odds ratio for postpartum smokers who frequently bedshared was 0.73 (95% confidence interval [CI]: 0.42-1.25) and for any bedsharing was 1.05 (95% CI: 0.57-1.94). Results for prenatal smoking were similar. This is the first US population-based study to look at the prevalence of bedsharing among smoking and nonsmoking mothers. Bedsharing is common in Oregon, with 35.2% of mothers in Oregon reporting frequently bedsharing and an additional 41.4% sometimes bedsharing. There was no significant association between smoking and bedsharing for either prenatal or postpartum smokers among any racial or ethnic group. Smoking mothers were as likely to bedshare as nonsmoking mothers. The frequency of bedsharing in Oregon was similar to estimates from other sources. Our study has the advantage of being a population-based sample drawn from birth certificates, weighted for nonresponse. **Conclusions:** Although a number of case series have raised concerns about the safety of

mother-infant bedsharing, even among nonsmoking mothers, this has not yet been confirmed by careful, controlled studies. There have been 9 large-scale case-control studies of the relationship between bedsharing and SIDS. Three case-control studies did not stratify by maternal smoking status, but found no increased risk for SIDS. Six case control studies reported results stratified by maternal smoking status: 1 study, while asserting an association, provided an unexplained range of univariable odds ratios without CIs; 3 found no increased risk for older infants of nonsmoking mothers; and 2 found a risk only for infants <8-11 weeks of age. Despite the preponderance of evidence that bedsharing by nonsmoking mothers does not increase the risk for SIDS among older infants, the recent specter of bedsharing as a cause of SIDS, based on uncontrolled case series and medical examiners' anecdotal experience, has led some medical examiners to label a death "suffocation" or "overlay asphyxiation" simply because the infant was bedsharing at the time of death. This "diagnostic drift" may greatly complicate future studies of the relationship between bedsharing and SIDS. Epidemiologic evidence shows that there is little or no increased risk for SIDS among infants of nonsmoking mothers but increased risk among infants of smoking mothers and younger infants of nonsmoking mothers. It seems prudent to discourage bedsharing among all infants <3 months old. Young infants brought to bed to be breastfed should be returned to a crib when finished. It would be worthwhile for other researchers to reanalyze their previous data to evaluate the consistency of the interaction of young infant age and bedsharing. Large controlled studies that include infants who are identified as dying from SIDS, asphyxia, suffocation, and sudden unexplained infant death, analyzed separately and in combination, are needed to resolve this and other issues involving bedsharing, including the problem of diagnostic drift. Recommendations must be based on solid scientific evidence, which, to date, does not support the rejection of all bedsharing between nonsmoking mothers and their infants. Cribs should be available for those who want to use them. Nonsmoking mothers should not be pressured to abstain from bedsharing with their older infants; they should be provided with accurate, up-to-date scientific information. Infants also should not co-sleep with nonparents. In Oregon, if not elsewhere, the message that smoking mothers should not bedshare is not being disseminated effectively. Because it is not known whether the risk caused by smoking is associated with prenatal smoking, postpartum smoking, or both, bedsharing among either prenatal or postpartum smokers should be strongly discouraged. Much more public and private effort must be made to inform smoking mothers, in culturally competent ways, of the very significant risks of mixing bedsharing and smoking. Public health practitioners need to find new ways to inform mothers and providers that smoking mothers should not bedshare and that putting an infant of a nonsmoking mother to sleep in an adult bed should be delayed until 3 months of age.

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<http://pediatrics.aappublications.org/cgi/reprint/116/4/e530>

(Not a U.S. Government Site)

Tappin D, Ecob R, Brooke H.

Bedsharing, roomsharing, and Sudden Infant Death Syndrome in Scotland: A case-control Study.

J Pediatr. 2005 Jul; 147(1):32-7.

Objective: To examine the hypothesis that bed sharing with an infant is associated with an increased risk of sudden infant death syndrome (SIDS). Study design: A 1:2, case: control study in Scotland UK, population 5.1 million, including 123 infants who died of SIDS between January 1, 1996 and May 31, 2000, and 263 controls. The main outcome measure was sharing a sleep surface during last sleep. Results: Sharing a sleep surface was associated with SIDS (multivariate OR 2.89, 95% CI 1.40, 5.97). The largest risk was associated with couch sharing (OR 66.9, 95% CI 2.8, 1597). Of 46 SIDS infants who bed shared during their last sleep, 40 (87%) were found in the parents' bed. Sharing a bed when <11 weeks (OR 10.20, 95% CI 2.99, 34.8) was associated with a greater risk, P = .010, compared with sharing when older (OR 1.07, 95% CI 0.32, 3.56). The association remained if mother did not smoke (OR 8.01, 95% CI 1.20, 53.3) or the infant was breastfed (OR 13.10, 95% CI 1.29, 133). Conclusions: Bed sharing is associated with an increased risk of SIDS for infants <11 weeks of age. Sharing a couch for sleep should be strongly discouraged at any age.

