Safe Infant Sleeping, SIDS and Other Sleep-Related Infant Deaths

DANIELLE EGGIE, MD PGY-III
GRAND ROUNDS
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Objectives

- Understand the definition of sudden infant death syndrome (SIDS).
- Understand the components of a thorough case investigation used to diagnose SIDS and understand that SIDS is a diagnosis of exclusion.
- Understand the epidemiology and risk factors for SIDS and other sleep-related infant deaths.
- Understand the AAP recommendations for a safe infant sleep environment.
Patient J M: History of Present Illness

- Chief complaint: 4 ½ month old male “found in crib not breathing, blue and unresponsive”

- Patient was placed to sleep on his back in his own crib, unattended. After 10-15 minutes, he was found by Grandfather face-down in the sheet

- Grandfather performed CPR including chest compressions and breaths; breathing resumed after approximately 7-8 minutes
Patient was brought to an OSH where he was noted to be irritable and inconsolable

ABG revealed 7.23/18.9/150/7.7; CXR and Head CT were normal. Patient given NS bolus and transferred to CHNOLA PICU

En route, patient noted to have seizure-like posturing activity that resolved with IV Versed
No recent fever
No increased irritability
No increased fatigue
No change in appetite
No reported falls or trauma
(+) Nasal congestion x few days
No cough

No respiratory distress or apneas
(+) slightly increased spit-ups
No diarrhea
No reported ingestions
No change in urine output
No rashes
(+) sick contact: sister with adenovirus
Patient J M: Medical History

- **Past Medical History:**
  - GER on Zantac
  - Prematurity

- **Birth History**
  - Former 32 WGA born via C-section
  - 3-week NICU stay for feeding intolerance
  - Required a few days of O2 via NC
  - No history of intubations

- **Family History**
  - No history of metabolic disorders
  - No history of genetic disorders
  - Father has 1st cousins with history of epilepsy
  - Mother with history of multiple miscarriages, possible cervical incompetence

- **Immunizations were up to date**
Patient JM: Medical History

- Development
  - Rolled to right and left side
  - Not yet rolled over
  - Some difficulty with head/neck control

- Social
  - Patient lives with mom, dad and healthy 3 year old sister
  - Sometimes watched by grandparents
Patient J M: Physical Exam

- T98.4, P 144, RR 48, BP 106/40, O2 sat 99% on RA, Wt 6.1kg, Ht 62cm, HC 44cm
- Gen: sleepy infant but arousable
- HEENT: AFSF, head atraumatic, pupils small but equal and reactive, MMM, clear rhinorrhea
- CV: RRR, no murmurs, 2+ distal pulses, cap refill <2 seconds
- Resp: clear lungs bilaterally, no wheezing, no retractions
- Abd: soft, non-tender, non-distended, no organomegaly
- Skin: no rashes, no bruising
- Neuro: post-sedative, moving all extremities, some right arm stiffening
Patient JM: Assessment

- 4 1/2 month old male (corrected at 2 1/2 months) with history of prematurity and GER here with ALTE s/p respiratory arrest at home with unclear etiology and with suspected seizures
  - r/o infectious process
  - r/o metabolic disorder
  - r/o ingestion
  - r/o trauma (accidental vs. non-accidental)
Patient J M: Initial Laboratory Studies

- CMP: Na 147, K 4.1, Cl 117, BUN 9, Cr 0.3, Gluc 99, Ca 8.6, Mg 2.1, Phos 6.1
  TP 5.7, Alb 3.3, TB <0.1, **AST 148**, AP 259, **ALT 92**

- CBC: WBC 16.5, Hgb 11.2, Hct 34.3, Plt 455, differential S63 B5 L28 M4

- CBG: **pH 7.31**, **pCO2 35**, pO2 93, **HCO3 17**, Base deficit -7.8

- CSF: clear, WBC 2, RBC 208, differential N15 L61 M24, Glucose 103, Protein 42

- **Utox: negative except +benzo**

- Blood, Urine, and CSF cultures pending
Patient J M: Hospital Course

- Over the first few days of hospitalization, patient ultimately developed intractable seizures that required Keppra, Phenobarbital, Cerebryx, as well as a Versed drip
  - He ultimately required intubation and mechanical ventilation due to inability to protect his airway

