Working Together to Reduce Infant Sleep-Related Deaths:
WHAT YOU NEED TO KNOW NOW

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Objectives for Today’s Talk

- Definition of sudden unexpected infant death (SUID) and sudden infant death syndrome (SIDS)
- Statistics on SIDS and accidental sleep deaths
- Pathophysiology of SIDS
- 2016 AAP recommendations: SIDS risk reduction and suffocation prevention
- Safe sleep modeling and education in the hospital setting
Infant Mortality Rates for the Five Leading Causes of Infant Death in the United States, 2005 and 2011

24,000 deaths per year
U.S. Post-Neonatal Mortality 2015

FACT:

3,700 babies in the US die suddenly and unexpectedly each year!
What is SUID or SUDI?

- Sudden Unexpected Infant Death
  - Occurs in a previously healthy infant
  - Can be explained or unexplained
    - Explained: trauma, drowning, suffocation
    - Unexplained: SIDS, undetermined
  - Most unobserved, during sleep/environment

- Sleep-related deaths

- SIDS represents a subcategory of SUID
Some Causes of Deaths that Occur Suddenly and Unexpectedly during Infancy

- SIDS
- Accidental suffocation
- Poisoning
- Unknown
- Metabolic disorders
- Hypothermia/Hyperthermia
- Neglect or homicide
What is SIDS?

- ICD-10 definition: The sudden death of an infant under one year of age which remains unexplained after the performance of a complete post-mortem investigation including:
  - Performance of a complete autopsy
  - Examination of the death scene
  - Review of the case history
SIDS FACTS

- The leading cause of death in infants from 1 month to 1 year of age (post-neonatal infant mortality)
- A diagnosis of exclusion. The cause of death is assigned only after ruling out other causes.
- Peak time of occurrence: 1-4 months
- Higher incidence in males
- No longer see a higher frequency in colder months

SIDS FACTS

- Higher incidence in preterm and low birth weight infants
- Associated with:
  - Young maternal age
  - Maternal smoking with pregnancy
  - Late or no prenatal care
- 2-3 times more common in African-American, American Indian, and Alaska Native children
Triple Risk Model to Explain SIDS

- **Intrinsic risk factors**
  - Smoking
  - Prematurity
  - Alcohol and illicit drugs
  - Hypoxia
  - Growth restriction

- **Critical Developmental Period**

- **Exogenous Stressors**

- **Extrinsic risk factors**
  - Prone/side sleep position
  - Soft bedding
  - Overbundling/overheating
  - Bed sharing
  - Bed sharing + smoking and/or alcohol

- **Vulnerable Infant**
  - (e.g. brainstem dysfunction)

- **SIDS**

- **First 6 months**

**Modifiable Risk Factors**

Adapted from Filiano and Kinney, 1994

Serotonin receptor binding density lower in SIDS cases compared to controls.
An Example of SIDS Pathogenesis

- **Step 1**: Life-threatening event → Asphyxia and brain hypoperfusion
- **Step 2**: Failure of arousal → Progressive asphyxia
- **Step 3**: Hypoxic coma
- **Step 4**: Bradycardia and gasping
- **Step 5**: Failure of autoresuscitation resulting in death

Adapted from Kinney and Thach, 2009
2016 AAP Recommendations: Infant Sleep Safety

- Recommendations are to reduce the risk of SIDS and sleep-related suffocation, asphyxia, and entrapment.
- Recommendations should be used consistently until 1 year of age.
  - Most epidemiological studies upon which these recommendations are based include infants up to 1 year of age.
Strength of Recommendation

- Scale based on the Strength of Recommendation Taxonomy (SORT)
- A: There is good quality patient-oriented evidence
- B: There is inconsistent or limited quality patient-oriented evidence
- C: The recommendation is based on consensus, disease-oriented evidence, usual practice, expert opinion, or case series for studies of diagnosis, treatment, prevention, or screening.
Recommendations Change as the Evidence Evolves

- Statistics and risk factors may change
  - New risks emerge (e.g.: side positioning)
  - Different levels of risk?
- Policies and procedures may change
  - Better death scene investigations
  - Diagnostic shift
- Unintended consequences
  - Plagiocephaly, development
  - New tummy time recommendations
2016 SIDS Task Force Policy Statement

Level A Recommendations:

