

CAN WE PREVENT INFANT SLEEP-RELATED DEATHS?

WHAT YOU NEED TO KNOW NOW

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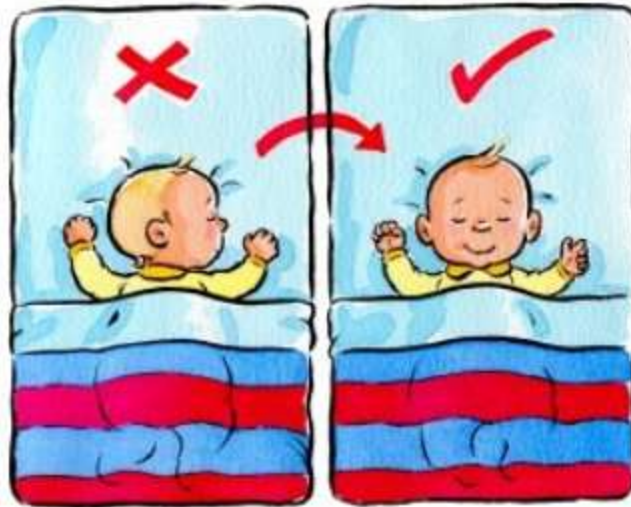
Objectives for Today's Talk

- Definition of SUID and SIDS
- Statistics on SIDS and accidental sleep deaths
- Pathophysiology of SIDS
- 2011 AAP recommendations: SIDS risk reduction and suffocation prevention



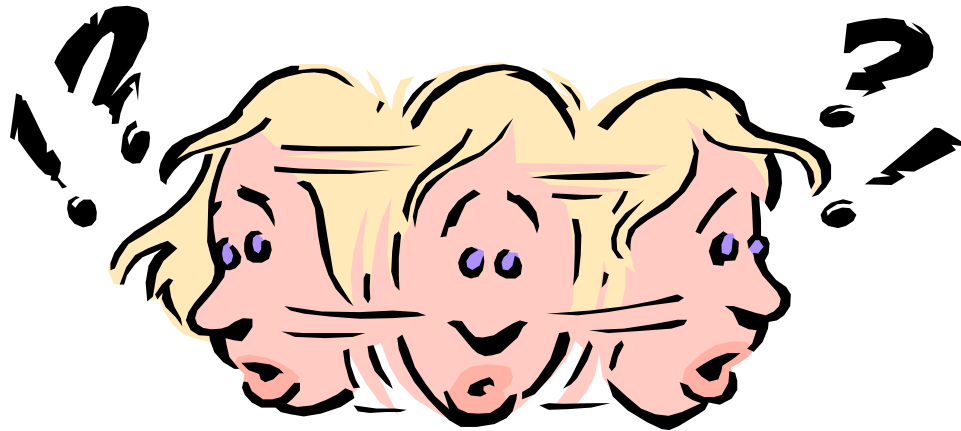
Infant Sleep Safety

- Requires a consistent and repetitive message in the community to prevent accidental deaths



Advice on Infant Sleep Safety: Who Do You Listen to...

- Family and Friends
- Doctors, Nurses, Lactation Counselors
- Magazines, Newspapers, Internet
- Oprah, Dr. Phil, Dr. Spock, Dr. Sears
- Grandma!!!



“It Will Never Happen to Me...”

There are scores of bereaved parents who saw themselves as low risk; who didn't smoke, received early prenatal care, were middle class, Caucasian, and breastfed their infant and although they knew the recommendations for “Back to Sleep”, they ignored them....WHY????

“Because it will never happen to me!”

“It Won’t Happen to Me”

AND IT DID!!!



Bereaved Parent...

“Why didn’t
anyone tell me
it was
dangerous to
sleep with my
baby?”





Definitions

- **Co-sleeping**: a vague and confusing term to describe shared sleeping arrangements between infant and parents
- **Bedsharing**: any individual sharing a sleeping surface with an infant
- **Roomsharing**: parent and infant sleep proximate in the same room, on separate sleep surfaces

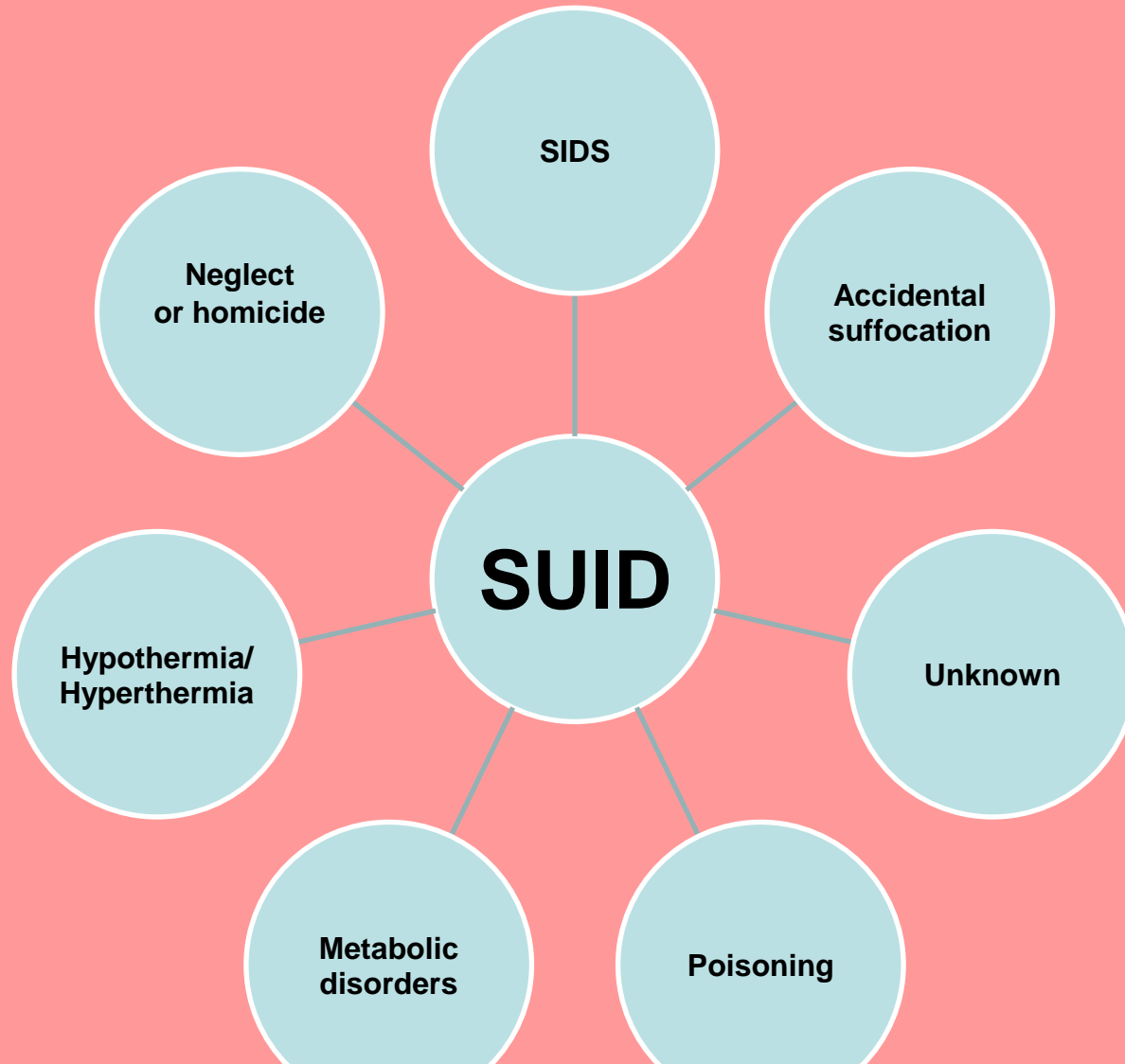


What is SUID or SUDI?