- Biotin, Leucovorin, and Pyridoxine were started empirically while ruling out neurotransmitter defect

- Acyclovir was started while ruling out HSV encephalopathy
Patient J M: Laboratory Studies

- Infectious studies
  - CSF studies
    - Culture negative
    - HSV PCR negative
    - Enterovirus PCR negative
  - Blood and Urine culture negative
  - VP: +rhino/enterovirus

- Metabolic studies
  - Ammonia normal, LDH normal
  - Plasma amino acids normal x2
  - **Urine organic acids: mild pyruvic aciduria and ketonuria**
    - Consistent with hypoxia/poor perfusion/seizures

- Neurologic studies
  - Neurotransmitter studies normal
Patient J M: Imaging

- MRI on Hospital Day 2:
  - Diffuse bilateral symmetric cortical and dentate nuclei cytotoxic edema with associated leptomeningeal enhancement. Findings could be related to status epilepticus vs. infectious meningitis vs. metabolic encephalopathy vs. partial prolonged ischemic injury

- MRI on Hospital Day 14:
  - Findings consistent with significant global anoxia with extensive cerebral and cortical gray and white matter infarction
Patient J M: Hospital Course

- Neuro: No further seizure activity after hospital day #3. Weaned off most antiepileptic drugs. Valium started for spasticity and irritability

- Resp: Required 8 days of intubation

- GI: Once stabilized, patient eventually tolerated full feeds on his own

- ID: No infectious etiology identified as cause of ALTE

- Optho: Found to have optic nerve pallor likely consistent with HIE

- Genetic: No metabolic disorder identified
Patient J M: Discharge Diagnosis

- Hypoxic ischemic encephalopathy s/p ALTE event and respiratory arrest
- Hypertonia and Spasticity
- Seizure disorder s/p intractable seizures
- Rhino/enterovirus infection
Patient J M

- What exactly is SIDS?
- Could this case have been SIDS had he not been resuscitated?
- Did he have risk factors for SIDS?
- What kind of questions should we be asking about sleep environment?
- And what constitutes a safe sleep environment for infants?
SIDS and Other Sleep-Related Infant Deaths
Terminology

- Sudden Unexpected Infant Deaths (SUID) or Sudden Unexpected Death in Infancy (SUDI)
  - Unexplained SUID
    - Sudden Infant Death Syndrome (SIDS)
    - Not SIDS, cause unknown
  - Explained SUID (15% of SUID)
    - Fatal Child Abuse (1-5% of SUID)
    - Metabolic disease (3-6% of SUID)
    - Underlying Medical Disorders
    - Sleep-related Infant Deaths (including accidental suffocation and strangulation in bed)
Sudden Infant Death Syndrome (SIDS)

- Also known as “crib death” or “cot death”

- Defined as the sudden death of an infant younger than 1 year of age, which remains unexplained after a thorough case investigation, including performance of a complex autopsy, examination of the death scene, and review of the clinical history
  - A diagnosis of exclusion

- Leading cause of all deaths among infants aged 1 to 12 months
  - The majority (90%) of SIDS deaths occur before a child is 6 months old, with most happening between 1 and 4 months
Epidemiology of SIDS

- Every year in the US, about 4,000 infants die suddenly of no immediately, obvious cause
  - About half of these Sudden Unexpected Infant Deaths (SUID) are due to SIDS
  - The three most frequently reported causes of SUID are SIDS, cause unknown and accidental suffocation and strangulation in bed (ASSB)

- In 2011, 1910 deaths were reported as SIDS, 869 as cause unknown and 624 as accidental suffocation and strangulation in bed\(^1\)
Figure 1. Trends in SIDS and other SUID mortality United States 1990-2006. UNK indicates ill-defined or unspecified deaths.\(^2\)
Epidemiology of SIDS

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SIDS rate in 1992
120 deaths per 100,000 births
Epidemiology of SIDS

In 1992, the AAP recommended that infants sleep in non-prone position.

