Safe To Sleep

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SIDS and other SUIDS

• Each year in the US, more than 4,000 infants, without a prior known illness or injury, die suddenly and unexpectedly
  – Sudden unexpected infant death (SUID), is defined as a death of an infant less than 1 year of age that occurs suddenly and unexpectedly, and whose cause of death is not immediately obvious prior to an investigation
  – After a case investigation, some SUIDs deaths can be attributed to various etiologies such as:
    • Suffocation
    • Asphyxia (CO)
    • Entrapment
    • Trauma

SIDS

• The SUID is classified as a SIDS death IF:
  – 3 criteria are met: (1) autopsy, (2) death scene investigation and (3) review of clinical history AND an etiology is still undetermined
  – SIDS is defined as “the sudden death of an infant, under 1 year of age, that remains unexplained after a thorough investigation, including an autopsy, death scene investigation, and a review of the infant’s clinical history.” (1991)
• In many instances, the requirements for a SIDS classification are not met
  • These death are signed out as undetermined (or unknown)
Subclasses of SUID

SUID

- Cause Determined
- No Cause
- No Cause and autopsy, death scene investigation, and review of clinical history complete

SIDS

- Autopsy, death scene investigation, and review of clinical history complete
- Undetermined

SIDs Epidemiology

- Incidence is rare during the 1st month
  - 1-3% under 1 month
- Peak incidence 2-4 months of age
- 95% of infants dying of SIDS will have done so by 6 months of age

SIDs Epidemiology

- African Americans and American Indians have consistently higher rates, 2 to 3 times the national average
- Male risk slightly higher than female 1.2:1
- Higher SIDS rate in winter than summer
  - Variation has decreased since back-to-sleep
Sudden Unexpected Deaths

Of the approximately 4,000 SUID deaths in the U.S. each year:
• ½ due to SIDS
• ¼ due to accidental suffocation and strangulation
• ¼ cause unknown (SIDS criteria not met)
  – Death scene investigation, review of clinical history, and autopsy

As of 2016, Georgia averaged 3 infant deaths per week due to sleep-related causes.

The majority of these deaths were preventable.

Historic Review

• In 1992, in response to epidemiologic reports from Europe and Australia (Tasmania), the AAP recommended that infants be placed for sleep in a non-prone position as a strategy for reducing the risk of SIDS
Historic Review

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- Resisted by most Pediatricians.

Back to Sleep Campaign

- The “Back to Sleep” Campaign was initiated in 1994 (because very few clinicians were following the 1992 recommendation).
  - Consumer driven campaign: PSA ads, magazine ads, etc.
  - Emphasized “non-prone” position until 1996 then BACK ONLY!
  - Side Sleeping Is Not Safe and Is Not Advised
    - 3rd highest risk factor after prone sleep position and smoking

Trends

- Between 1992 and 2015, the SIDS rate declined dramatically.
- The US SIDS rate declined from:
  - 130/100,000 live births in 1992
  - 39 /100,000 live births in 2015
- A 70% drop
BUT....

- Between 1992 and 2001, the SIDS rate declined dramatically
- The US SIDS rate declined from:
  - 130/100,000 live births in 1992
  - 39 /1,000 live births in 2001
  - From 2001 to 2015 the rate of drop has decreased significantly

Trends in SUID and SUID subtype rates per 100,000 live births, United States, 1990–2015.
Alexa B. Erck Lambert et al. Pediatrics
doi:10.1542/peds.2017-3519
SUID Rates 1990-2015

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ASSB = accidental suffocation and strangulation in bed

SUID rates per 100,000 live births, United States, 2000-2002 and 2013-2015

Diagnostic Shift Taking Place?