- Back to sleep for every sleep.
- Use a firm sleep surface.
- Keep soft objects and loose bedding out of the crib.
- Room-sharing—Infant on separate sleep surface.
- Breastfeeding is recommended.
- Consider offering a pacifier at nap time and bedtime.
- Avoid smoke exposure during pregnancy and after birth.
- Avoid alcohol and illicit drug use during pregnancy and after birth.
2016 SIDS Task Force Policy Statement

Level A Recommendations:

- Avoid overheating.
- Pregnant women should receive regular prenatal care.
- Do not use home cardiorespiratory monitors as a strategy for reducing the risk of SIDS.
- Health care professionals, staff in newborn nurseries and NICUs, and child care providers should endorse the SIDS risk-reduction recommendations from birth.
- Media and manufacturers should follow safe-sleep guidelines in their messaging and advertising.
2016 SIDS Task Force Policy Statement

Level B Recommendations:

- Avoid commercial devices that are inconsistent with safe sleep recommendations.
- Supervised, awake tummy time is recommended to facilitate development and to minimize development of positional plagiocephaly (flattening of skull).
2016 SIDS Task Force Policy Statement

Level C Recommendations:

- 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.
- There is no evidence to recommend swaddling as a strategy to reduce the risk of SIDS.
Correct Safe Sleep Environment
We Need to Move Beyond Back to Sleep

She’s on her back to sleep!
Sleep Position for Healthy Newborns

- Skin-to-skin care is recommended for all mothers and newborns, regardless of feeding or delivery method, immediately following birth.
  - Mom should be medically stable, awake, and able to respond to baby.
- When mother needs to sleep or take care of other needs, infant should be placed supine in a bassinet.
Sleep Position in Newborn Nursery

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

- Infants with gastroesophageal (GE) reflux should be kept supine.
  - Unless the risk of death from complications of GE reflux is greater than the risk of SIDS.
- Supine position does not increase the risk of choking and aspiration in infants with GE reflux.
  - Protective airway mechanisms
- Do NOT elevate the head of the infant’s crib.
  - Ineffective in reducing GE reflux.
  - Infant may slide to the foot of the crib—may compromise respiration.
The Truth About Supine Sleep and Aspiration: Ending the Fallacy

- Orientation of the Trachea to the Esophagus
SIDS Rate and Back Sleeping (1988 – 2006)

SIDS Rate Source: CDC, National Center for Health Statistics,
Sleep Position Data: NICHD, National Infant Sleep Position Study.
Infant Sleep Location

- Infants should sleep in parents’ room, close to parents’ bed, but on a separate surface designed for infants.
- Ideally for the first year of life, but at least for the first 6 months.
Room-Share How Long? You’re Kidding, Right?

- 2011: “all sleep recommendations are to be followed until 1 year of age”
- 2016: “room-sharing without bed-sharing...ideally until 1 year of age, but at least for the first 6 months”
Supporting Data

- 3 case-control studies comparing sleeping in a separate room vs. room-sharing:
  - Tappin (Scotland): AOR 3.26 (95% CI 1.03-10.35)
    • Protection is significant for smoker mothers
  - Blair (England): AOR 10.49 (95% CI 4.26-25.81)
    • Protection is significant for both smoker and nonsmoker mothers
  - New Zealand Cot Death study: AOR 2.85 (95% CI 2.04-3.85)
More Recent Data

- New Zealand SUDI study
  - 64% protection with room-sharing: AOR 0.36 (95% CI 0.19-0.71)
- Estimate of 50% reduction is very conservative
- None of the case-control studies stratify by age (months)
Why is Room-Sharing Protective?

- SIDS—failure to arouse
- More small awakenings during the night
  - Stirrings, movement; not fully awake
- Postulation: protective effect from small awakenings
- Room-sharing facilitates breastfeeding
Room-Sharing and Sleep Quality

- Volkovich: room-sharing vs. solitary sleep
  - Room-sharing mothers with more sleep disturbances
  - Infants with similar sleep quality

- Mao, Mindell: room-sharing infants—more awakenings

- Montgomery-Downs, Doan: sleep quality in breastfeeding mothers > to formula feeding mothers
  - Exclusive breastfeeding = 30 min more sleep

- More study needed
Insight Study (Paul, 2017)

- Sleep questionnaire at 4, 9, 12, and 30 months
  - Sleep duration, overnight behaviors
  - Compared early vs late independent infants

- At 4 months:
  - Equal sleep duration
  - Early group had better sleep consolidation
  - Longest stretch 46 minutes

Insight Study (Paul, 2017)