**Figure 1.** Trends in SIDS and other SUID mortality United States 1990-2006. UNK indicates ill-defined or unspecified deaths²

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In 1994, the “Back to Sleep” campaign was initiated

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Figure 1. Trends in SIDS and other SUID mortality United States 1990-2006.
UNK indicates ill-defined or unspecified deaths²
Racial and Ethnic Disparities in SIDS

Figure 2. Comparison of US rates of SIDS according to maternal race and ethnic origin in 1996 and 2006²
Figure 3. Prevalence of supine sleep positioning according to maternal race and ethnic origin, 1992-2010 from the National Infant Sleep Position Study²
Risk Factors for SIDS

- **General factors**
  - Racial/ethnic differences
  - Male Gender

- **Maternal/Antenatal factors**
  - Smoking, illicit drug use
  - Young, unmarried, no high school degree
  - Late or no prenatal care
  - Pregnancy complications
  - UTI and STI
  - Short interpregnancy interval

- **Neonatal factors**
  - Prematurity
  - Small for gestational age

- **Post neonatal factors**
  - Prone sleep position
  - Sleep environment
  - Recent GI illness
  - Lack of breastfeeding
Pathogenesis of SIDS

- Triple-risk model has been proposed
  1. Underlying vulnerability
  2. Trigger event
  3. Vulnerable developmental stage

- Ultimately results in a combination of progressive asphyxia, bradycardia, hypotension, metabolic acidosis, and ineffectual gasping, leading to death

*Figure 4. Triple-risk model in SIDS*
Differential Diagnosis for SIDS

**General**
- Sepsis
- Asphyxiation (accidental or deliberate)
- Anaphylaxis
- Hyperthermia
- Poisoning
- Inborn Errors of Metabolism
- Electrolyte imbalances
- Severe dehydration
- Drowning

**Heart**
- Myocarditis
- Congenital Heart Disease

**Lungs**
- Pneumonia
- Bronchiolitis/Tracheobronchitis
- Aspiration or airway obstruction

**GI**:
- Abdominal trauma
- Pyelonephritis
- Hepatitis

**Pancreas**
- Pancreatitis
- Boric acid poisoning
- Cystic fibrosis

**Brain**
- Meningitis/Encephalitis
- Head Trauma
- Arteriovenous malformation with bleeding
Thorough Case Investigation in SIDS

- Sudden Unexplained Infant Death Investigation (SUIDI) Reporting Form

- 8-page form to standardize data collection
  - Contains investigation data, witness interview, infant medical history, infant dietary history, pregnancy history, incident scene investigation, investigation summary, investigation diagram, and summary for pathologist
Thorough Case Investigation in SIDS

- **Death Scene Investigation**
  - Position of infant
  - Marks on the body
  - Body temperature
  - Presence of rigor
  - Type of bed or crib and any defects
  - Amount and position of clothing and bedding
  - Room temperature
  - Type of ventilation and heating
  - Reactions of caretakers

- **Clinical History**
  - Time last seen alive
  - Time when found unresponsive and by whom
  - Sleeping environment in which the infant was found (sleep surface, covers, other articles)
  - Presence of other individuals in the sleeping environment
  - Sleeping position when the infant was put down to sleep and when found
  - Any recent illnesses
Thorough Case Investigation in SIDS

- **Autopsy**
  - In about 15% of suspected SIDS cases, autopsy identifies a known cause of death
  - Autopsy includes external and internal examination, radiology, histology, microbiology, toxicology, electrolyte, metabolic and genetic studies

