Reducing the Risk of Sudden Infant Death Syndrome

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No Conflicts of Interest to Disclose
POLICY STATEMENT

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

abstract

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 ill-defined or unspecified causes of death have increased, particularly since the AAP published its last update in 2005. It has become increasingly important to consider these causes of sleep-related infant death. Many of the notifiable risk factors for SIDS and suffocation are also relevant to these other causes of death. The current AAP recommendations focus only on SIDS to focusing on a safe sleep environment.

Most infants with risk factors will not die from SIDS.

Some infants without risk factors will die from SIDS.

However, infants with risk factors are at increased risk of dying from SIDS.
AAP Recommendation #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.

Side sleeping is not safe and is not advised.

Prone sleeping was advocated in Western societies to reduce the risks from spitting up.
Prone Sleeping Dangerous?

- A visionary and courageous SIDS researcher, Shirley L. Tonkin, first advocated back sleeping in 1972.
- It took 20-years before her findings were accepted, and Back to Sleep campaigns began in the U.S.

Shirley L. Tonkin
Auckland University, Auckland, New Zealand.
Prone Sleeping and SIDS
(Odds Ratios vs Non-Prone Sleeping)

National Infant Sleep Position Study (U.S.A.)


U.S. Prone Sleeping and SIDS Rate

SIDS Risk Odds Ratio vs Supine Sleep Position

SIDS Risk Odds Ratio vs Supine Sleep Position

Supine

Prone

**Unaccustomed Prone Sleeping ↑ SIDS Risk**

- 1987-1990, case control study in New Zealand.
- 20% of SIDS deaths involved lack of experience with prone position.

**Graph:**
- 485 SIDS
- 1,800 Controls

**Chart:**
- Routine Supine Sleeper
- Routine Prone Sleeper
- Unaccustomed Prone Sleep

**Reference:**
• 1,916 SIDS deaths.
• 20.4% of SIDS deaths occurred in Child Care (7% expected).
• Usual sleep position supine or side at home.

Infant Deaths by “Body Position When Placed” California 2003 SUID Data

California Department of Health Services, MCAH/OFP, September 2005
Infant Deaths by “Body Position When Found” California 2003 SUID Data

California Department of Health Services, MCAH/OFP, September 2005
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.

Use safe firm mattresses, free of hazards, not in adult beds. Sitting devices are not recommended for routine sleep.


SIDS Odds Ratio vs No Exposure

- Soft Bedding
- Pillows


SIDS Odds Ratio vs No Exposure

- Any Pillow
- Soft Underlay
- Duvet >820 gm

Room-sharing without bedsharing is recommended---There is evidence that this arrangement decreases the risk of SIDS by as much as 50%. 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.

Early Study of Maternal Overlaying

- In 1892, a Scottish police surgeon, Templeman, was the first to draw attention to the potential role of excessive alcohol consumption and overlaying.
- 258 cases of suffocation in infants.
- More than half of deaths occurred Saturday night.
- Postulated that intoxication impaired arousal responses of parents sleeping with infants, thus increasing the risk of accidental suffocation.

Is Mother-Infant Bedsharing Harmful?

• Concern about maternal overlaying since Biblical times.

• In 18th century France, a wood and metal cage --- *arcuccio* --- was placed over a bedsharing infant to prevent overlaying.

• Epidemiological studies suggest an increased risk of *SIDS* or death in infants who bedshare, especially with parental smoking.

Arcuccio, ~1730
Is Mother-Infant Bedsharing Protective?

- Preferred sleeping position throughout human history and for most contemporary people.
- Provides optimal nutrition by promoting night-time breastfeeding.
- Bedsharing may alter or synchronize sleep patterns of the mother and baby.
- Is there some survival advantage for human infants to bedshare with their mothers?

Cosleeping refers to any and all sleeping arrangements in which the infant and a committed caregiver, usually but not exclusively or always the mother, remain in sensory proximity and/or contact, permitting the mutual exchange of sensory signals or stimuli (i.e., vision, hearing, touch, smells, movements, etc.).

• **Bedsharing:** Infant and another person(s) sharing the same sleeping surface; i.e., both in the same bed.

• **Cosleeping:** This term is ambiguous with respect to defining *location* where the infant sleeps, as it has been used to indicate either bedsharing, or roomsharing, or both.

• **Roomsharing:** Infant and another person(s) sleep in the same room with or without bedsharing.

• **Roomsharing but not bedsharing:** Infant and another person(s) sleep in the same room, but not on the same sleeping surface.