Full-text available at: <http://journals.elsevierhealth.com/periodicals/ympd>
(not a U.S. Government Site)

McKenna JJ, McDade T.

Why babies should never sleep alone: A review of the co-sleeping controversy in relation to SIDS, bedsharing and breast feeding.

Pediatr Respir Rev. 2005 Jun; 6(2): 134-52.

There has been much controversy over whether infants should co-sleep or bedshare with an adult caregiver and over whether such practices increase the risk of SIDS or fatal accident. However, despite opposition from medical authorities or the police, many western parents are increasingly adopting night-time infant caregiving patterns that include some co-sleeping, especially by those mothers who choose to breast feed. This review will show that the relationships between infant sleep patterns, infant sleeping arrangements and development both in the short and long term, whether having positive or negative outcomes, is anything but simple and the traditional habit of labeling one sleeping arrangement as being superior to another without an awareness of family, social and ethnic context is not only wrong but possibly harmful. We will show that there are many good reasons to insist that the definitions of different types of co-sleeping and bedsharing be recognized and distinguished. We will examine the conceptual issues related to the biological functions of mother-infant co-sleeping, bedsharing and what relationship each has to SIDS. At very least, we hope that the studies and data described in this paper, which show that co-sleeping at least in the form of roomsharing especially with an actively breast feeding mother saves lives, is a powerful reason why the simplistic, scientifically inaccurate and misleading statement 'never sleep with your baby' needs to be rescinded, wherever and whenever it is published.

Full-text available at: <http://www.sciencedirect.com> (not a U.S. Government site)

Blair P, Ward Platt MP, Smith IJ, Fleming PJ.

Sudden Infant Death Syndrome and sleeping position in pre-term and low birthweight infants: An opportunity for targeted intervention.

Arch Dis Child. 2005 May 24; [E-pub ahead of print]

Aims: Few families now place their infant prone to sleep but many still use the side position, despite strong evidence of a significant association with Sudden Infant Death Syndrome (SIDS). Some maternity hospital staff still advise the side position to parents of pre-term infants. We report the combined effects of SIDS risk factors in the sleeping environment for infants who were "small at birth" (i.e. pre-term [<37 weeks], low birthweight [<2500 g] or both). **Methods:** A three year population-based, case-control study, with parental interviews after each death and reference sleep of age-matched controls. Based in five former Health Regions in England (population 17.7 million) with 325 cases and 1300 controls. **Results:** Of the SIDS infants 26% were "small at birth" compared to 8% of the controls. The most common sleeping position was supine, both for controls (69%) and those SIDS infants (48%) born at term or ≥ 2500 g, but for "small at birth" SIDS infants the commonest sleeping position was side (48%). The combined effect of the risk associated with being "small at birth" and factors in the infant sleeping environment remained multiplicative despite controlling for possible confounding in the multivariate model. The risk of SIDS associated with being "small at birth" and being put down in the side position (multivariate OR=14.96[95% CI:5.10-43.93]), bed-sharing with parents who habitually smoke (multivariate OR=37.41[95% CI:5.83-239.86]) or being a routine dummy user who did not use a dummy for the last sleep (multivariate OR=17.50 [95% CI:6.14- 49.86]) were each more than multiplicative. For those "small at birth" SIDS who slept in a room separate from the parents the large combined effect (multivariate OR=79.45[95% CI: 18.03-350.20]) showed evidence of a significant interaction ($p=0.047$). No excess risk was identified from bed-sharing with non-smoking parents for infants born at term or birthweight ≥ 2500 g (multivariate OR=1.12[95% CI:0.30-4.27]). **Conclusion:** The combined effects of SIDS risk factors in the sleeping environment and being pre-term or low birthweight generate high risks for these infants. Their longer postnatal stay allows an opportunity to target parents and staff with risk reduction messages.

Full-text available at: <http://adc.bmjournals.com/> (Not a U.S. Government Site)

Alexander RT, Radisch D.

Sudden infant death syndrome risk factors with regards to sleep position sleep surface, and co-sleeping.

J Forensic Sci. 2005 Jan; 50(1):147-51.