- At 9 months:
  - Longer sleep duration (40 min/night)
  - Better consolidation (100 min)
- At 30 months:
  - Longer sleep duration (45 min/night)
- Room-sharing: 4 times more likely to transition to bed sharing overnight

Insight Commentary (Hauck, Moon)

- Late room-sharing: mean 7 hours longest sleep
- Is early consolidation desirable?
- Differences related to bedtime routines:
  - Early bedtime
  - Number of night feeds
  - Feeding back to sleep
- Focus on the routine, not early separation?
Feeding the Baby at Night

- Acknowledgment that parents may fall asleep while feeding baby
  - Safer to feed on bed than on sofa, couch, or armchair if you might fall asleep
  - No pillows, sheets, blankets, or other items that could obstruct infant breathing or cause overheating should be in bed
  - Return infant back to separate sleep surface as soon as parent awakens
Say NO to Couches, Sofas, and Cushioned Armchairs!

- Never place a baby for sleep on these surfaces.
- Never sleep with a baby on these surfaces.
- One of the MOST dangerous places for an infant.

(OR 5.1-66.9).
High-Risk Bed Sharing Situations

- Age <4 months
- Preterm or low birth weight
- Smoked during pregnancy
- Bed sharer is current smoker (even if not smoking in bed)
- Bed sharer has used/is using meds or substances that could impair alertness or arousal
- Bed sharer is not parent (including other children)
- Soft surface (waterbed, couch, armchair)
- Soft bedding (pillows, quilts, comforters)
Bedsharing in Low-Risk Breastfed Infants

- **Blair, et al:** AOR 1.6 (95% CI 0.96-2.7)
  - Age <14 weeks
  - Parents: No cigarettes or alcohol
  - Independent of feeding method

- **Carpenter, et al:** AOR 5.1 (95% CI 2.3-11.4)
  - Age <3 months
  - Parents did not smoke
  - Mother: No alcohol or drugs
  - Breastfed infants
Independent Review (Dr. Robert Platt)

- Very small numbers of low-risk babies
  - 24 in Blair’s study
  - 12 in Carpenter’s study
- Does not believe that data support definitive differences in 2 studies
- Some evidence of increased risk in this group, but cannot say how large the increased risk is
- Cannot conclude that bed sharing in this group is safe
Bed Sharing
Bed Sharing
Bed Sharing with Overlay
Bed Sharing with Overlay
Bed Sharing with Overlay
Couch Sleeping
Couch Sleeping
Couch Sleeping
Unsafe Bedding: NISP Trends 1993-2010

- Decrease from 86% to 55%
- Rate of decline decreases 2001-10
- 83.5% for teen mothers
- Predictors of adjusted OR >1.5
  - Young mothers
  - Non-white race, ethnicity
  - Less than college education

Why Use Soft Bedding?

- Comfort/Warmth
  - Extrapolation of own feelings
  - Misinterpret firm with taut
    - Soft + taut ≠ firm

- Safety
  - Blankets, pillows, rolls to prevent falls
Soft Bedding for Older Infants

- Many parents recognize soft bedding is a risk
- Increased complacency as baby gets older
- Soft bedding is THE most important risk factor for infants 4-12 months old (Colvin 2015)
- Infants roll into bedding and cannot extract themselves
To Swaddle or Not to Swaddle? That is the Question.

- **Pros:**
  - Calms the infant; promotes sleep; decreases number of awakenings
  - Encourages use of the supine position

- **Cons:**
  - Increased respiratory rate and reduced functional residual lung capacity
  - Exacerbates hip dysplasia if the hips are kept in extension and adduction
  - “Loose” swaddling becomes loose bedding
  - Overheating, especially if the head is covered or the infant has infection
  - Effects on arousability to an external stimulus remain unclear (conflicting data). There may be minimal effects of routine swaddling on arousal.
Swaddling

- There is insufficient evidence to recommend routine swaddling as a strategy to reduce the incidence of SIDS.
- Swaddling must be correctly applied to avoid the possible hazards.
- Swaddling does not reduce the necessity to follow recommended safe sleep practices.

Swaddling—Is it Safe?

- Wearable blankets, swaddles: 10 deaths
  - 80% positional asphyxia, prone sleeping
  - 70% additional risk factors
- Regular blankets: 12 deaths
  - 58% positional asphyxia, prone sleeping
  - 92% additional risk factors

Swaddling—More Questions...