- Around 1998, it appeared that some medical examiners and coroners were moving away from classifying deaths as SIDS and calling more deaths accidental suffocation/positional asphyxia or of unknown cause.
  - more sophisticated techniques and greater emphasis on the death scene investigation were occurring
  - “Death of Innocents”, Newsweek, Sept. 22, 1997
Diagnostic Shift Taking Place?
• Around 1998, it appeared that some medical examiners and coroners were moving away from classifying deaths as SIDS and calling more deaths accidental suffocation/positional asphyxia or of unknown cause.
  – more sophisticated techniques and greater emphasis on the death scene investigation were occurring
    • Waneta Hoyt: 5 infants died—all diagnosed with SIDS in the 70’s
    • Case was reopened and in 1995 Hoyt convicted of 5 counts of murder
• The increase in suffocation rates (and therefore the decrease in the SIDS rate) is probably, to some degree, related to a diagnostic shift

National Standardization
• Despite the increasing number of suffocation deaths in the late 90’s-early 2000’s, it was difficult to design and evaluate programs to prevent these deaths
• No 2 jurisdictions evaluated the death scene the same and there was no consistency in data collection and/or reporting the cause-of-death
  – hampered the ability to monitor national trends and to ascertain risk factors

NCDR-CRS
• In 2005, in response to this trend of increasing suffocation deaths, the CDC developed a Web-based National Child Death Review Case Reporting System (NCDR-CRS) to facilitate consistent collection and reporting of child fatality review program data
  – In 2005, 9 states joined the program, now all 50 states are participating
  – Standardizes the data that is collected throughout the country
SUIDS and Sleep Environment

• In April, 2012 a study was published using the NCDR-CRS data which looked at the characteristics and sleep circumstances of infants who died suddenly and unexpectedly:
  Sudden Unexpected Infant Deaths: Sleep Environment and Circumstances
  Patricia Schnitzer, Theresa Covington, Heather Dykstra

Methods

• Reviewed data from 9 states from 2005-2008
• 3,136 SUIDs divided into 3 categories:
  (1) SIDS n=960; 30.6%
  (2) Suffocation n=939; 29.9%
  (3) Undetermined n=1,237; 39.5%

Results

• 25% of infants were sleeping in a crib/bassinette at the time of death
  – 70% were in an adult bed, couch or chair
• Of those infants with documentation of their sleep position when found
  – 36% back
  – 64% stomach or side
Results

- 64% of SUID victims were sharing a sleep surface
  - 49% with an adult and 15% with an animal

Conclusion

- “Infants whose deaths were classified as resulting from suffocation were significantly more likely than those whose deaths were classified as SIDS to be found in an adult bed, couch, chair or other surface not intended for infant sleep.”

Other Studies

  - Risk of suffocation in cribs: 0.63 deaths/100,000
  - Risk of suffocation in adult bed: 25.5/100,000
  - 40-fold increase!
Safe To Sleep

• In response to the realization that the SIDS rate had changed very little (as did the percentage of supine sleeping) over the past 10 years while the percentage of infants dying of suffocation has exponentially increased, the Safe To Sleep Campaign was launched in 2012
  – an expansion of the original Back to Sleep campaign started in 1994
  – In addition to strategies for reducing the risk of SIDS, Safe to Sleep also describes actions that parents and caregivers can take to reduce the risk of other sleep-related causes of infant death, such as suffocation

Safe To Sleep

• The safe sleep strategies initially published in Pediatrics in October 2011.
• Safe To Sleep Campaign launched in 2012 and recommendations amended in 2016.

SIDS and Other Sleep Related Infant Deaths: Updated 2016 Recommendations for a Safe Infant Sleeping Environment

Task Force on Sudden Infant Death Syndrome
Pediatrics Volume 138, Number 5, November 2016

19 recommendations outlined
Recommendations: 1st 9 deal with sleep environment

1. Back to sleep for every sleep:
   - Side is NOT safe
   - 3rd highest risk factor after prone sleep position and smoking

Exceptions:
1. Upper airway anomalies that cause obstruction in the supine position (Pierre Robin Syndrome)
2. Severe neuromuscular disorder (hypotonia) preventing child from being able to turn head

Sleep Position

• The prevalence of supine positioning has remained stagnant for the last decade
• The most common reason is fear of choking or aspiration in the supine position
  - Numerous studies in multiple countries (including the U.S.) have demonstrated that there is no increased incidence of aspiration with infants sleeping in the supine position

Fear of Supine Sleeping

• When a baby is in the back sleeping position, the trachea lies on top of the esophagus

• Anything regurgitated or refluxed from the esophagus must work against gravity to be aspirated into the trachea
Issues related to Sleep Position