- **Sudden Unexpected Infant Death**
 - Occurs in a previously healthy infant
 - No obvious cause of death prior to investigation
 - Excludes deaths with obvious cause
- The big “umbrella” of all initially unexplained infant deaths
- SIDS represents a subcategory of SUID



Some causes of deaths that occur suddenly and unexpectedly during infancy



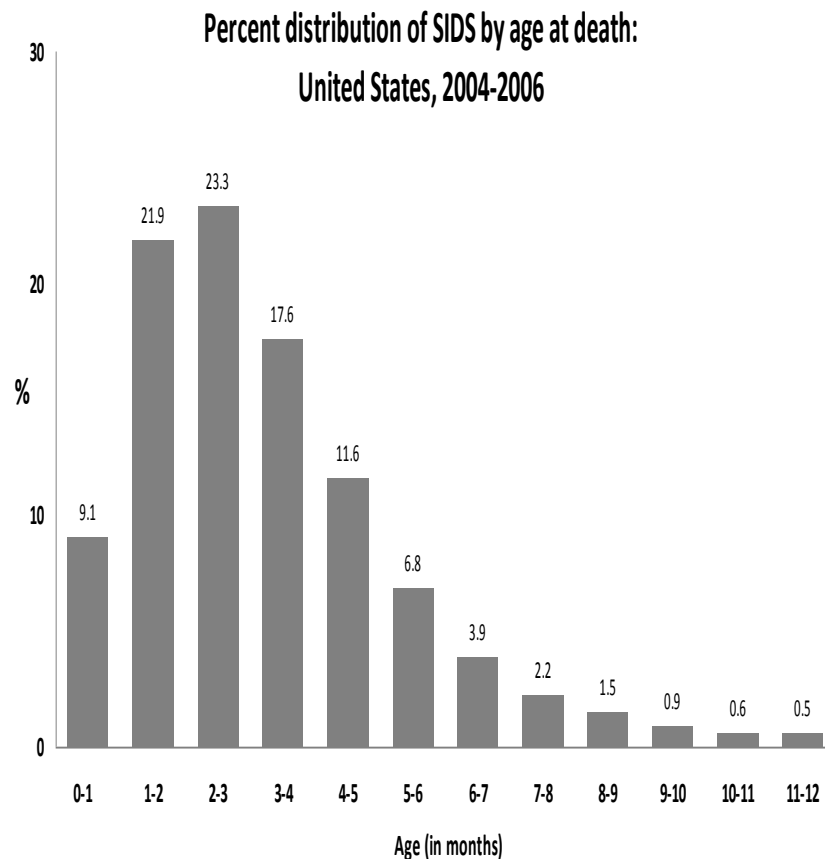
What is SIDS?

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 one month to one 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



AAP Task Force on SIDS Policy Statement: Nov. 2011

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, Alaska Native children

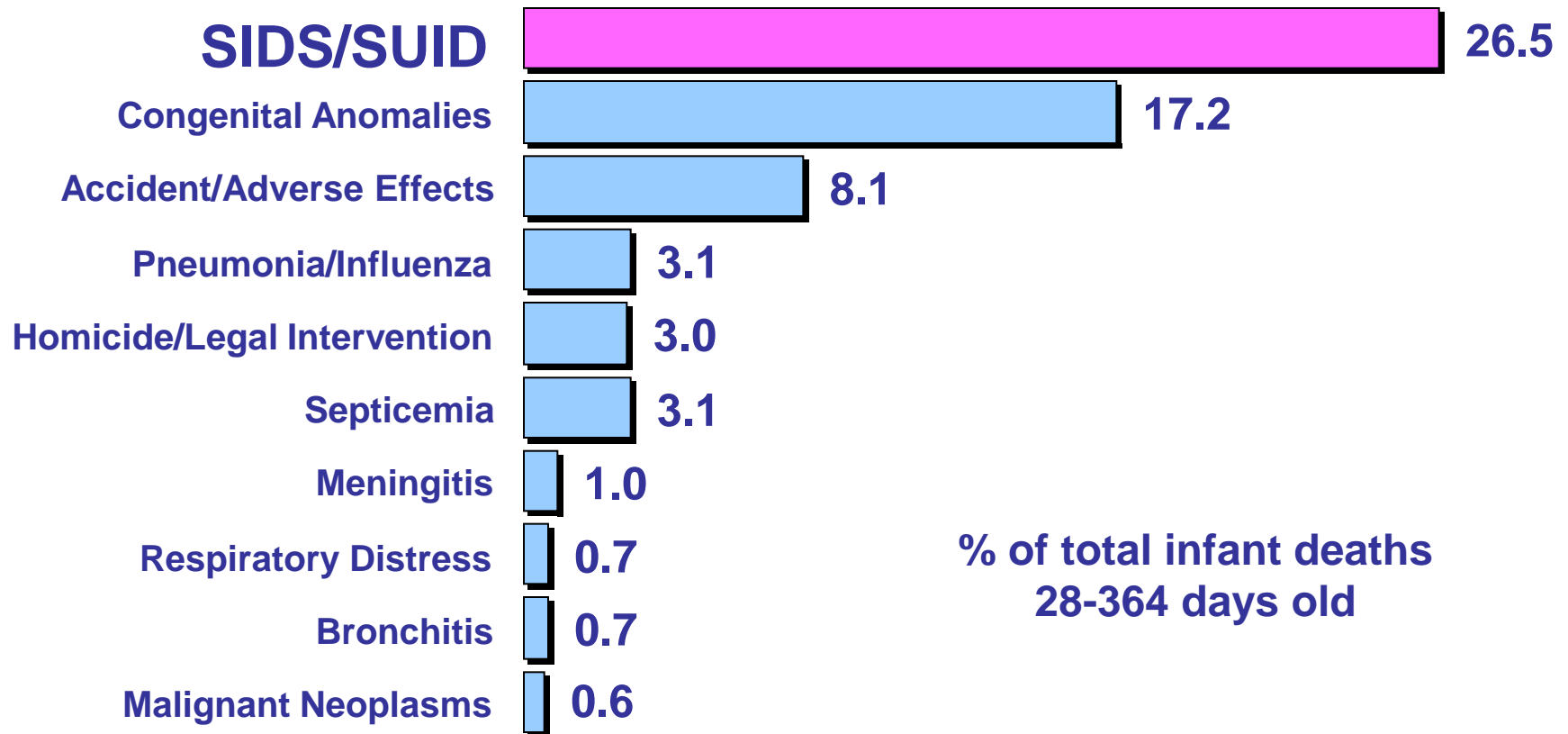
SIDS is NOT...

- Preventable...but the risk can be reduced!
- Caused by vomiting and/or choking
- Caused by immunizations
- Contagious
- The result of child abuse or neglect
- The cause of every unexpected infant death