We present a study of 102 Sudden Infant Death Syndrome (SIDS) deaths using retrospective review of medical examiner autopsy reports. The prevalence of sleep related risk factors with regards to sleep surface, sleep position, and co-sleeping were determined in a population of infants less than 1-year-old. Of the 102 SIDS deaths, 67 (65.7%) were not in a crib, 63 (61.8%) were prone, and 48 (47.1%) were co-sleeping. However, 94 (92.2%) of these deaths had at least one risk factor present. Only 8 (7.8%) infants had

slept alone, in a crib or bassinet, and on their back or side. Infants less than 4-months-old had a higher rate of co-sleeping (54.7%) than the older infants (25.9%), and a higher frequency of heart malformations at post-mortem examination. The older infants were more likely to exhibit pulmonary and tracheal inflammation, and neuropathology.

Full-text available at: http://journalsip.astm.org/JOURNALS/FORENSIC/jofs_home.html
(not a U.S. Government site)

Bredemeyer SL.

Implementation of the SIDS guidelines in midwifery practice.

Aust J Midwifery. 2004 Nov; 17(4):17-21.

The literature suggests that midwives strongly influence parenting practices immediately after birth and during early postnatal management of the newborn. Midwives must therefore be aware of the current evidence and public health recommendations for reducing the risk of Sudden Infant Death Syndrome (SIDS) and provide consistent information about use of the supine position. Midwives must also include information about environmental factors that are also known to increase the risk of SIDS such as exposure to cigarette smoke, covering the infant's face during sleep and other potential unsafe sleeping practices such as co-sleeping and bed sharing with their infant. The position midwives use to settle infants and place them for sleep is an important example for parents. The position favored by midwives when placing a newborn to sleep will have a significant impact on parental practice after discharge home. A standardized evidenced based approach to the SIDS Guidelines immediately after birth will facilitate consistency in practice and uniformity in the message parents are given about safe sleeping practices for their newborn infant.

Mesich HM.

Mother-infant co-sleeping: understanding the debate and maximizing infant safety.

MCN Am J Matern Child Nurs. 2005 Jan-Feb; 30(1): 30-7;

Mother-infant co-sleeping is debated fervently in the research literature. While studies abound, there is no precise answer to this conundrum, and parents continue to ask nurses for their best opinions about the safety of co-sleeping. The puzzling results of these studies have occurred partly because of: (1) retrospective study designs, (2) lack of control over covariables, (3) misclassification of infant deaths, and (4) unknown prevalence of co-sleeping practices. This article describes the salient issues nurses need to understand in the mother-infant co-sleeping debate, and suggests ways that nurses can help parents to modify risk factors and safety measures if they desire co-sleeping.

Full-text available at: <http://www.mcnjournal.com> (not a U.S. Government site)

Carpenter RG, Irgens LM, Blair PS, England PD, Fleming P, Huber J, Jorch G, Schreuder P.

Sudden unexplained infant death in 20 regions in Europe: Case control study.

Lancet. 2004 Jan 17; 363(9404):185-91.

Background: After striking changes in rates of sudden unexplained infant death (SIDS) around 1990, four large case-control studies were set up to re-examine the epidemiology of this syndrome. The European Concerted Action on SIDS (ECAS) investigation was planned to bring together data from these and new studies to give an overview of risk factors for the syndrome in Europe. Methods: We undertook case-control studies in 20 regions. Data for more than 60 variables were extracted from anonymised records of 745 SIDS cases and 2411 live controls. Logistic regression was used to calculate odds ratios (ORs) for every factor in isolation, and to construct multivariate models. Findings: Principal risk factors were largely independent. Multivariately significant ORs showed little evidence of intercentre heterogeneity apart from four outliers, which were eliminated. Highly significant risks were associated with prone sleeping (OR 13.1 [95% CI 8.51-20.2]) and with turning from the side to the prone position (45.4 [23.4-87.9]). About 48% of cases were attributable to sleeping in the side or prone position. If the mother smoked, significant risks were associated with bed-sharing, especially during the first weeks of life (at 2 weeks 27.0 [13.3-54.9]). This OR was partly attributable to mother's consumption of alcohol. Mother's alcohol consumption was significant only when baby bed-shared all night (OR increased by 1.66 [1.16-2.38] per drink). For mothers who did not smoke during pregnancy, OR for bed-sharing was very small (at 2 weeks 2.4 [1.2-4.6]) and only significant during the first 8 weeks of life. About 16% of cases were attributable to bed-sharing and roughly 36% to the baby sleeping in a separate room. Interpretations: Avoidable risk factors such as those associated with inappropriate infants' sleeping position, type of bedding used, and sleeping arrangements strongly suggest a basis for further substantial reductions in SIDS incidence rates.