Bedsharing in Oregon, 1998-1999


n = 1,844
Infant Bedsharing in Los Angeles County

<table>
<thead>
<tr>
<th>Ethnicity</th>
<th>Infants who Ever Bedshared (%)</th>
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<tbody>
<tr>
<td>All</td>
<td>79.1</td>
</tr>
<tr>
<td>White</td>
<td>67.1</td>
</tr>
<tr>
<td>Latina</td>
<td>80.3</td>
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<tr>
<td>Afr-Am</td>
<td>87.6</td>
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<td>API</td>
<td>85.3</td>
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</table>

n = 6,246

Los Angeles Mommy and Baby (LAMB) Project, 2007
National Child and Adolescent Health Research, Evaluation, and Planning Unit
Los Angeles County Department of Public Health
Health Resources and Services Administration (HRSA) R40MC06635
Mother-Infant Bedsharing Increases Breastfeeding vs Sleeping in a Different Room

Episodes of Successful Breastfeeding per hour

Bedshare: 1.2
Side Car Crib: 1.3
Separate Crib: 0.5

p<0.02

Mother-Infant Bedsharing


James J. McKenna, Ph.D.
Professor and Chair
Department of Anthropology
University of Notre Dame
Mother-Infant Bedsharing


Arousal which Overlap (%)

- **Infant**
- **Mother**

- Solitary
- Solitary
- Bedshare

James J. McKenna, Ph.D.
Professor and Chair
Department of Anthropology
University of Notre Dame
Bedsharing, Breathing, and Infant Sleep

• Increased breastfeeding.
• No decrease in apnea.
• No stimulation of breathing.
• Increase in arousals (baby wakes mother).
• Decrease in deep sleep.
• No apparent physiological protection.

SIDS in Ireland, 1994-1998

- 203 SIDS.
- 622 controls.


- 123 SIDS.
- 263 controls.


<table>
<thead>
<tr>
<th>Condition</th>
<th>Odds Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>No Bedshare, No Smoking</td>
<td>1</td>
</tr>
<tr>
<td>No Bedshare, Smoking</td>
<td>1.3</td>
</tr>
<tr>
<td>Bedshare, No Smoking</td>
<td>1.3</td>
</tr>
<tr>
<td>Bedshare AND Smoking</td>
<td>5.0</td>
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</tbody>
</table>

SIDS = 127
Controls = 922

Bedsharing and SIDS Risk: CESDI Study
(Odds Ratios vs did not sleep with an adult)


Bedshare, but return to cot
Bedshare Whole Night
Bedshare on Sofa
Separate Room

SIDS = 325
Controls = 1300
Infant Deaths by “Sleeping Alone or With Others” California 2003 SUID Data

California Department of Health Services, MCAH/OFP, September 2005
Two Distinct Bedsharing Subgroups

**Elective:**
- Breast feeders
- Non-smokers
- Firm mattress

**Non-Elective:**
- Bottle fed
- Smokers
- Risk ‘factors’

**Less Risk**

**High Risk**

Roomsharing

• Infant’s crib or bassinet should be placed in the parents’ bedroom close to the parents’ bed.

• Removes the possibility of suffocation, strangulation, or entrapment which may occur with the infant in an adult bed.

• Allows close parent proximity to facilitate feeding, comforting, and monitoring the infant.

*Pediatrics, 128: 1030-1039, 2011.*
Roomsharing

- Infant can be brought to bed for breastfeeding, but then returned to the crib.
- Devices promoted to make bedsharing “safe” are not recommended.
- Because of the extremely high risk of bedsharing on a sofa or armchair, infants should not be fed on a sofa or armchair when there is a high likelihood of the parent falling asleep.

*Pediatrics, 128: 1030-1039, 2011.*
Roomsharing

- No studies have shown bedsharing to be safe or protective against SIDS.
- All risks associated with bedsharing, such as parent fatigue, cannot be controlled.
- Therefore, the AAP does not recommend any specific bedsharing situations as safe.
- Provide separate sleep areas for twins, triplets, etc.

*Pediatrics, 128: 1030-1039, 2011.*
Bedsharing is Unsafe with:

- Infant <3-months of age.
- Parent cigarette smoking.
- Parent is excessively tired; such as sleep deprivation (<4-hours sleep the previous night).
- Parent depressant medication or alcohol use.
- With non-parent or multiple persons.
- Soft or unsafe bed.
- Duvets, pillows, or soft covers.
- Sleeping on a sofa, armchair, or couch.