Infant Mortality Statistics

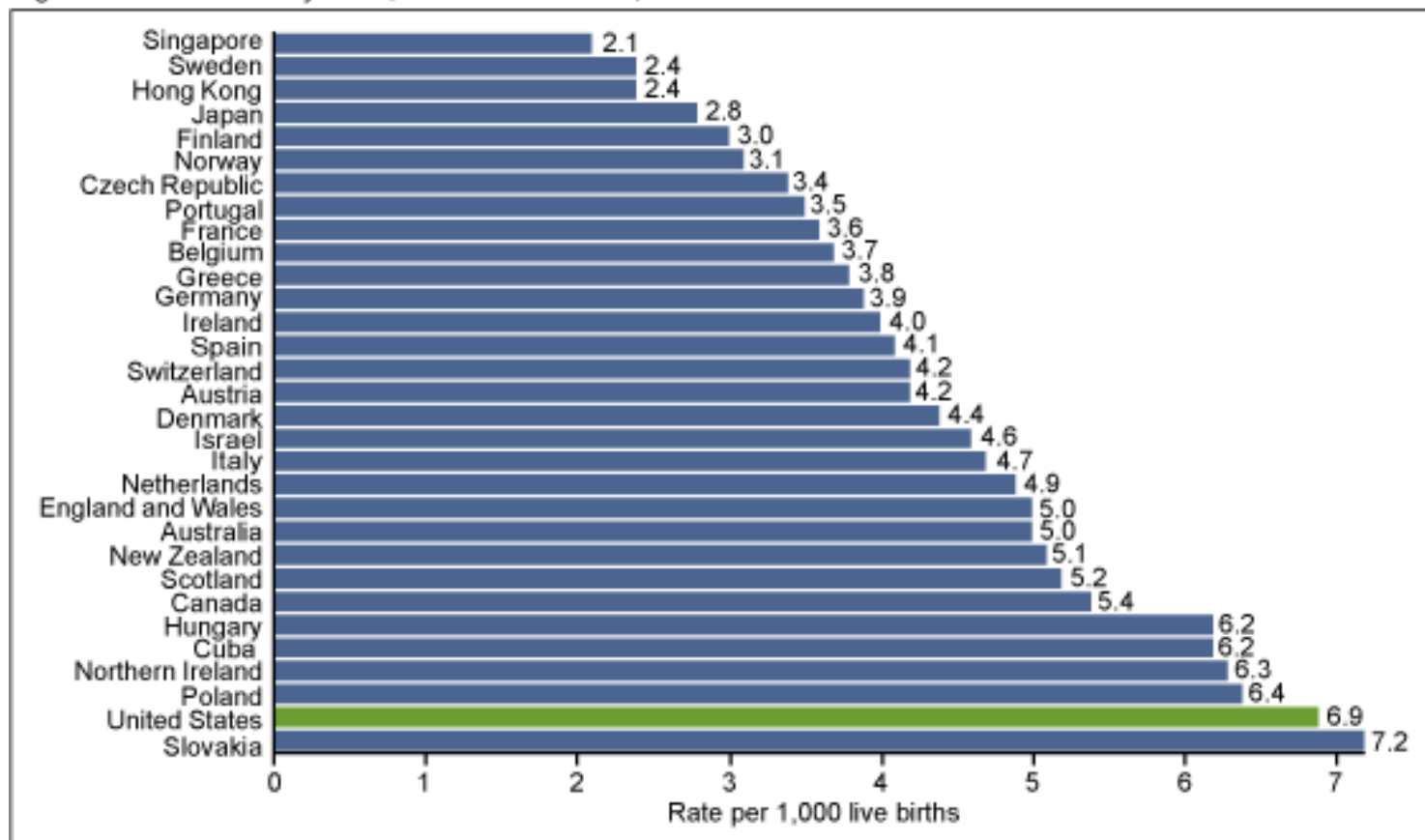
SIDS/SUID – United States 1999

The major cause of infant death after the first month



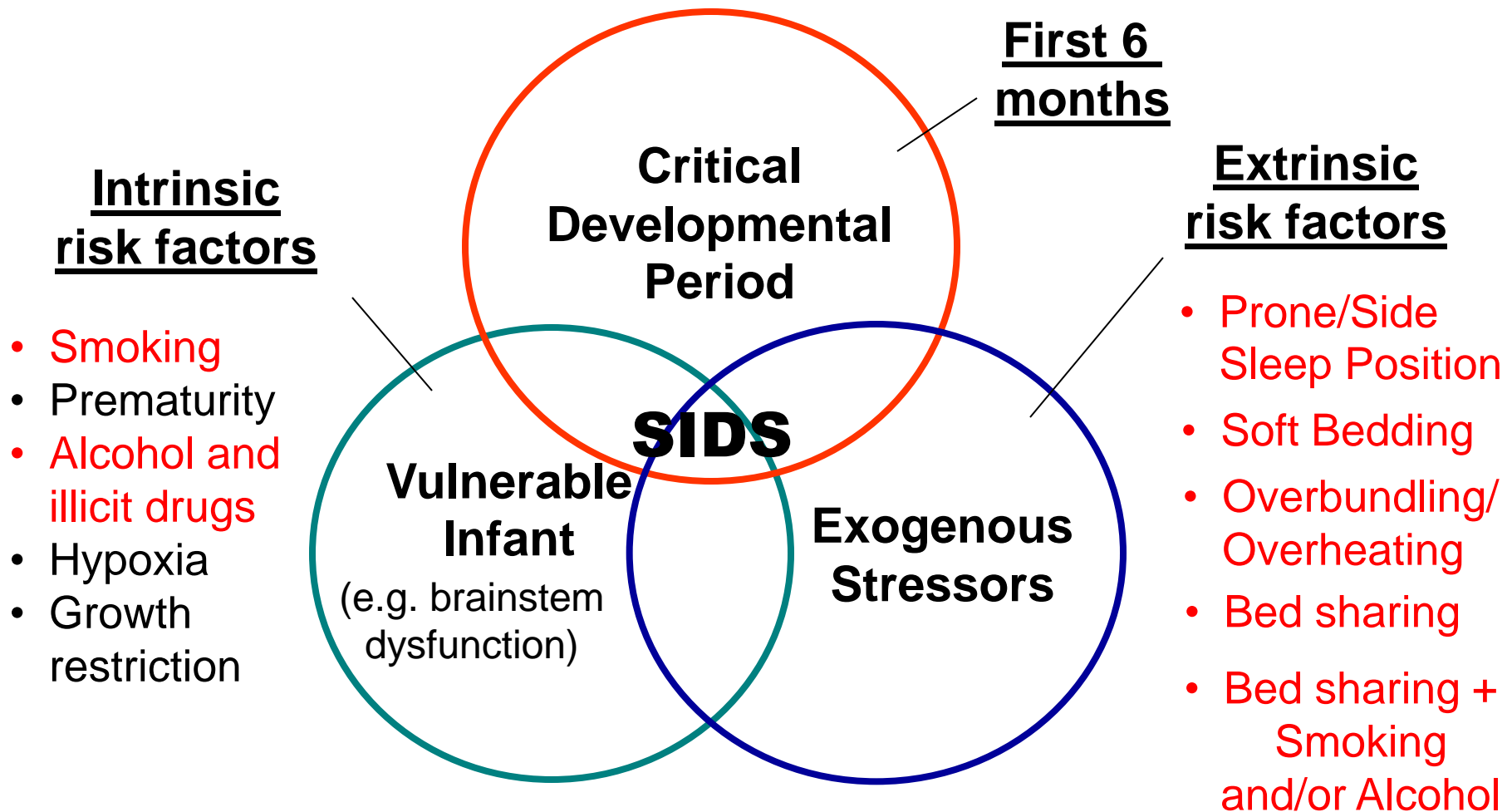
Infant Mortality Rates in Industrialized Countries, 2005

Figure 1. Infant mortality rates, selected countries, 2005



SOURCE: Health, United States, 2008.

Triple Risk Model to Explain SIDS



A Brainstem Abnormality

- Serotonergic neurons in the medulla project to nuclei in the brainstem and spinal cord which help regulate vital autonomic functions:
 - Blood pressure
 - Temperature control
 - Respiratory control
 - Upper Airway Reflexes
 - Arousal