- **External examination**
  - Well-developed, well-nourished baby
  - Frothy blood-tinged fluid around the nose
  - Cyanosis of the lips and nail beds
  - Hypostatic staining anteriorly, suggesting face down position

- **Internal Examination**
  - Pulmonary congestion and edema
  - Intrathoracic petechiae
  - Upper respiratory tract inflammation
  - Hepatic erythropoiesis
SUID Case Registry

- State-based surveillance system
- Uses multidisciplinary child death review teams to review the circumstances of childhood deaths and uses findings to inform prevention strategies
- Use data to improve knowledge about SUID characteristics and risk factors, evaluate case investigation practices, and identify high risk groups to target interventions

Figure 5. SUID Case Registry State Grantees, 2012

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1. Source: [Link to figure 5]
Safe Infant Sleeping Environment

According to the 2011 AAP Policy Statement
AAP Policy Statement

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 entrapment, and ill-defined or unspecified causes of death have increased in incidence, particularly since the AAP published its last statement on SIDS in 2005. It has become increasingly important to address these other causes of sleep-related infant death. Many of the modifiable and nonmodifiable risk factors for SIDS and suffocation are strikingly similar. The AAP, therefore, is expanding its recommendations from focusing only on SIDS to focusing on a safe sleep environment that can reduce the risk of all sleep-related infant deaths, includ-
## Summary and Strength of Recommendations

### TABLE 1  Summary and Strength of Recommendations

<table>
<thead>
<tr>
<th>Level A recommendations</th>
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<tbody>
<tr>
<td>Back to sleep for every sleep</td>
</tr>
<tr>
<td>Use a firm sleep surface</td>
</tr>
<tr>
<td>Room sharing without bedsharing is recommended</td>
</tr>
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<td>Keep soft objects and loose bedding out of the crib</td>
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<td>Pregnant women should receive regular prenatal care</td>
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<td>Avoid smoke exposure during pregnancy and after birth</td>
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<td>Breastfeeding is recommended</td>
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<td>Consider offering a pacifier at nap time and bedtime</td>
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<tr>
<td>Avoid overheating</td>
</tr>
<tr>
<td>Do not use home cardiorespiratory monitors as a strategy for reducing the risk of SIDS</td>
</tr>
<tr>
<td>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</td>
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<th>Level B recommendations</th>
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<tbody>
<tr>
<td>Infants should be immunized in accordance with recommendations of the AAP and Centers for Disease Control and Prevention</td>
</tr>
<tr>
<td>Avoid commercial devices marketed to reduce the risk of SIDS</td>
</tr>
<tr>
<td>Supervised, awake tummy time is recommended to facilitate development and to minimize development of positional plagiocephaly</td>
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<td>Health care professionals, staff in newborn nurseries and NICUs, and child care providers should endorse the SIDS risk-reduction recommendations from birth</td>
</tr>
<tr>
<td>Media and manufacturers should follow safe-sleep guidelines in their messaging and advertising</td>
</tr>
<tr>
<td>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</td>
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</table>
#1: Back to sleep for every sleep
What’s wrong with sleeping prone?

- Increases the risk of rebreathing expired gases, resulting in hypercapnia and hypoxia.
- Increases the risk of overheating by decreasing the rate of heat loss and increasing body temperature compared with infants sleeping supine.
- Alters the autonomic control of the infant cardiovascular system during sleep, particularly at age 2 to 3 months, and can result in decreased cerebral oxygenation.
What’s wrong with sleeping prone?

- Infants are less likely to arouse when sleeping in the prone position.
  - The ability to arouse from sleep is an important protective physiologic response to stressors during sleep.

- Prone position places infants at high risk of SIDS.

- Back to sleep until 12 months of age.
What about side-sleeping?

- Side sleep position is at a higher risk of SIDS than prone position.

- It is inherently unstable and the probability of an infant rolling to the prone position from the side sleep position is significantly greater than rolling prone from the back.
Why would a parent not place an infant in the supine position?