AAP Recommendations

- Room-sharing, with the infant in a crib in the parents’ room next to the adult bed, is safest, and is safer than bedsharing.
- Infants brought to bed for breastfeeding should return to a separate crib.
- Do not bedshare if parents smoke cigarettes.
- Do not bedshare if the parents’ arousal is depressed (alcohol, drugs, sleep deprived <4-hours sleep the night before).
- Do not sleep with an infant on a sofa or chair.

AAP Recommendation #4

Keep soft objects and loose bedding out of the crib to reduce the risk of SIDS, suffocation, entrapment, and strangulation.

Avoid Soft Objects and Bedding

- Soft objects (pillows, pillow-like toys, quilts, comforters, and sheepskins) should not be used.
- Loose bedding (blankets and sheets) might be hazardous, and should not be used.
- Bumper pads are not recommended.
- Infant sleep clothing designed to keep the infant warm without the possible hazard of head covering or entrapment should be used.

Pregnant women should receive regular prenatal care---There is substantial epidemiological evidence linking a lower risk of SIDS for infants whose mothers obtain regular prenatal care.

Odds Ratio for SIDS vs Infants Without these Prenatal Risk Factors

Late or No Prenatal Care

838 SIDS
1,676 Controls

2.5

According to repeated nationwide surveys, More Doctors Smoke CAMELS than any other cigarette!

Doctors in every branch of medicine were asked, "What cigarette do you smoke?" The brand named most was Camel.

You’ll enjoy Camels for the same reason so many doctors smoke them. Camels have cool, mild tobacco, pack after pack, and a flavor unmatched by any other cigarette.

Make this remarkable test: smoke only Camels for 30 days and see how well Camels please your taste, how well they suit your smoking habits. You’ll see how enjoyable a cigarette can be.

The Doctors’ Choice is America’s Choice!

For 30 days, test Camels in your "T-Zone" (T for Throat, T for Taste).
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.

SIDS and Maternal Smoking During Pregnancy


![Graph showing the SIDS Odds Ratio vs No Smoking based on the number of cigarettes smoked per day. The graph indicates a higher SIDS risk with increasing smoking.](image-url)
SIDS and Parent Postnatal Cigarette Smoking

SIDS and Infant Exposure to Cigarette Smoke

P. Fleming & P. Blair

SIDS Odds Ratio vs No Exposure

Hours of Cigarette Exposure per Day

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.

19 SIDS in 2,143 ISAM (8.87/1000)
396 SIDS in 325,372 infants (1.22/1000)

Odds Ratio of SIDS in Infants of Substance Abusing Mother vs No Prenatal Drug Exposure

- Any Drug: 7.39
- Cocaine: 6.87
- Opiates: 15.1
- PCP: 3.07


- Periconceptual Alcohol Use: 6.2
- 1st Trimester Binge Drinking: 8.2
Breastfeeding is recommended.

The protective effect of breastfeeding increases with exclusivity. However, any breastfeeding has been shown to be more protective against SIDS than no breastfeeding.

Breastfeeding and SIDS in Germany

![Odds Ratio vs Not Breastfeeding](chart)

Meta-Analysis of Breastfeeding and SIDS

Breastfeeding in Los Angeles County

Mothers who did Any Breastfeeding (%)

- All: 85.2
- White: 89.8
- Latina: 83.4
- Afr-Am: 79.4
- API: 91.7

n = 6,246

Los Angeles Mommy and Baby (LAMB) Project, 2007
National Child and Adolescent Health Research, Evaluation, and Planning Unit
Los Angeles County Department of Public Health
Health Resources and Services Administration (HRSA) R40MC06635
Breastfeeding in Los Angeles County

Geographic Breastfeeding Rates among Children Born in 2000
National Immunization Survey, Center for Disease Control and Prevention

N=167

Percent of Infants who Breastfeed

Ever: 81.3%
At 6-months: 39.2%
At 12-months: 11.5%
Consider offering a pacifier at naptime and bedtime---Although the mechanism is yet unclear, studies have reported a protective effect of pacifiers on the incidence of SIDS.

Pacifiers

- Mechanism of protection not known.
- The protective effect persists throughout the night, even if the pacifier falls out of the infant’s mouth.
- If the infant refuses the pacifier, it should not be forced.
- Because of the risk of strangulations, pacifiers should not be tied around the infant’s neck to attached to clothing.

*Pediatrics, 128: 1030-1039, 2011.*
• Objects such as stuffed toys, which might present a suffocation or choking hazard, should not be attached to pacifiers.