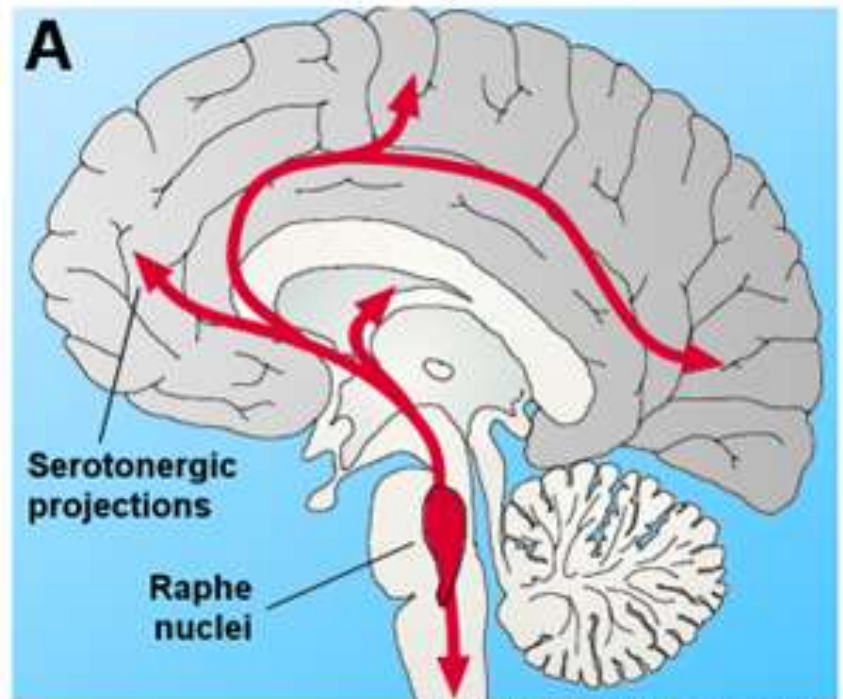


Image by Bilzör, © 2005 Erowid.org

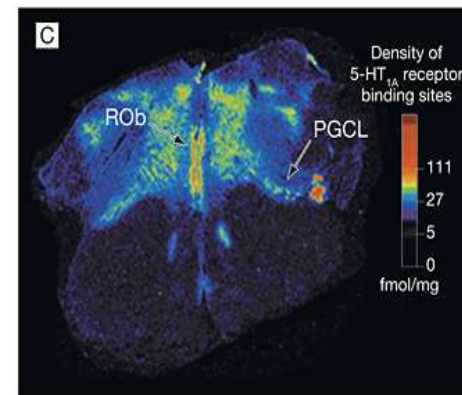
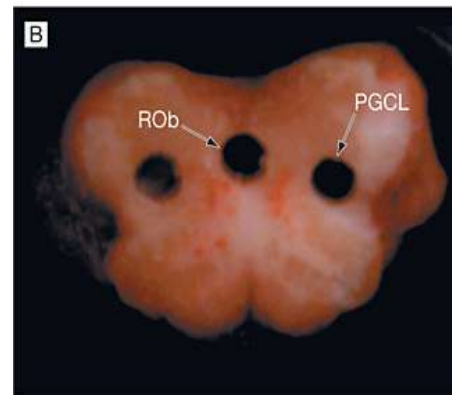
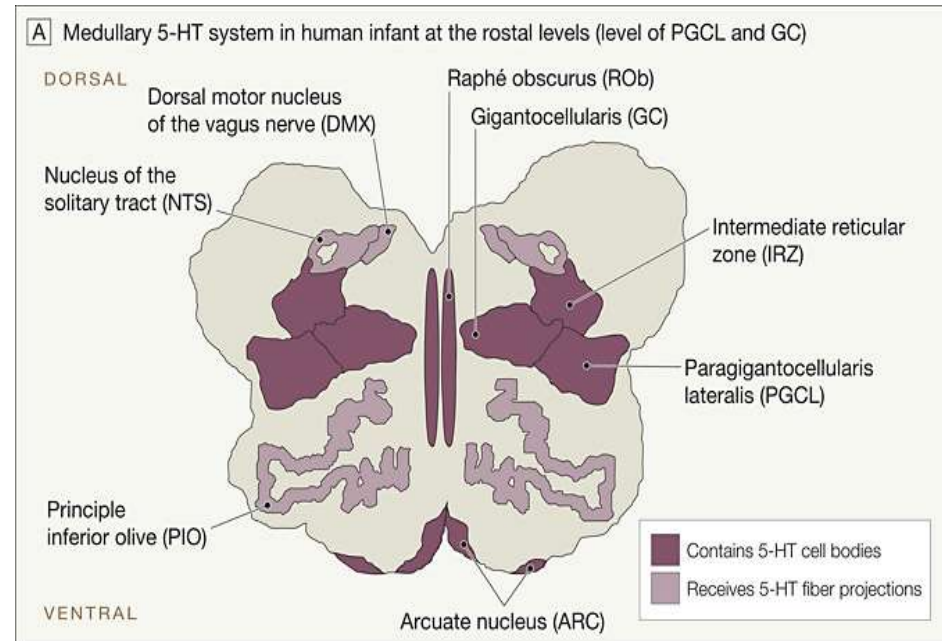


Kinney Hypothesis

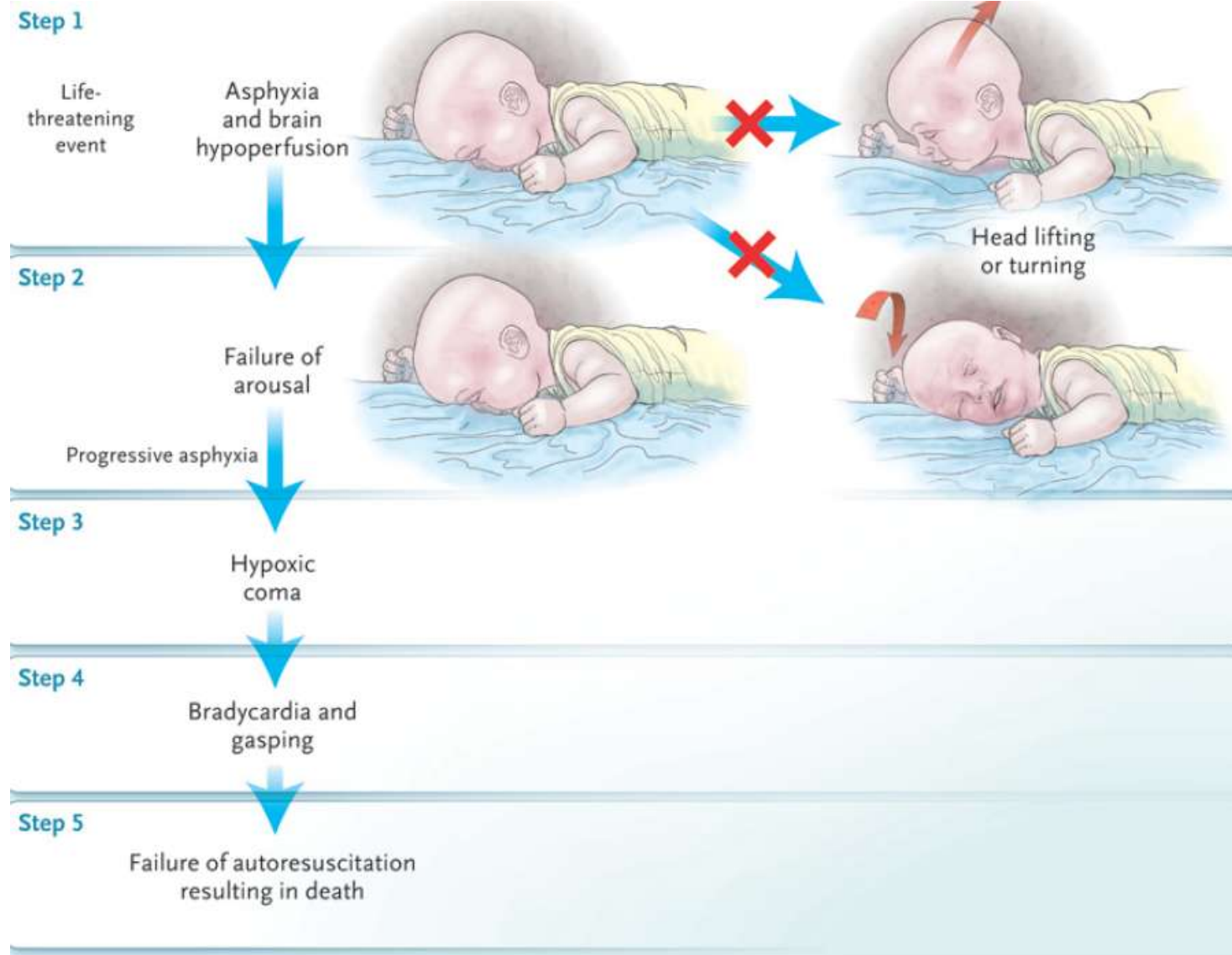
- Identified altered serotonin receptor binding density in medullas in brains of infants dying of SIDS (J. Neuropathology & Exp Neurology (2003))
- Hypothesis:
 - Medullary serotonin dysfunction results in a failure of autonomic and respiratory responses to hypoxia or hypercapnia
 - Results in sudden death in a subset of SIDS cases

Medullary Serotonin (5-Hydroxytryptamine [5-HT]) System in the Human Infant

- Serotonin levels 26% lower in SIDS cases
- Tryptophan hydroxylase levels 22% lower in SIDS cases
- Supports the theory that a subset of SIDS cases are due to a disorder of medullary serotonin deficiency
- Duncan et al. JAMA 2010;303(5): 430-437