- The other reason often cited by parents is the perception that the infant sleeps better prone
- Confirmed by polysomnographic studies
  - Physiologic studies have found that infants are less likely to arouse when they are sleeping in the prone position
    - The ability to arouse from sleep is an important protective physiologic response which is blunted in the prone position

Recommendations: 1st 9 deal with sleep environment

- 1. Back to sleep for every sleep
  - A. Side is NOT safe
  - B. Studies lacking to support raising head of crib to improve reflux
  - C. "Skin-to-skin" care is recommended for all mothers and newborns, regardless of feeding or delivery method, immediately following birth (as soon as the mother is medically stable, awake, and able to respond to her newborn), and to continue for at least an hour.
    - (1) Thereafter, should be placed supine in a bassinet.

Despite evidence many still sleeping their child prone

  - Looked at 3,297 mothers from 32 US hospitals with an oversampling of AA and Hispanic mothers
  - 77.3% reported they usually placed their infants in the supine position for sleep, but fewer than half did so exclusively.
  - Only 43.7% of mothers reported that they intended to and then actually placed infants exclusively supine
  - AA mothers and those who did not complete high school were more likely to use the prone position
**CDC Warning**

- January 13, 2018—Brenda Fitzgerald-Press
- Conference to announce that AAP guidelines are NOT being followed
  - 21.6% of mothers reported placing baby to sleep on side or stomach
  - 61.4% reported sharing a bed with baby
  - 38.5% used soft bedding or other objects in sleep area
    - 19.1% bumper pads
    - 17.5% plush or thick blankets
    - 7.1% pillows
    - 6.2% infant positioners
    - 3.1% stuffed toys

**Recommendations**

2. Firm sleep surface: firm mattress that is tight fitting in the crib (no gaps) covered with tight fitting sheet

**Cultural Influences**

  - Interviewed 83 mothers (54 lower SES 29 higher SES)
    - Primary reason for using soft surfaces was infant comfort—perceived that infants were uncomfortable if the surface was not soft
    - Many parents interpreted “firm sleep surface” to mean taut; they were comfortable with and believed that they were following recommendations for a firm sleep surface when they placed pillows/blankets on the mattress as long as a sheet was pulled tautly over the pillows/blankets
    - Primary reasons for using soft bedding (including bumper pads) were comfort, safety, and aesthetics
    - Bedding also used to prevent infant rollover and falls; particularly for infants sleeping on a bed or sofa
Recommendations

2. Firm sleep surface: tight fitting mattress covered with tight fitting sheet
   A. Never place on soft surface and do not sleep child in car seat, stroller, or swing
   B. Do not use bumper pads

3. Breastfeeding is recommended

4. Sleep in parents room, close to parents bed but on a separate surface for at least 6 months but preferably 1 year
   A. Never recommended to sleep in adult bed but if brought to bed (to nurse) remove all pillows, blankets etc. from area—create a “safe zone” in case mom falls asleep during nursing.
   1. Safe zone in bed safer than mom falling asleep on couch/chair
Bed Sharing

• Bed sharing is never recommended, but there are specific circumstances in which bed-sharing is particularly hazardous:
  1. When 1 or both parents are smokers (OR: 2.3–17.7)
  2. When the infant is younger than 3 months (OR: 4.7–10.4)
  3. When the infant is placed on excessively soft surfaces such as waterbeds, sofas, and armchairs (OR: 5.1–66.9)
  4. When soft bedding accessories (pillows or blankets) are used (OR: 2.8–4.1)
  5. When there are multiple bed-sharers (OR: 5.4)
  6. When the parent has consumed alcohol (OR: 1.66)

Controversial Recommendation

• “Mother-Infant-Room-Sharing and Sleep Outcomes in INSIGHT Study” by Ian Paul, et al. June, Pediatrics 2017
  – Intervention Nurses Start Infants Growing on Healthy Trajectories-obesity prevention trial comparing a responsive parenting intervention with a safety control. Sleep questionnaires were completed at 4,9,12 and 30 months.
  – Data from this study used to evaluate quality of sleep in “room sharers” vs. “independent sleepers”

Findings of Study

• “Room sharing at ages 4 and 9 months is associated with less nighttime sleep in both the short and long-term and reduced sleep consolidation.”