• For breastfeeding infants, delay pacifier introduction breastfeeding has been firmly established (usually 3-4 wks).

• No evidence that finger sucking reduces SIDS risk.

*Pediatrics, 128: 1030-1039, 2011.*
Avoid overheating---Infants should be dressed appropriately for the environment (no more than one layer of clothing).

Parents and caregivers should evaluate the infant for signs of overheating (sweating, or chest feels hot to the touch).

Overbundling and covering the face or head should be avoided.

Odds Ratios for SIDS vs Controls

- Wearing a Hat
- Electric Blanket
- Thick Quilt
- Hot Water Bottle
- Heater in Room

Infants should be immunized in accordance with recommendations of the AAP and CDCP—There is no evidence that there is a causal relationship between immunizations and SIDS. Infants should also received regular well-child check-ups.

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.

Commercial Devices to *Reduce the Risk of SIDS*

- These, and other devices, have not been tested for safety or efficacy.
Infant Sleep Positioners Pose Suffocation Risk

Advice for Consumers

• STOP using infant sleep positioning products. Using this type of product to hold an infant on his or her side or back is dangerous and unnecessary.

• NEVER put pillows, sleep positioners, comforters, or quilts under the baby or in the crib.

• ALWAYS place an infant on his or her back at night and during nap time.


Two government agencies are warning parents and other caregivers not to put babies in sleep positioning products as two recent deaths underscore concerns about suffocation.

In addition to the deaths, the commission has received dozens of reports of babies who were placed on their back or side in the positioners only to be found later in hazardous positions within or next to the product. “We urge parents and caregivers to take our warning seriously and stop using these products,” the information suggests the positioners pose a risk of suffocation. As a result, FDA is requiring makers of FDA-cleared sleep positioners to submit...
Do not use home cardiorespiratory monitors as a strategy to reduce the risk of SIDS.

There is no evidence that the use of such home monitors decreases the incidence of SIDS.

Rate of at least 1 extreme event

PCA (weeks) at beginning of 4-week observation period

Supervised awake *tummy time* is recommended to facilitate development and to minimize development of positional plagiocephaly.

Positional Plagiocephaly increases to 4-months of age, but the majority of cases resolve by 2-years of age.

To Avoid Positional Plagiocephaly

- Encourage *Tummy Time* when the infant is awake and observed.
- Avoid excessive time in car seat carriers and bouncers.
- Alternate the supine head position during sleep.

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.

Infant Sleep Position Choice of Nursery Staff in Hospital Normal Newborn Nurseries

N = 96 nurses

Infant Sleep Position *Modeled* by Nursery Staff in Hospital Normal Newborn Nurseries

Usual Supine Sleep Positioning by Mothers Reception of Nursery Staff Recommendations and/or Modeling

- R = Recommendation
- M = Modeling

N = 579 mothers

Motivations for *Side* Infant Placement Choice Among Nursery Staff

- **Fear of Aspiration**: 91%
- **Personal Knowledge**: 41%
- **Written Policy**: 5%
- **Verbal Policy**: 6%
- **Physician Instruction**: 3%
- **Head Nurse Instruction**: 3%

*n=96 nurses*

Infants that “spit-up”

n = 3,240 neonates

Healthy Newborn Infants (%)

Awake: 3.7%
Asleep: 3.4%

Interventions for Infants who “spit-up” while Asleep

Events (%) Requiring Intervention

- None
- Bulb syringe
- Stimulation
- Wall Suction

Supine (n=130)
Side (n=12)

n = 142 events

Media and manufacturers should follow safe sleep guidelines in their messaging and advertising.

Media and advertising messages contrary to safe sleep recommendations might create misinformation about safe sleep practices.

Misinformation about Safe Sleep Practices

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.

Primary Care Physicians Do Not Discuss SIDS Risk Reduction

Behavior can Reduce SIDS

Knows Back Sleep Safest

Should Discuss SIDS Risk

Do Discuss SIDS Risk

Give Written Material

N = 214

The majority of SIDS victims have $\geq 1$ Risk Factor

SIDS is known as the cause of death because biology interacts with the environment.

- Clear evidence of suffocation, entrapment, etc.
  - Dx: Accidental

- Some Risk Factors, but would not cause death in all infants.
  - Dx: Variable

- No Risk Factors.
  - Dx: SIDS
AAP Recommendation #18

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.

SIDS Rate per 1,000 Live Births

- **California**
- **USA**

**SAFE TO SLEEP**
No SIDS