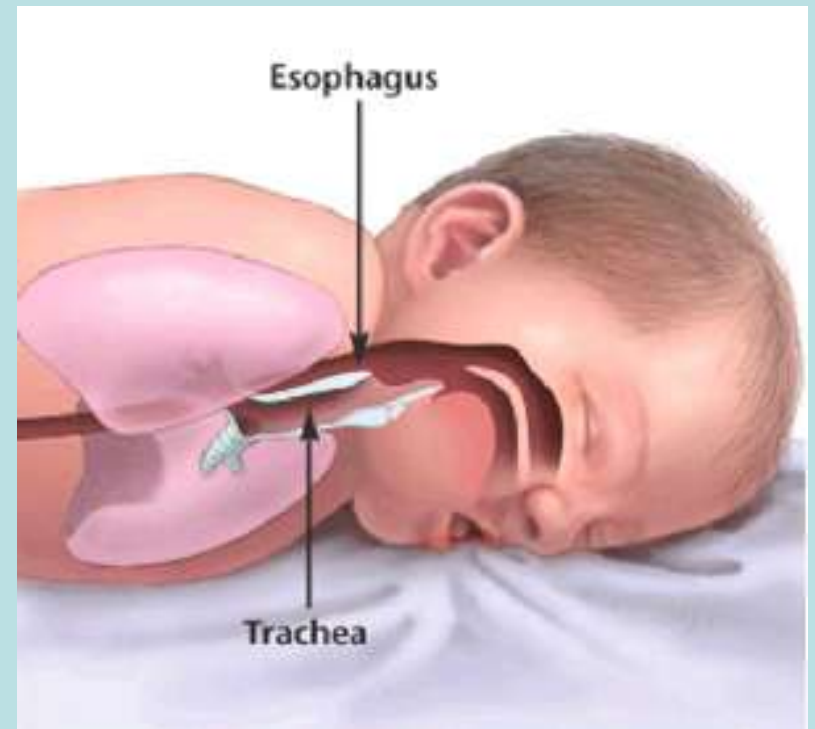
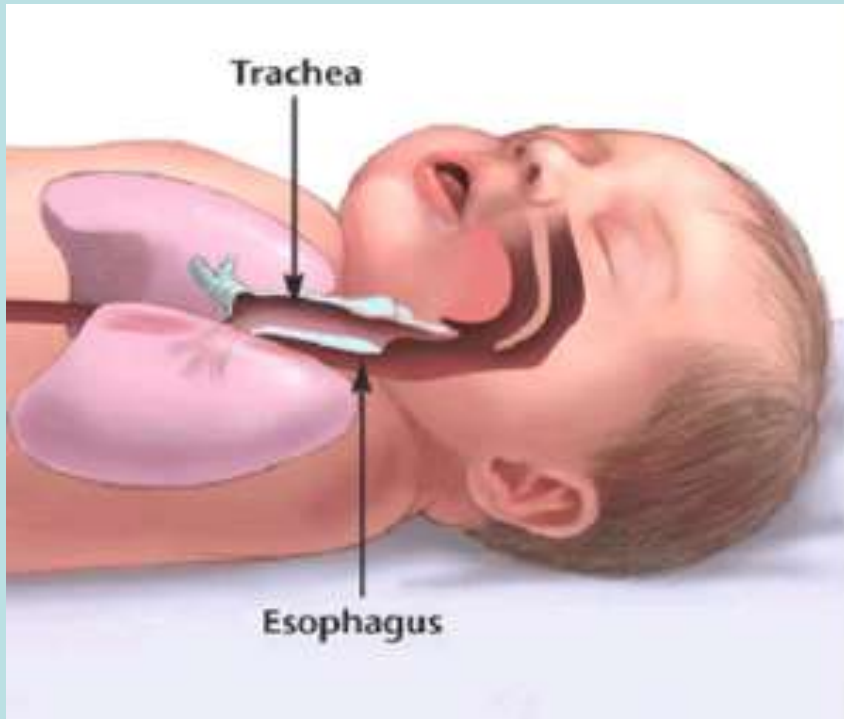
An example of SIDS pathogenesis