- Fear of choking or aspiration in the supine position
  - Coughing or gagging is evidence of a normal protective gag reflex
  - Parents often misconstrue this for choking or aspiration
  - There has been no increased incidence of aspiration since the change to supine sleeping

- Infant seems uncomfortable or does not sleep well
  - An infant who wakes frequently is normal and should not be perceived as a poor sleeper
Why would a parent not place an infant in the supine position?

- If infant has diagnosis of Gastroesophageal Reflux
  - North American Society for Pediatric Gastroenterology and Nutrition is in agreement with the AAP for supine sleep
- Rare exception of infants with greater risk of death from GER than from SIDS
  - Infants with upper airway disorders with impaired airway protective mechanisms
- AAP does not recommend elevating the head of the bed to reduce GER
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Preterm infants and supine sleep positioning

- Preterm infants should be placed supine for sleep once medically stable
  - Preterm infants at increased risk of SIDS
  - Recommended by 32 weeks CGA to allow them to become accustomed to sleeping in this position before discharge
  - Have been shown to have longer sleep duration, fewer arousals from sleep, and increased central apneas while in the prone position

- A recent study of NICU nurses found that only 50% of nurses place preterm infants supine during the transition to an open crib, and more than 20% never place preterm infants supine
What if the infant can roll from the supine to prone position?

- In a recent study, 6% and 12% of 16- to 23-week old infants placed on their backs or sides were found in the prone position.

- Among infants aged 24-weeks, 14% and 18% of those infants placed on their backs and sides were found in the prone position.

- Allow the infant to remain in the sleep position that he or she assumes.
  - Repositioning the sleeping infant to the supine position can be disruptive and might discourage the use of supine position altogether.

- Again, AAP recommends placing infants supine until 1 year of age.
#2: Use a firm sleep surface
Crib Safety

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

- Cribs
  - Correct slat spacing (less than 2 3/8 inches)
  - Snugly fitting and firm mattresses
  - No drop sides

- AAP recommends the use of new cribs
  - Older cribs might no longer meet current safety standards or may have missing parts
Crib Safety

When the drop-side detaches at the bottom, a baby can fall into the gap and suffocate between the mattress and the side rail.

A baby can strangle in the “V” shape when the top portion of the drop-side detaches.
What if the parent cannot afford an infant crib?

- Crib may not be possible
  - Financial reasons, space considerations, or misconception that “crib death” only occurs in cribs

- Alternatives include portable cribs, play yards or bassinets
  - Sturdy bottom and wide base
  - Smooth surfaces without protruding hardware
  - Legs with locks to prevent folding while in use
  - Firm, snugly fitting mattress

- Vertical sides made of air-permeable material may be preferable
Inappropriate Sleep Surfaces

- Infants should not be placed for sleep on beds because of the risk of entrapment and suffocation
  - Portable bed rails should not be used with infants because of the risk of entrapment and strangulation

- Pillows or cushions should not be used as a mattress substitute

- Areas with hazards, such as dangling cords, electric wires, and window-covering cords because of the risk of strangulation

- Sitting devices, such as car safety seats, strollers, swings, infant carriers, and infant slings, are not recommended for routine sleep
  - When using infant slings and cloth carriers, ensure that the infant's head is up above the fabric, the face is visible, and nose and mouth are clear of obstructions
AAP cannot make recommendation for or against the use of bedside sleepers
- No data regarding safety
- Potential safety concerns
  - Sleeper not attached properly
  - If infant moves into adult bed

Recalled by CPSC due to two infants who had strangled in their bassinets
#3: Room-sharing without bed-sharing is recommended
AAP for room-sharing and against bed-sharing

- Bed-sharing refers to a specific type of co-sleeping when the infant is sleeping on the same surface with another person.
  - Bed-sharing might increase the risk of overheating, rebreathing or airway obstruction, head covering, and exposures to tobacco smoke.