- Pooled OR = 1.38
  - Prone = 12.99
  - Side = 3.16
  - Supine = 1.93
- Increased risk with age
- Limitations:
  - Heterogeneity, definitions, other risk factors

Swaddling (wrapping a light blanket snuggly around a baby) may help calm a crying baby. If you swaddle your baby, be sure to place him on his back to sleep. Stop swaddling your baby when he starts to roll.
Pacifiers

- AAP recommendation: Consider offering a pacifier at nap time and bedtime.
- Studies consistently demonstrate a protective effect of pacifiers on SIDS.
- Mechanism unknown:
  - Dislodge within 15 to 60 minutes
  - Decreased arousal threshold
Pacifiers and Breastfeeding

- Well-designed trials:
  - 2 found no association among term infants
  - 1 found no association among preterm infants
  - 1 found slightly decreased breastfeeding duration at one month if pacifier introduced in first week of life, but NO difference if pacifier introduced after one month!
Baby Friendly USA: Pacifiers

- Breastfeeding babies should not be given pacifiers by the staff of the facility, with the exception of:
  - Limited use to **decrease pain** during procedures when the baby cannot safely be held or breastfed (pacifiers used should be discarded after these procedures)
  - Babies who are being tube-fed in NICU
  - Other rare, specific medical reasons
Addressing Sleep Deprivation

- Give parents tools to cope with fussy babies.
- Sleep-deprived parents may make poor judgments.
- Make use of tools:
  - Swaddling, side carrying, shushing, swinging, and sucking
Overcoming Barriers to Change: What Parents are Saying...

- Prone positioning: fear of choking
- Baby sleeps “better” on stomach
- Soft things are safer for the baby
- SIDS is “God’s will”
- Vigilance: sleep with baby for protection
Factors Associated With Choice of Infant Sleep Position

- 3,300 mothers from 32 hospitals
- 77% usually use supine position
- 49% exclusive use supine position!
- Most likely to use prone:
  - African-American mothers
  - Mothers with < high school education
  - Lack of perceived control
  - Personal attitude/societal norms

A Lifetime of Infant Sleep Safety

- A continuum starting in childhood
  - Secondary school, baby sitting classes
- Pre-pregnancy
- Pregnancy/prenatal education
  - Prior to baby shower...“wrong gifts”
- In-hospital education and modeling
  - Include family, friends, baby sitters
- Re-enforcement in the doctor’s office
  - Especially between 1 to 4 months
- Grandparents: They hold great power!
- The general public (day cares, religious leaders)
What is Working?

EDUCATION
LEADS TO...
INCREASED KNOWLEDGE
WHICH LEADS TO...
BEHAVIOR CHANGE
WHICH LEADS TO...
IMPROVED OUTCOMES (LESS SUID)???
The Back to Sleep Campaign Resulted in a 53% Decrease in SIDS-related Deaths Over 10 Years
Infant Sleep Safety

- Requires a consistent and repetitive message in the community to prevent accidental deaths
Safe Sleep Nurse Modeling

- People trust nurses.
- Whatever the nurse does must be correct and it will be imitated in the home.
- Fact: supine positioning in the nursery can almost DOUBLE its use in the home!
Physician Advocacy

- Srivatsa, 1997: HCP education to new families...34% reduction in prone sleeping
- Eron, 2009: Study of Central NY state physicians...30% identified incorrect safest sleep position...30% do not discuss with families
- Colson, 2009: Only 1/3 mothers advised by MD to use supine position...3 times more likely to position the baby properly
Healthcare Provider Advice to New Mothers: Safe Sleep

Mason: Clinical Peds, 7/13

- Bundled intervention:
  - Nursing education, policy, model behavior, safe sleep video, posters in rooms, declaration of safe sleep practice
- Safe sleep environment: ↑ from 25% to 58%
- Intention in home: 95% supine, none “co-sleeping”
## Bundled Intervention = Behavior Change

<table>
<thead>
<tr>
<th>QUESTION</th>
<th>GROUP</th>
<th>p-value</th>
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<tbody>
<tr>
<td></td>
<td>ISS Study</td>
<td>NISP</td>
</tr>
<tr>
<td>Behavior Questions</td>
<td>n = 490</td>
<td>n = 1046</td>
</tr>
<tr>
<td>Baby routinely placed to sleep on back</td>
<td>92.5%</td>
<td>73%</td>
</tr>
<tr>
<td>Baby routinely sleeps in bassinet/crib</td>
<td>99.5%</td>
<td>71%</td>
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<tr>
<td>Baby sleeps under a thin sheet</td>
<td>99.2%</td>
<td>86%</td>
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<tr>
<td>Baby given a pacifier for sleep</td>
<td>74.1%</td>
<td>84%</td>
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Hospital Unsafe Sleep Persists!