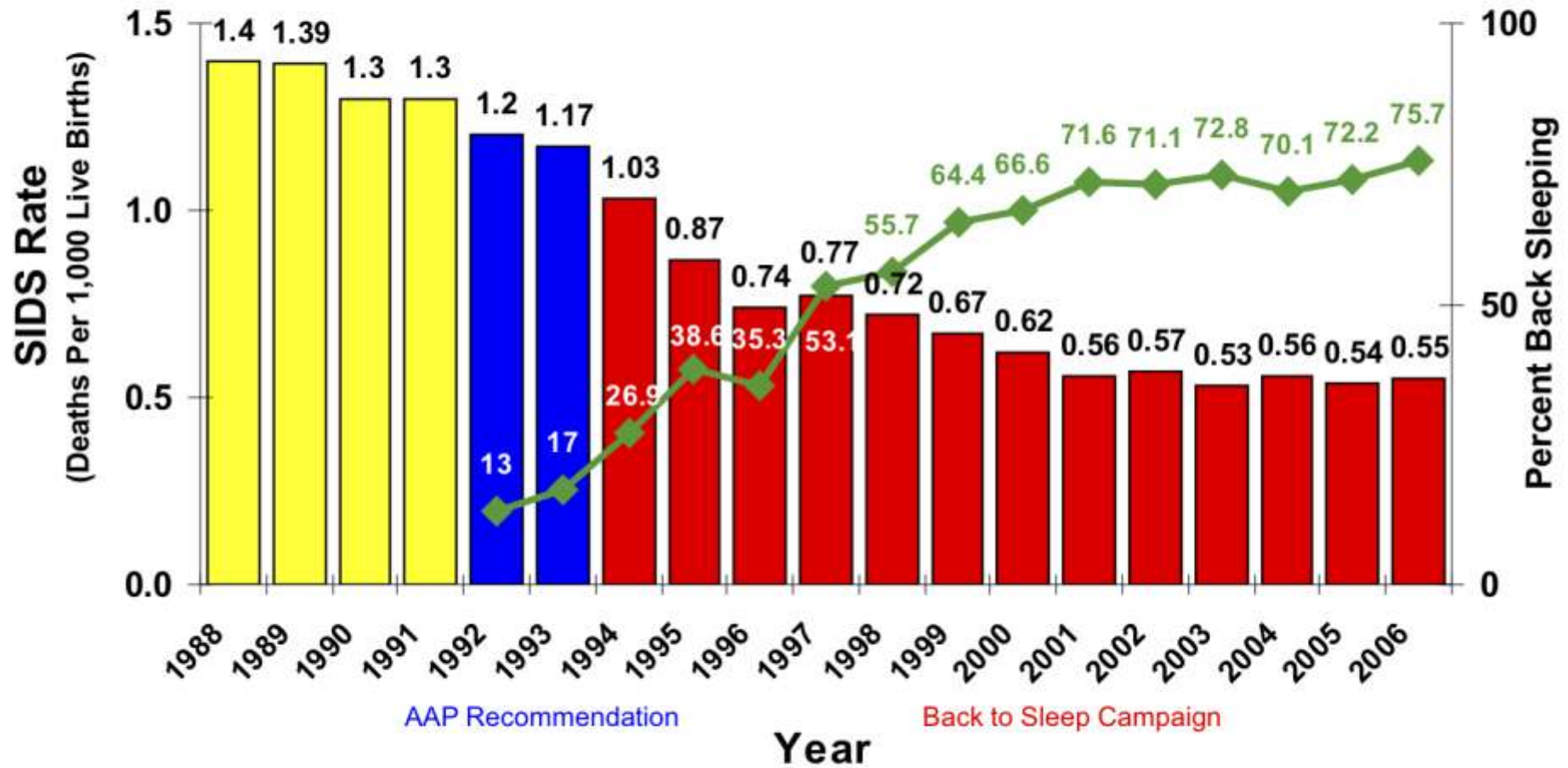
Adapted from Kinney and Thach, 2009

The Truth About Supine Sleep and Aspiration: Ending the fallacy

Orientation of the Trachea to the Esophagus

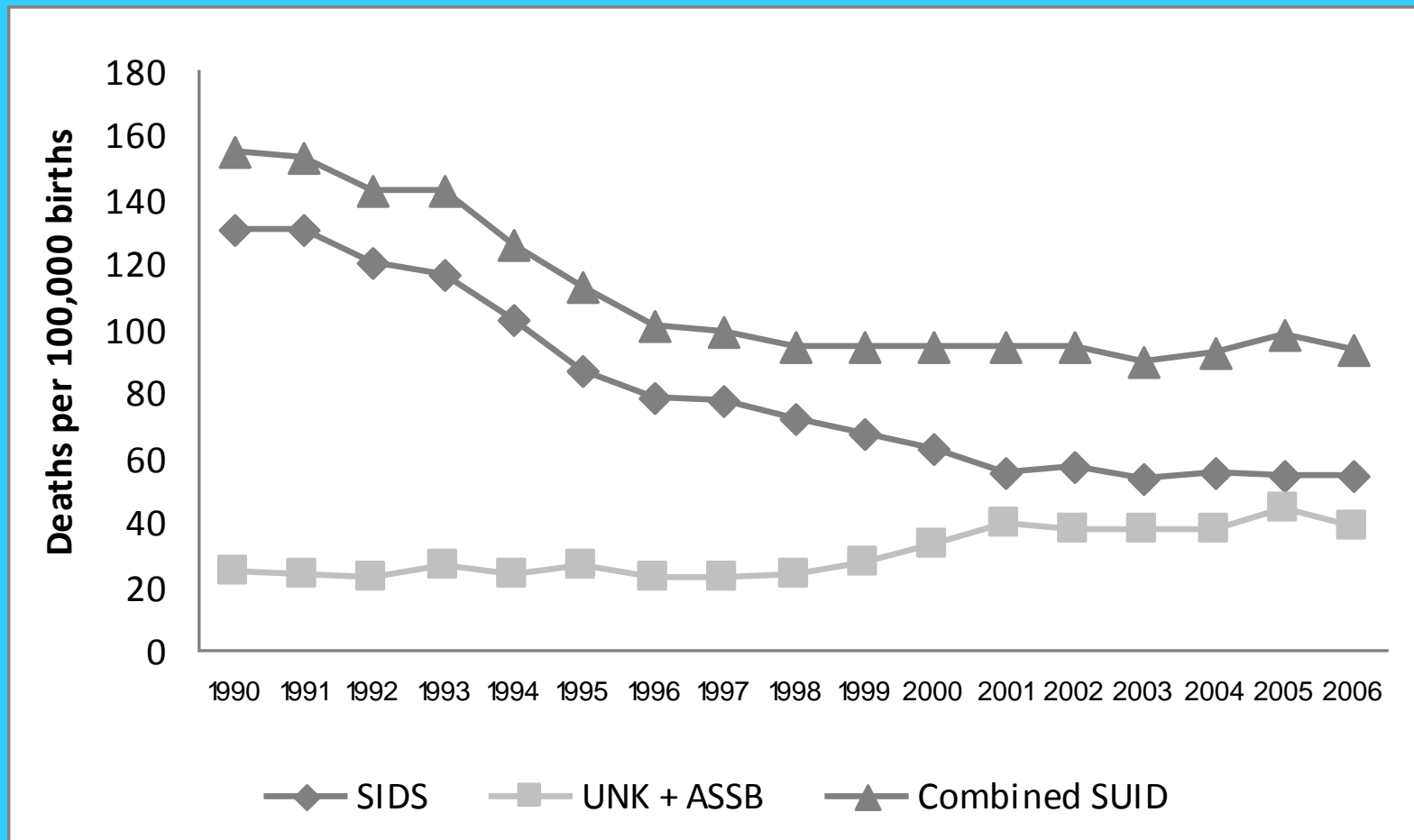


SIDS Rate and Back Sleeping (1988 – 2006)



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

Trends in Post-neonatal Mortality: United States 1990-2006



Where Should Infants Sleep?

Sheers, Rutherford, and Kemp

Pediatrics, Oct. 2003



- Infants < 8 months, rate of death in cribs:
.63 deaths/100,000 infants.
- Infants < 8 months, rate of death in adult beds:
25.5 deaths per 100,000 infants.

Risk for SIDS:

Greatest if sharing a sleep surface.

Intermediate if sleeping in another room.

Least if infant sleeps in same room without bedsharing

Bed Sharing with Siblings, Soft Bedding Increase SIDS Risk – Chicago Infant Mortality Study, Pediatrics, May, 2003

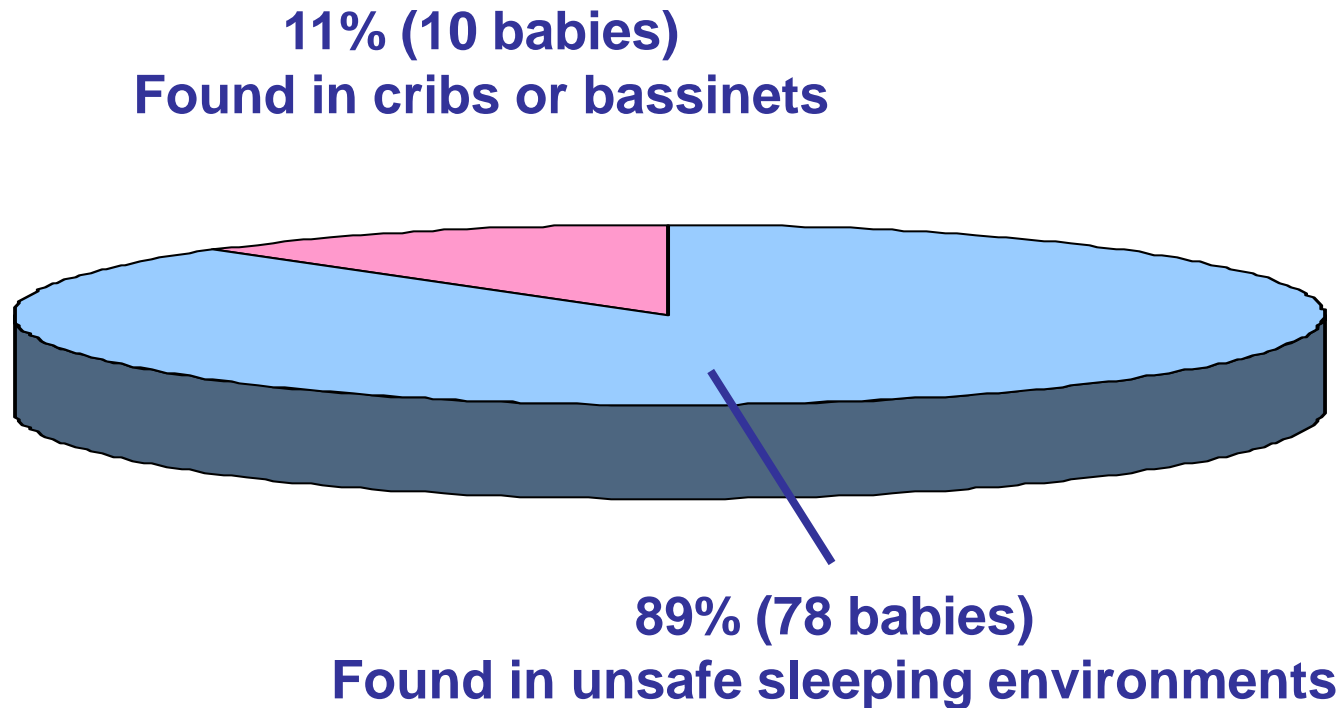
- Sleeping on soft bedding:
increased SIDS risk 5 X
- Sleeping on the stomach:
increased SIDS risk 2.4 X
- SIDS victims were 5.4 times more likely to have
shared a bed with other children.
- Sleeping on the stomach on soft bedding:
increased risk of SIDS 21 times

Unsafe Sleep Environment



Allegheny County, Pa

Study of 88 SIDS Deaths, 1994-2000



Bed Sharing



Bed Sharing



Bed Sharing with Overlay



Bed Sharing with Overlay



Bed Sharing with Overlay



Couch Sleeping



© Michigan Public Health Institute 2006

SIMULATED RECONSTRUCTION

Couch Sleeping



© Michigan Public Health Institute 2006

SIMULATED RECONSTRUCTION

Couch Sleeping



SIMULATED RECONSTRUCTION

Positioners



Pillows and Soft Bedding



Child or Adult Beds



Bed Sharing and the Risk of SIDS: Can We Resolve the Debate?

- Vennemann, Blair, Moon; J Peds, Jan. 2012
- Combined OR for SIDS in all bed sharing vs. non-bed sharing infants = 2.89 (CI, 1.99-4.18)
- The risk was higher for infants of smoking mothers: **OR = 6.27** (CI, 3.94-9.99)
- The risk was highest for infants <12 weeks old: **OR = 10.37** (CI, 4.44-24.21)



Bed sharing when parents do not smoke: is there a risk of SIDS

- 5 large case control data sets
- 1472 SIDS cases; 4679 controls
- AOR controlling for all other risk factors:
 - Bed sharing all ages = 2.7
 - Bed sharing; infant < 3 months = 5.1
- Absolute risk 0.08/1000 vs. 0.23/1000
- Smoking and alcohol greatly increase risk of bed sharing

Carpenter R, McGarvey C, Mitchell EA, et al. BMJ Open 2013;3:e002299



We Need to Move Beyond Back to Sleep



She's on her
back to sleep!





2011 SIDS Task Force Policy Statement: **Key Points**



- Expansion from SIDS to include other sleep related deaths (asphyxia, suffocation)
 - Increasing incidence
 - Similar environmental conditions
- Consistent with, reinforce, and expand on the 2005 recommendations
- Easier to understand, with specific answers to common questions
- Attempt to overcome barriers to implementation with evidence-based answers

2011 SIDS Task Force Policy Statement

- Always place your baby on the back for every sleep time.
- Always use a firm sleep surface that is approved for infant use.
- The baby should sleep on a separate surface, but close to the parents (room-sharing).
- Do not use soft objects or loose bedding, including wedges, positioners, or [bumpers](#).