• So, what does this mean?
Paul study continued

• Study pointed out that “inadequate sleep has been associated with poorer cognitive, psychomotor, physical and socioemotional development, which includes emotion regulation, mood, and behavior in infancy and childhood.”
• Short sleep duration during infancy is also associated with inadequate sleep later in childhood.

Paul Study

• Argued against having child in parents room after 4-6 months
  – 95% of all SIDS by 6 months so why keep child in room any longer given the negative effects of poor sleep
• Argued that parents who “room-shared” frequently had a greater tendency to bring child in bed with them which has been shown to be “risk-taking” behavior

“The Sleep of Co-sleeping Infants When They Are Not Co-sleeping: Evidence That Co-Sleeping is Stressful”
M. Hunley

• Appeared in Developmental Psychobiology January 2002
• The sleep of 101 normal, full-term infants was recorded nonintrusively in the home for 24 hr periods when they were 5 weeks and 6 months old
  – Infants assigned to one of 3 groups: short-term co-sleepers (2 x wk for less 6 months), long-term (more than 2 x week or more for at least 6 months), or non-co-sleepers
• Both co-sleeper groups showed less sleep and more “disrupted sleep”
Co-Sleeping-continued

• The disruptions of sleep, as observed in infants during co-sleeping, is referred to as sleep fragmentation
  – Sleep fragmentation has “consistently been associated with adverse conditions or consequences at all ages including illness, poor performance on cognitive tests, and negative developmental outcome in infants. Accordingly, it seems reasonable to interpret the experience of co-sleeping as one that may have a negative impact on the infants neurobehavioral development.”

Co-Sleeping Proponent

Argument is made that “by not having long periods of uninterrupted deep sleep, infants avoid having sleep periods with extremely low arousal levels, so that if a challenge to the resp. system should occur, the infant would be more responsive.”

James McKenna (Notre Dame)

Co-sleeping

• “Such a view does not take into account the well-documented negative effects of sleep fragmentation that characterizes the infants’ sleep during bed sharing. Also ignores the statistics showing increased risk of death with bed-sharing.”

Ian Paul
Bed Sharing

- The benefits of co-bedding twins and higher-order multiples have not been established
  - there is increased potential for overheating and rebreathing while co-bedding
  - Most co-bedded twins are placed on their sides (or prone facing each other) rather than supine

Recommendations

5. Keep soft objects and loose bedding away from infants’ sleep area
6. Use a pacifier (don’t attempt in infant less than 1 month if nursing)

SIDS Reduction

- Consider offering a Pacifier at sleep time
  - A large meta-analysis revealed that pacifier use decreased the risk of SIDS by 50% to 60%
    (summary adjusted OR: 0.39 [95% CI: 0.31–0.50])
  - Can wait up to 1-month of age if nursing
  - Once asleep, no need to keep replacing
  - Mechanism of protection is unclear:
    a) lowered arousal thresholds
    b) maintaining airway patency while falling asleep

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Recommendations

7. Avoid smoke exposure during pregnancy and after birth
   - Maternal smoking during pregnancy is a major risk factor in almost every epidemiologic study of SIDS
   - It is estimated that up to one-third of SIDS deaths could be prevented if all maternal smoking during pregnancy were eliminated

Smoking

- Press release from CDC on February 28, 2018
  - 1 in 14 pregnant women who gave birth in the U.S. in 2016 smoked cigarettes during her pregnancy
  - 7.2% of all expectant mothers smoked—varied greatly from state-to-state
    - Ranged from 25.1% in West Virginia to 1.6% in California
  - White women were 2x as likely to smoke during pregnancy than black women and 6x as likely as Hispanic women

Recommendations

7. Avoid smoke exposure during pregnancy and after birth
   - Maternal smoking during pregnancy is a major risk factor in almost every epidemiologic study of SIDS
   - It is estimated that up to one-third of SIDS deaths could be prevented if all maternal smoking during pregnancy were eliminated
8. Avoid alcohol and illicit drug use during pregnancy and after birth
9. Avoid overheating and head covering in infants
10. Pregnant women should receive regular prenatal care
11. Infants should be immunized in accordance with the recommendations of the AAP and CDC
Immunizations and SIDS