- 8 Children’s Hospitals audits pre/post
  - Baseline: Safe sleep 4.9% of 264 infants
  - Post: 31.2% of 234 infants (P < .001)
  - Extra blankets most common
  - Baseline 77% vs. 44% post-intervention.
  - Mean number of unsafe items reduced by 50% (P < .001).
Washington DC

- 2 urban DC nurseries
- 26% did not believe or unsure that infant positioning was associated with SIDS.

Top 3 factors influencing sleep position:
  - 56% PERSONAL PREFERENCE!

Why non-supine? Clinical experience: (25%)
  - Increase risk aspiration
  - Decrease sleep and comfort

TodaysBaby QI: Safe Sleep Teaching

- PowerPoint on PDSA cycles
- Posters
- Pocket cards
- Sample policy
- Website: FAQs, track QI

CREATE A CAMPAIGN to achieve culture change!

TodaysBaby QI: Safe Sleep Teaching

- QI intervention median = 160 days
- Mothers reported receiving information 72% to 95% (increase of 24%-57%)
- 94% babies observed supine (plus 24%)
- 88% infants in safe sleep environment
  - Increase of 33%
- Gains maintained up to 12 months

Social Media and Risk-Reduction Training Study (SMART)

- Cluster randomization: 4 groups
- Safe sleep or breast feeding education
- Nursing QI and social media (mobile health)
- N = 1,600; 1,263 responses (79%)
- Safe sleep NQI and MHealth:
  - Supine sleep: 92.5%
  - Room-sharing: 85.9%
  - No soft bedding: 81.9%
  - Pacifier use: 76.2%

Hospital Initiative Components
www.cribsforkids.org/HospitalInitiativeToolkit/

- INTRODUCTORY LETTER
- HOSPITAL INITIATIVE TOOL KIT INSTRUCTIONS
- ORGANIZATIONAL CHART
- HOSPITAL POLICY
- ACKNOWLEDGMENT FORM (Engl. & Span.)
- SAFE SLEEP EDUCATIONAL FLIP CHART
- NONCOMPLIANCE WAIVER (Engl. & Span.)
- NURSING EDUCATION MODULE
- SAFE SLEEP POSTERS
- DOOR HANGERS (Engl. & Span.)
- GRADUATION CERTIFICATE
- SAMPLE LETTER TO HOSPITALS
- SAMPLE LETTER TO PROVIDERS
- INFANT SAFE SLEEP BROCHURES (Engl. & Span.)
- PRESS KIT
The National Safe Sleep Hospital Certification Program

- All materials available on-line
  - No major costs to the hospital
- Easy on-line access for documentation
- NO FEE FOR PARTICIPATION

www.CribsforKids.org/HospitalInitiative

Tiffany Price (tprice@cribsforkids.org)
Coordinated Education Efforts Work!

- TN—25% reduction in infant sleep-related deaths in 2 years.

Coordinated Education Efforts Work!

- 2009 to 2015: 38% decrease in infant mortality
- Decreased from 13.5 to 8.4 per 1,000.
- SUID decreased >50%
- Decrease in racial disparity!

http://healthybabiesbaltimore.com/home
And Finally...

- Health care providers should have open, frank, nonjudgmental conversations with families about their sleep practices.
Encouraging Parents to Take Action!

According to the Social Learning Theory parents are more likely to recall and comply with instructions when the health care provider:

- Uses a positive tone.
- Provides adequate information.
- Allows the parent to ask most of the questions.
Motivational Interviewing

“a collaborative, goal-oriented style of communication with particular attention to the language of change”

- Strengthen personal motivation and commitment to a specific goal
- Explore one’s reasons for change (barriers)
- Patient generates own solutions
  - More likely to feel realistic
  - Planting seeds of change
Impact of Eliminating Sleep-Related Deaths

Every week we lose 70 children which is equivalent to 4 kindergarten classrooms.
Thank You!!!

HEY! "Back to SLEEP," everybody!

WAAAH!

WAAAH!

WAAAH!
Contact Information

mgoodstein@wellspan.org
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IMR over time: Finland vs. US

Infant mortality in Finland, 1936 to 2010 per 1,000 births

Source: Statistics Finland

FIGURE 1. Infant mortality rate,* by year — United States, 1915–1997

*Per 1000 live births.