2011 SIDS Task Force Policy Statement

- Get regular prenatal care.
- **Breastfeed your baby as much as possible.**
- Consider offering a pacifier at each sleep opportunity.
- Avoid overheating, head-covering.
- **Get your baby immunized.**
- Avoid commercial devices marketed to reduce the risk of SIDS.



2011 SIDS Task Force Policy Statement

- Do not use home cardiorespiratory monitors as a strategy for reducing the risk of SIDS.
- Supervised, awake tummy time is recommended to facilitate development and to minimize the development of positional plagiocephaly.



Bumper Pad Fatalities

- Thach study using CPSC data found 3 mechanisms for deaths related to BPs:
 - Suffocation against soft “pillow-like” bumpers
 - Entrapment between mattress or crib and firm bumper pads
 - Strangulation from bumper pad ties



Sleep position and Reflux

- Infants with 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.



Avoid Overheating

- Increased risk of SIDS
 - Definition of overheating varies.
 - Cannot provide specific room temperature guidelines.
- Dress infants appropriately for the environment, with no greater than 1 layer more than an adult would wear to be comfortable.
- There is currently insufficient evidence to recommend use of a fan as a SIDS risk-reduction strategy.



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.





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: Last/Referent Sleep and SIDS Risk (Hauck 2005)

A. Univariate Analyses

Source	Odds Ratio
Carpenter et al 2004	0.47 (0.34-0.64)
Fleming et al 1999	0.62 (0.46-0.83)
Hauck et al 2003	0.33 (0.21-0.54)
L'Hoir et al 1999	0.16 (0.07-0.36)
McGarvey et al 2004	0.34 (0.22-0.50)
Mitchell et al 1993	0.44 (0.26-0.73)
Tappin et al 2002*	0.55 (0.32-0.95)
Tappin et al 2002†	0.91 (0.47-1.76)
Summary Odds Ratio	0.47 (0.40-0.55)

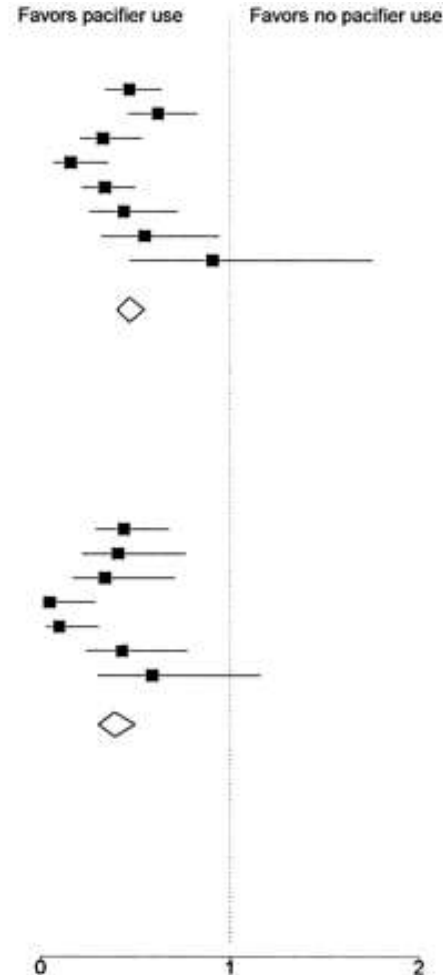
Test for homogeneity $P = 0.010$
 Test for overall effect $P < 0.001$

B. Multivariate Analyses

Source	Odds Ratio
Carpenter et al 2004	0.44 (0.29-0.68)
Fleming et al 1999	0.41 (0.22-0.77)
Hauck et al 2003	0.34 (0.17-0.71)
L'Hoir et al 1999	0.05 (0.01-0.29)
McGarvey et al 2004	0.10 (0.03-0.31)
Mitchell et al 1993	0.43 (0.24-0.78)
Tappin et al 2002*	0.59 (0.30-1.17)
Summary Odds Ratio	0.39 (0.31-0.50)

Test for homogeneity $P = 0.040$
 Test for overall effect $P < 0.001$

* "A little" pacifier use
 † "A lot" pacifier use



Pacifier Risks??



- Dental malocclusion:
 - Non-nutritive sucking is normal in infants
 - AAPD and AAP conclude that it is unlikely to cause long-term problems if stopped by age 3
- Otitis media:
 - Risk 1.2 to 2 times increased....But incidence is low in first 6 months, when SIDS risk is highest
- Gastrointestinal infections more common?
- Increased oral colonization with Candida

Pacifiers and Breastfeeding

- Observational studies: consistent relationship between pacifier use and decreased breastfeeding duration



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!**



Recommendations: Pacifier Use

- Consider using a pacifier at bedtime and nap time during the first year of life
 - If breastfeeding, delay pacifier introduction until 3 to 4 weeks of age to assure firm establishment of breastfeeding
 - Use when baby is falling asleep
 - Do NOT reinsert after baby is asleep
 - Do NOT coat in any sweet solution
 - Clean pacifiers often and replace regularly



+



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HEALTHY & SAFE

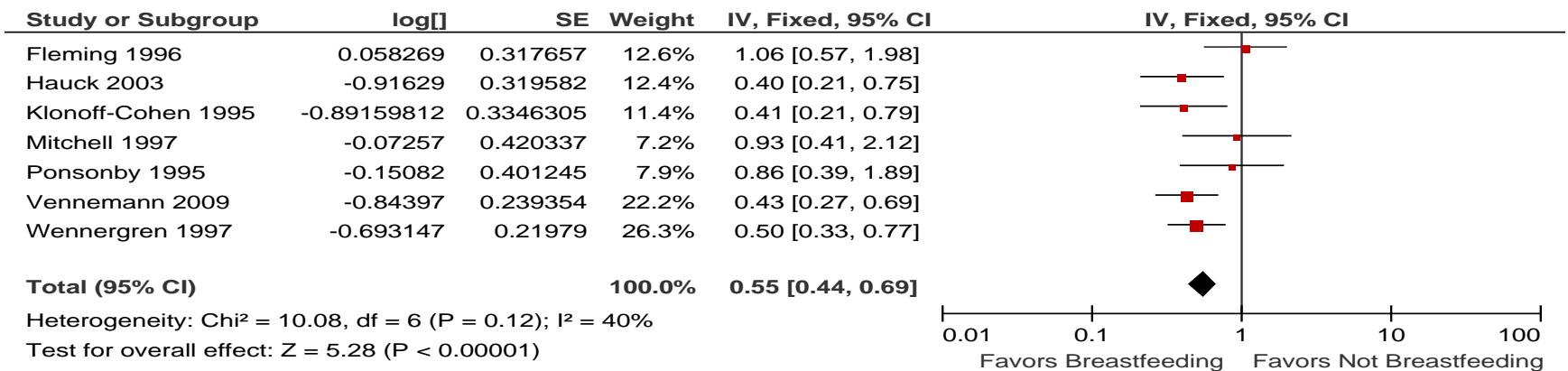
Claim: This is anti-Breastfeeding

- Answer: Untrue! AAP completely supports breastfeeding through the first year of life
- Earlier studies: Conflicting data on breastfeeding protecting against SIDS



Recommendation: Breastfeeding is Protective Against SIDS!!

- Agency for Healthcare Research and Quality meta-analysis (**adjusted summary OR, 0.64**; 95% CI, 0.51-0.81)
- German SIDS Study Group (50% protective effect)
- Hauck, Vennemann, and Moon meta-analysis (18 case control studies): **Adjusted OR = 0.55**



Breastfeeding: Protective Mechanisms Against SIDS



- Breastfed babies more easily aroused from sleep vs. formula fed babies
- Breastfeeding decreases incidence of multiple infectious illnesses, esp. respiratory and GI...associated with increased vulnerability to SIDS
- Breast milk contains maternal antibodies, micronutrients, cytokines which promote immune system benefits



Breastfeeding, Bed Sharing, and SIDS

- Breastfeeding is common reason for bed sharing (Hauck, 2008)
- Bed sharing associated with longer duration of breastfeeding
 - ?Causal
- While bed sharing may facilitate breastfeeding, it is not essential for successful breastfeeding (Hauck 2009)
- Benefits of breastfeeding do not outweigh the increased risk associated with bed sharing (Ruys, 2007)

Other Maternal Characteristics Impacting Breastfeeding Duration

- At least some college education
- Non-Hispanic white race
- Married
- Did not return to work in the first year of infancy
- Breastfed another child
- Did not smoke postpartum
- Had prenatally planned to exclusively breastfeed
- Had no neonatal breastfeeding problems
- Age and income (only for any breastfeeding)



Breastfeeding and Infant Sleep Safety

- Bedsharing has NEVER been shown to be essential to the success of breastfeeding or the establishment of parental bonding.
- This is all about the SAFETY of the baby, NOT the convenience of the parents!