Full-text available at: <http://www.thelancet.com> (not a U.S. Government site)

McCoy RC, Hunt CE, Lesko SM, Vezina R, Corwin MJ, Willinger M, Hoffman HJ, Mitchell AA.

Frequency of bed sharing and its relationship to breastfeeding.

J Dev Behav Pediatr. 2004 Jun; 25(3):141-9.

Bed sharing has been promoted as facilitating breastfeeding but also may increase risks for sudden, unexpected infant deaths. This prospective cohort study was performed to determine the prevalence of adult and infant bed sharing and its association with maternal and infant characteristics. Demographic data were collected from 10,355 infant-mother pairs at birth hospitals in Eastern Massachusetts and Northwest Ohio, and follow-up data were collected at 1, 3, and 6 months by questionnaire. Associations with bed sharing were estimated using odds ratios and 95% confidence intervals from multiple logistic regression models while adjusting for confounding variables. At 1, 3, and 6 months, 22%, 14%, and 13% of infant-mother pairs shared a bed, respectively. On multivariate analysis, race/ethnicity and breastfeeding seemed to have the strongest association with bed sharing. These factors need to be considered in any comprehensive risk to benefit analysis of bed sharing.

Full-text available at: <http://www.jrnldbp.com> (not a U.S. Government site)

Sebire NJ, Talbert D.

Alveolar septal collapse in the transitional infant lung: A possible common mechanism in sudden unexpected death in infancy.

Med Hypotheses. 2004; 63(3):485-93.

Sudden unexpected death in infancy (SUDI) is a category used to represent the largest single group of infant deaths. Although there are several theories, the cause of SUDI remains unknown and the mechanism of co-sleeping associated deaths are also undetermined. We investigate a possible biomechanical mechanism which may be common in SUDI and may provide an explanation for the association of the known risk factors for SUDI such as co-sleeping, prematurity, prone sleeping position, over wrapping, overheating and maternal smoking. The neonatal lung has few, if any, true septa but from about four weeks of age, a period of rapid alveolarisation commences. The developing alveolar walls (septa) have little fibre support against surface tension forces as they grow but are supported by a double layer of capillaries. Until the elastin/collagen supporting network is laid down these nascent septal walls are vulnerable to collapse against sac or duct walls during this transitional period. We hypothesize that such collapse will prevent one side of the septa, and the wall it overlays, from alveolar gas exchange and a functional left-right shunt is formed which may result in hypoxia. Furthermore, lung stretch receptors in bronchi running through or adjacent to collapsed regions will be activated, falsely signaling lung inflation to the brain stem with resultant respiratory inhibition, so precipitating further collapse. The process will continue until lung volume falls below residual capacity, when normal tidal breathing efforts will no longer result in significant air flow, even if stretch receptor signals have not produced complete apnoea. Large inspiratory efforts are then required to break the surface tension seal, which damages capillaries to produce petechial hemorrhages. Many epidemiological risk factors for SUDI could influence such a mechanism, leading to the proposal that Alveolar Septal Collapse in Infancy (ASCI) is a core mechanism via which these factors act.

Full-text available at: <http://www.sciencedirect.com> (not a U.S. Government site)

Hill SA, Hjelmeland B, Johannessen NM, Irgens LM, Skjaerven R.

Changes in parental risk behaviour after an information campaign against sudden infant death syndrome (SIDS) in Norway.

Acta Paediatr. 2004 Feb; 93(2): 250-4.

Aim: To assess parental risk behaviour before and after a sudden infant death syndrome (SIDS) information campaign with special emphasis on associations with maternal age, education, marital status and birth order. Methods: Data from questionnaires sent to all mothers who gave birth in Norway during a period before the campaign were compared with corresponding data obtained after the campaign. Results: Prevalence of non-supine sleeping position decreased from 33.7% to 13.6% while changes in smoking, non-breastfeeding and co-sleeping were disappointing. Risk factors were particularly prevalent in young mothers, but also in mothers with a minimum period of education,

non-cohabitation and at birth order 2+. Conclusions: Non-supine sleeping decreased to a level that has never been reported before. In future campaigns, subgroup-specific measures may be needed.

Full-text available at: <http://www.ingentaconnect.com> (not a U.S. Government site)

Keller MA, Goldberg WA.

Co-sleeping: Help or hindrance for young children's independence?

Infant and Child Development. 2004; 13: 369-388.