“DPT Immunization and Sudden Infant Death: Results of the National Institute of Child Health and Human Development Cooperative Epidemiological Study of SIDS Risk Factors”
Peds April, 1987
• 400 SIDS victims & 800 matched controls: found no association between SIDS and DPT

“Risk of SIDS After Immunization With The DPT Vaccine”
NEJM Sept 8, 1998
• Looked at 129,834 infants and found no ↑ risk

DPT Immunization and A’s/B’s

• Enrolled 191 infants who were born at 10 different hospitals. Placed on cardiorepiratory monitors which were used continuously.
  – 93 received DPT and 98 did not. During the next 48 hours documented the # of prolonged apneas and prolonged bradycardias
  – No difference in the groups

Next 6 Recommendations are unchanged and related to prematurity and exposures

10. Pregnant women should receive regular prenatal care
11. Infants should be immunized in accordance with the recommendations of the AAP and CDC
12. Avoid use of commercial devices that are inconsistent with safe sleep recommendations (crib mattresses, wedges, etc).
13. Do not use home cardiorepiratory monitors as a strategy to reduce the risk of SIDS
14. Supervised awake “tummy time”
15. There is no evidence to recommend swaddling as a strategy to reduce the risk of SIDS
16. Health care professionals, staff in newborn nurseries and NICUs, and child care providers should endorse and model the SIDS risk reduction recommendations from birth.

### Issues related to Sleep Position

- **Preterm Infants Should Be Placed Supine as Soon as Possible**
  - Recommendations from the AAP state that hospitalized preterm infants should be placed in the supine position for sleep by 32 weeks’ postmenstrual age.
  - One study of NICU nurses (2010) found that only 50% of nurses place preterm infants supine during the transition to an open crib.
    - more than 20% never place preterm infants supine or will only place them supine 1 to 2 days before discharge.

- **Term infants should be placed supine within the first few hours after birth**
  - Many hospitals continue to place infants on their sides after birth.
    - Staff believe that newborn infants need to clear their airways of amniotic fluid and may be less likely to aspirate while on their sides.
    - No evidence exists that such fluid will be cleared more readily while in the side position.
Final 4 recommendations directed toward policy makers, researchers, and clinicians

16. Health care professionals, staff in newborn nurseries and NICUs, and child care providers should endorse and model the SIDS risk reduction recommendations from birth

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

18. Continue the “Safe Sleep Campaign”

19. Continue research and surveillance on the risk factors, causes, and pathophysiologic mechanisms of SIDS and other sleep–related infant deaths, with the ultimate goal of eliminating these deaths altogether

Bedding

• The CPSC (Consumer Product Safety Commission) has reported that the majority of sleep-related infant deaths are attributable to suffocation involving pillows, quilts, and extra bedding

• Specifically, these items should not be placed loose near the infant, between the mattress and the sheet, or under the infant
Sleep Surfaces

- Infants should sleep in a safety-approved crib, portable crib, or bassinet
  - Cribs should meet safety standards including those for slat spacing and no drop sides
  - Mattresses should be firm
    • No gaps between the mattress and the side of the bassinet, playpen, portable crib
  - Pillows or cushions should not be used as substitutes for mattresses or in addition to a mattress

Sleep Surfaces

- The AAP recommends the use of new cribs, because older cribs might no longer meet safety standards or might have missing parts

Major “new” points

1. Bed sharing: because it is recognized that mothers fall asleep while feeding their baby there is a new emphasis on creating a “clear zone” in the bed so that if the mom does fall asleep child won’t suffocate on bedding.
   a. If mom is going to feed baby in the middle of night when she is tired, it is better to do it in the bed with a “safe zone” than to go to a soft sofa or chair

2. No recommendation for swaddling to prevent SIDS and if one decides to swaddle they must NOT place child prone
   a. Once child shows tendency to roll, must stop swaddling

3. Skin-to-skin care is recommended for all mothers and newborns, regardless of feeding or delivery method, immediately following birth (as soon as the mother is medically stable, awake, and able to respond to her newborn), and to continue for at least an hour.”
   a. Thereafter, should be placed supine in a bassinet.
Remember the ABC’s

• A  Alone
• B  Back
• C  Crib
• s  No Smoking