- Room-sharing refers to when parent and infant sleep in close proximity.
  - Most likely to prevent suffocation, strangulation, and entrapment which may occur when the infant is sleeping in the bed with an adult.
  - Allows close proximity to the infant, which facilitates feeding, comforting and monitoring the infant.
AAP for room-sharing and against bed-sharing

- There is evidence that room-sharing decreases the risk of SIDS by as much as 50\%_6^,7\.

- A recent national survey reported 45\% of parents shared a bed with their infant at some point in the last 2 weeks\^8\.

- Recent meta-analysis of 11 studies that investigated the association of bed-sharing and SIDS revealed a summary OR of 2.88 with bed-sharing\^9\.

- Parents may still choose to bed-share
  - Cultural and personal reasons, convenience for feeding, bonding, parent’s own vigilance, and environmental concerns
YOUR BABY SLEEPING WITH YOU CAN BE JUST AS DANGEROUS.

Babies can die when sleeping in adult beds. Always put your baby to sleep on his back, in a crib. If you can’t afford a crib, call (414) 286-8620.

CITY OF MILWAUKEE
HEALTH DEPARTMENT
Bed-sharing can be particularly hazardous in certain circumstances\textsuperscript{6,7,10}

- When 1 or both parents are smokers (OR: 2.3-17.7)
- When the infant is younger than 3 months of age (OR: 4.7-10.4) regardless of parental smoking
- When the infant is placed on excessively soft surfaces such as waterbeds, sofas, armchairs (OR: 5.1-66.9)
- When soft bedding accessories such as pillows or blankets are used (OR: 2.8-4.1)
- When there are multiple bed-sharers (OR: 5.4)
- When parent has consumed alcohol (OR: 1.66)
- When the infant is bed-sharing with someone who is not a parent (OR: 5.4)
Bed-sharing for feeding or comforting

- Infants may be brought into the bed for feeding or comforting but should be returned to their own crib or bassinet when the parent is ready to return to sleep.

- There is no increased risk associated with bringing the infant into bed for a short period of time.

- Infants should not be fed on a couch or armchair when there is high risk that the parent may fall asleep.
#4: Keep soft objects and loose bedding out of the crib
No Bumper Pads

No Stuffed Animals

No Comforters
No Quilts

Avoid antique cribs

No Pillows
Avoid soft bedding

- The risk of SIDS increases **21-fold** when the infant is placed prone with soft bedding\(^\text{10}\)

- CPSC has reported that the majority of sleep-related infant deaths in its database are attributable to suffocation involving pillows, quilts, and extra bedding\(^\text{11}\)

- If a blanket is used, it should be thin and tucked under the mattress with the infant positioned with his or her feet at the foot of the bed
Avoid Bumper Pads

- Infant deaths have occurred because of bumper pads
  - Suffocation against soft, pillow like bumper pads
  - Entrapment between the mattress or crib and firm bumper pads
  - Strangulation from bumper pad ties
Crib Incidents associated with Bumper Pads

<table>
<thead>
<tr>
<th>Year</th>
<th>Fatalities</th>
<th>Injuries</th>
<th>No Injury</th>
<th>Unknown</th>
</tr>
</thead>
<tbody>
<tr>
<td>1990 to 1994</td>
<td>12</td>
<td>8</td>
<td>10</td>
<td>1</td>
</tr>
<tr>
<td>1995 to 1999</td>
<td>8</td>
<td>10</td>
<td>8</td>
<td>0</td>
</tr>
<tr>
<td>2000 to 2004</td>
<td>15</td>
<td>18</td>
<td>49</td>
<td>0</td>
</tr>
<tr>
<td>2005 to 2009</td>
<td>22</td>
<td>23</td>
<td>41</td>
<td>1</td>
</tr>
<tr>
<td>2010 to October 2012</td>
<td>14</td>
<td>21</td>
<td>20</td>
<td>2</td>
</tr>
<tr>
<td>Total</td>
<td>71</td>
<td>80</td>
<td>128</td>
<td>4</td>
</tr>
</tbody>
</table>