This study investigated the relationship between sleep arrangements and claims regarding possible problems and benefits related to co-sleeping. Participants were 83 mothers of preschool-aged children. Data were collected through parent questionnaires. Early co-sleepers (who began co-sleeping in infancy), reactive co-sleepers (children who began co-sleeping at or after age one), and solitary sleepers were compared on the dimensions of maternal attitudes toward sleep arrangements; night wakings and bedtime struggles; children's self-reliance and independence in social and sleep-related behaviours; and maternal autonomy support. The hypothesis that co-sleeping would interfere with children's independence was partially supported: solitary sleepers fell asleep alone, slept through the night, and weaned earlier than the co-sleepers. However, early co-sleeping children were more self-reliant (e.g. ability to dress oneself) and exhibited more social independence (e.g. make friends by oneself). Mothers of early co-sleeping children were least favourable toward solitary sleep arrangements and most supportive of their child's autonomy, as compared to mothers in other sleep groups. Reactive co-sleepers emerged as a distinct co-sleeping sub-type, with parents reporting frequent night wakings and, contrary to early co-sleepers, experiencing these night wakings as highly disruptive. Implications for parents and pediatricians are discussed.

Full-text available at: <http://www3.interscience.wiley.com/cgi-bin/abstract/109800771/ABSTRACT> (not a U.S. Government site)

Matthews T, McDonnell M, McGarvey C, Loftus G, O'Regan M.

A multivariate "time based" analysis of SIDS risk factors.

Arch Dis Child. 2004 Mar; 89(3): 267-71.

Aims: To investigate the influence of analytical design on the variability of published results in studies of sudden infant death syndrome (SIDS). Methods: The results of a prospective case-control study, of 203 cases of SIDS, and 622 control infants are presented. All variables significant on univariate analysis were included in a multivariate model analysed in nine stages, starting with sociodemographic variables, then sequentially and cumulatively adding variables relating to pregnancy history, current pregnancy, birth, the interval from birth to the week prior to death, the last week, the last 48 hours, and the last sleep period. A ninth stage was created by adding placed to sleep prone for the last sleep period. Results: As additional variables are added, previously published SIDS risk factors emerged such as social deprivation, young maternal age, > or =3 previous live births, maternal smoking and drinking, urinary tract infection

in pregnancy, reduced birth weight, and the infant having an illness, regurgitation, being sweaty, or a history of crying/colic in the interval from birth to the week before death, with co-sleeping and the lack of regular soother use important in the last sleep period. As the model progressed through stages 1-9, many significant variables became non-significant (social deprivation, young maternal age, maternal smoking and drinking) and in stage 9 the addition of placed to sleep prone for the last sleep period caused ≥ 3 previous live births and a reduced birth weight to become significant. Conclusion: The variables found to be significant in a case-control study, depend on what is included in a multivariate model.

Full-text available at: <http://adc.bmjournals.com/> (not a U.S. Government site)

Vemulapalli C, Grady K, Kemp JS.

Use of safe cribs and bedroom size among African American infants with a high rate of bed sharing.

Arch Pediatr Adolesc Med. 2004 Mar; 158(3): 286-9.

Background: Impoverishment and crowding are associated with an increased risk of sudden unexpected death among infants. Bed sharing likely increases this risk, particularly among African American infants. Objectives: To compare the sleep environment of African American infants who bed share with that of infants who do not share sleep surfaces and to compare access to a safe crib, and the space available for it, in the sleeping rooms of both groups of infants. Methods: Home visits were made at approximately age 2 weeks to the homes of serially enrolled African American infants born between July 15, 2001, and November 1, 2001. Questionnaires were used to survey sleep practices, especially sleep surface used. The area of the floor space of rooms used for sleeping was calculated. A portable crib was provided for infants lacking access to safe sleep surfaces. Results: Of these infants, 42 (41%) usually bed shared and 60 (59%) slept alone. The areas of the floor spaces were similar (mean \pm SD, 13.8 \pm 3.3 m²) for bed sharers vs 12.7 \pm 3.7 m²) for those who slept alone; 95% CI for difference, -0.34 to 2.51 m²). Infants sleeping alone were much more likely to have access to a safe crib (51 of 60 vs 13 of 42; $P < .001$), and 53 cribs were provided. Follow-up telephone calls made at approximately age 7 months to 43.4% of recipients suggested that the cribs were used on most nights, were durable, and were enthusiastically received. Conclusions: Crowding is not a strong explanation for bed sharing among impoverished African American infants in St Louis, Mo, who often bed share because there is not a safe crib available. Providing safe cribs may reduce the prevalence of bed sharing.

Full-text available at: <http://archpedi.ama-assn.org/> (not a U.S. Government site)