**Figure 6.** Reported Incidents Citing Bumper Pads and Injury Status, January 1990-2012 by Year
#5: Pregnant women should receive regular prenatal care
#6: Avoid smoke exposure during pregnancy and after birth
Avoid Smoking and Smoke Exposure

- Smoking during pregnancy, in the pregnant woman's environment and in the infant's environment should be avoided.
- Smoke exposure\(^{14}\)
  - adversely affects infant arousal
  - Increases risk of preterm birth and low birth weight, which are both risk factors for SIDS
- Largest contributing risk factor of SIDS aside from sleep position
- The effect of tobacco smoke exposure on SIDS risk is dose-dependent.
#7: Avoid alcohol and illicit drug use during pregnancy and after birth
Avoid alcohol and illicit drug use

- Maternal alcohol use (OR: 6.2) and maternal first-trimester binge drinking (OR: 8.2) are associated with increased SIDS risk and postnatal infant mortality\textsuperscript{15,16}

- A prospective cohort study found the SIDS rate to be significantly increased for infants exposed in utero to methadone (OR: 3.6), heroin (OR: 2.3), and cocaine (OR: 1.6)\textsuperscript{17}
#8: Breastfeeding is recommended
Breastfeeding is Recommended

- Recent SIDS-breastfeeding meta-analysis concluded that ever breastfeeding was associated with a lower risk of SIDS (OR: 0.41)\textsuperscript{18}

- The German Study of Sudden Infant Death found that exclusive breastfeeding at 1 month of age halved the risk of SIDS (OR: 0.48)\textsuperscript{19}

- Breastfeeding statistics in the US\textsuperscript{20}
  - 73% of mothers initiate breastfeeding
  - 42% and 21% are still breastfeeding at 6 and 12 months, respectively
Benefits of breastfeeding in association with SIDS

- Infants are more easily aroused from sleep
- Decreased incidence of diarrhea, upper and lower respiratory infections and other infectious diseases that are associated with an increased vulnerability to SIDS
- Provides overall immune system benefits from maternal antibodies and micronutrients in human milk
#9: Consider offering a pacifier at nap time and bedtime
Several studies have found a protective effect of pacifiers on the incidence of SIDS\textsuperscript{7,10}

- Two meta-analyses revealed that pacifier use decreased the risk of SIDS by 50% to 60\textsuperscript{21}

The protective mechanism persists throughout the sleep period, even if the pacifier falls out of the infant’s mouth\textsuperscript{22}

Proposed mechanism although still unclear\textsuperscript{22}

- Lowered arousal thresholds
- Favorable modification of autonomic control during sleep
- Maintaining airway patency during sleep
Pacifier Safety

Pacifiers that attach to infants’ clothes should not be used with sleeping infants.

Pacifiers with attached objects or stuffed toys should not be used because of the risk of suffocation or choking.
Pacifier Use and Breastfeeding

- Large multi-center, randomized controlled trial\textsuperscript{23}
  - 1021 mothers who were highly motivated to breastfeed
  - Assigned to two groups:
    - Mothers advised to offer a pacifier after 15 days
    - Mothers advised not to offer a pacifier
  - At 3 months, there were no differences in breastfeeding rates between the 2 groups
    - 85.8\% of infants in the offer-pacifier group vs. 86.2\% in the not-offered group were still exclusively breastfeeding

- AAP recommends that pacifiers can be used during breastfeeding, but implementation should be delayed until breastfeeding is well established
#10: Avoid Overheating
Avoid Overheating in Infants

- Clear evidence that the risk of SIDS is associated with the amount of clothing or blankets on an infant and the room temperature\(^2\)\(^4\).

- One study found that bedroom heating compared with no bedroom heating increased SIDS risk (OR 4.5)\(^2\)\(^5\).

- Another study found a decreased risk of SIDS in a well-ventilated bedroom (windows and doors able to open) (OR 0.4)\(^2\)\(^6\).

- No current recommendations on the use of a fan as a SIDS risk-reduction strategy.
  - 1 study showed use of a fan reduced the risk of SIDS (OR 0.28); however, was a small sample size (n=36) and weak link to a mechanism\(^2\)\(^7\).
Swaddling

- Not enough evidence to recommend it as a SIDS risk-reduction strategy
- Benefits of swaddling
  - Effective technique to help calm infants and promote sleep
  - May prevent infants placed supine from rolling to prone position
- Risks of swaddling
  - Can cause an increase in respiratory rate and reduced functional residual lung capacity if tight swaddling
  - Loose swaddling could result in head covering and possible strangulation
  - Increase the risk of overheating
  - Impaired arousal – decreases startling and increases sleep duration
#11: Do not use home cardiorespiratory monitors as a strategy for reducing the risk of SIDS
Previously it was believed that ALTEs were the predecessors of SIDS and home apnea monitors were used for prevention.

No evidence that apparent life-threatening events (ALTE) are precursors to SIDS\textsuperscript{28}

Infant home monitors should not be used as a strategy for preventing SIDS.
#12: Expand the national campaign to reduce the risks of SIDS
For too many babies last year, this was their final resting place.

The safest place is in a crib. City of Milwaukee Health Department. www.milwaukee.gov/safesleep
#13: Infants should be immunized in accordance with the recommendations of the AAP and CDC

LEVEL B RECOMMENDATIONS
Immunizations and SIDS

- Incidence of SIDS peaks at a time when infants are receiving numerous immunizations
  - Case reports of a cluster of deaths shortly after immunization with diphtheria-tetanus-pertussis in the late 1970s created concern of a possible causal relationship

- There is no evidence to suggest that immunizations cause SIDS

- Many recently published studies suggest that immunizations may protect against the incidence of SIDS
  - A recent meta-analysis found the risk of SIDS to be halved by receiving immunizations (OR 0.54)
#14: Avoid commercial devices marketed to reduce the risk of SIDS

LEVEL B RECOMMENDATIONS
“SIDS-reducing” Commercial Devices

Infant Side Positioner Body Support $18.99

Anti-Roll Cushion $187.66

Jolly Jumper Crib Wedge $13.00
#15: Supervised, awake tummy time on a daily basis is recommended

LEVEL B RECOMMENDATIONS
Daily Tummy Time

- Should begin as early as possible to promote motor development and facilitate development of the upper body muscles

- Minimizes the risk of positional plagiocephaly
  - Results if head position is not varied when placed for sleep, if the infant spends little or no time in awake tummy time, and if head is not held in upright position when not sleeping
#16: Health care professionals, staff in newborn nurseries and NICU, and child care providers should endorse the SIDS risk-reduction recommendations from birth

LEVEL C RECOMMENDATIONS
#17: Media and manufacturers should follow safe-sleep guidelines in their messaging and advertising

LEVEL C RECOMMENDATIONS
#18: Continue research and surveillance on the risk factors, causes, and pathophysiology mechanisms of SIDS and other sleep-related infant deaths, with the ultimate goal of eliminating these deaths entirely

LEVEL C RECOMMENDATIONS
Back to Patient JM: Now 7 months

- No further seizure activity
- Remains on Keppra and Valium

- Neuro/development
  - Smiling and cooing per parents
  - Poor tracking with occasional eye contact
  - Little improvement in head control
  - Still not rolling over

- Therapies
  - OT 3x/week
  - Early Steps 1x/week
  - PT 3x/week

- Specialists
  - Neurology
  - Ophthalmology follows for cortical visual impairment
References


Thank-you

- Dr. Maria Weimer
- Dr. Costa Dimitriades
- Dr. Lauren Raney
- My captive audience
In Memory of Aaron DeBarbieris

January 27, 2014 to May 13, 2014