The Bedsharing Advocates



- Dr. James McKenna, Dr. Bill Sears, Academy of Breastfeeding Medicine
- Many of their recommendations = AAP
- They do NOT advocate other children in the bed
- List many caveats to bedsharing:
 - Smoking, drinking, medications causing drowsiness, obesity
 - **Don't if you are excessively tired!!!!**



Bedsharing and Infant Death

- **FACT:** Half of the infants in the U.S. who die from Sudden Unexpected Death do so while sleeping with their parents
 - U.S. experience with bedsharing and infant death is very different from other cultures
 - Cultures where babies routinely sleep with their parents:
 - Use firm mats on the floor
 - Have separate mats for the infant
 - Do not use soft bedding

Trends and Factors Associated With Infant Bed Sharing 1993-2010

- 19,000 participants: 11% routinely bed share
- Increased from 6.5% to 13.5%
- Factors associated with bed sharing:
 - less than HS education
 - non-white
 - Lower household income (20K, 20-50K)
 - West or South US
 - age of infant (<8 wks, 8-15 wks)
 - prematurity



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)



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!

model behavior Parents tend to copy practices that they observe in hospital settings. As a nurse, you play a vital role in ensuring an infant's health and survival after they leave the hospital. This is the most important modeling job of your life.

All term infants should be placed to sleep on their backs from the start.

During rooming in, it must be made clear that the infant is to sleep in a crib or bassinet. Bedsharing should not take place in the mother's room.

Keep soft materials such as pillows, blankets, comforters, bumper pads, sheepskins, stuffed toys and other soft objects out of the infant's sleeping environment.

Pacifier use should be encouraged after breastfeeding has been established for one month.

Blankets used for swaddling should come no higher than the infant's chest.

Parents/caregivers need to be made aware of the dangers of anyone smoking around the infant.

model behavior

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



Safe Sleep and WIC



- 310 families: prerequisite to food vouchers:
 - Trained educator with groups of 3-10
 - Sleep position, bed sharing, smoke avoidance
- Intention to back sleep: from 58% to 85%
- 6 month follow-up vs. control group:
 - Supine: 75% vs. 45%
 - Bed sharing: 16% vs. 44%

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”
- Why bother? Recommendations keep changing anyway
- Vigilance: sleep with baby for protection





Things you can do in your practice...

- Give parents tools to cope with fussy babies
- Sleep-deprived parents may make poor judgments
- Make use of tools such as swaddling, side carrying, shushing, swinging, and sucking



Changes you may wish to make in your practice

- Discuss sleep safety instead of just SIDS
- Discuss concerns about aspiration and choking with parents of young infants
- Discourage use of bumper pads and other soft bedding
- Encourage roomsharing without bedsharing



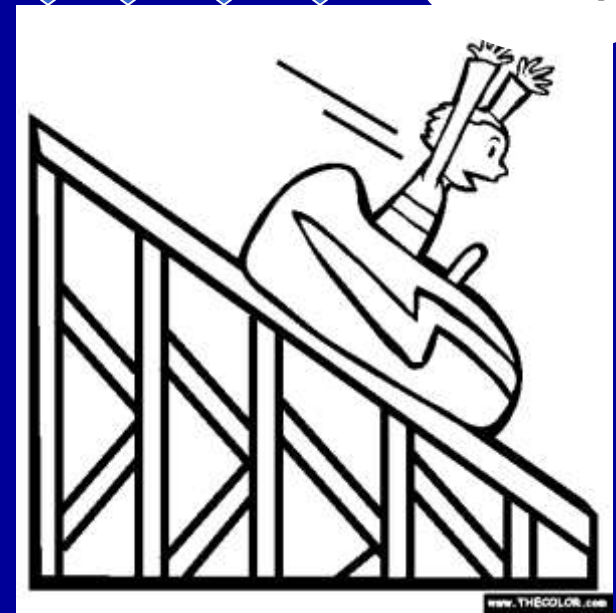
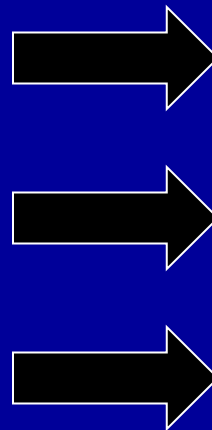
Achieving a Cultural Shift on ISS

Inconsistency of message.
Lack of HCP education.
Wrong advice from family and friends.
Unsafe sleep images.
Inappropriate sleep products.

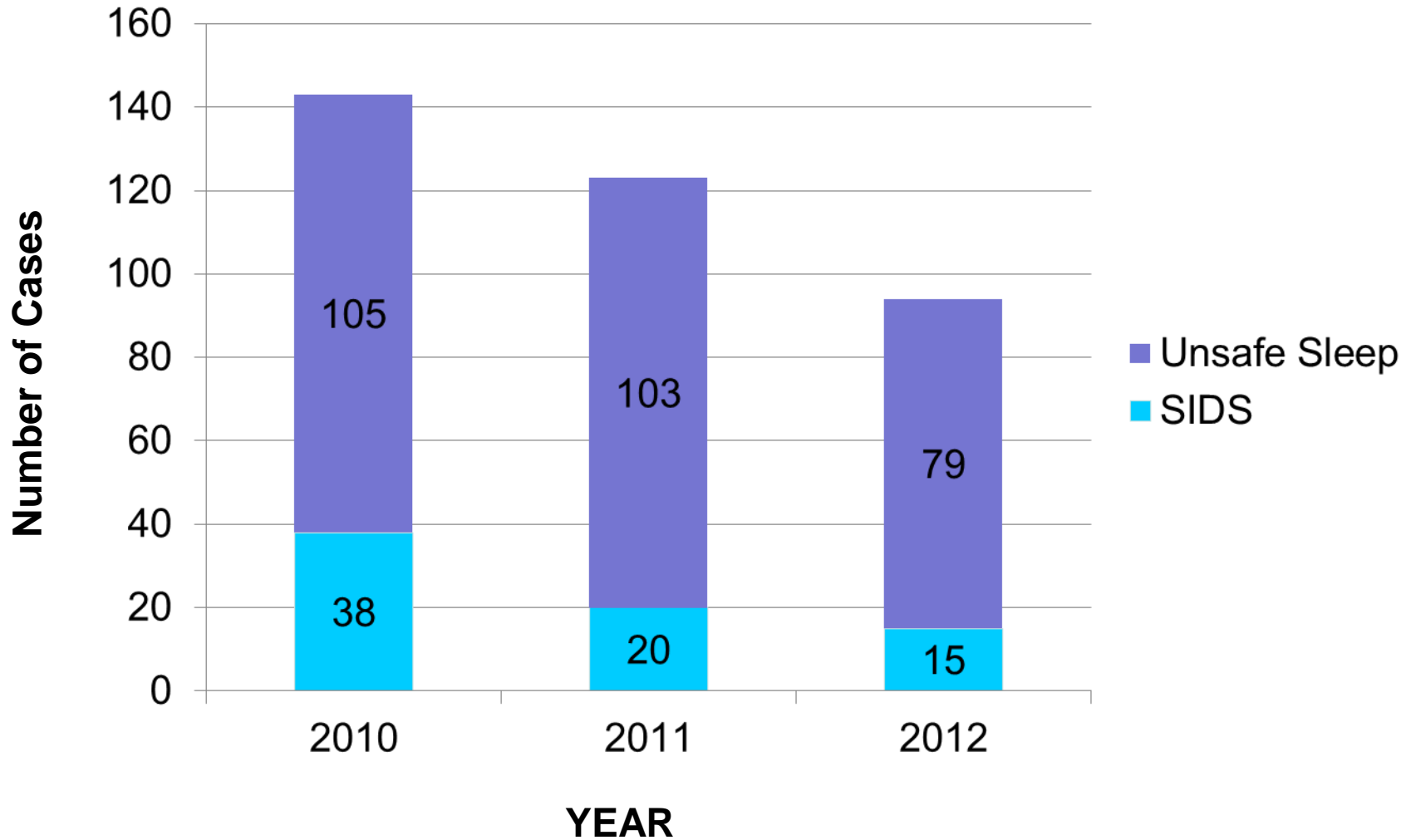


National campaign with consistency of message.
Improved HCP education.
Partnership: Religious Leaders.
Safe sleep images.
Social marketing.
Legislation?

Safe
Sleep

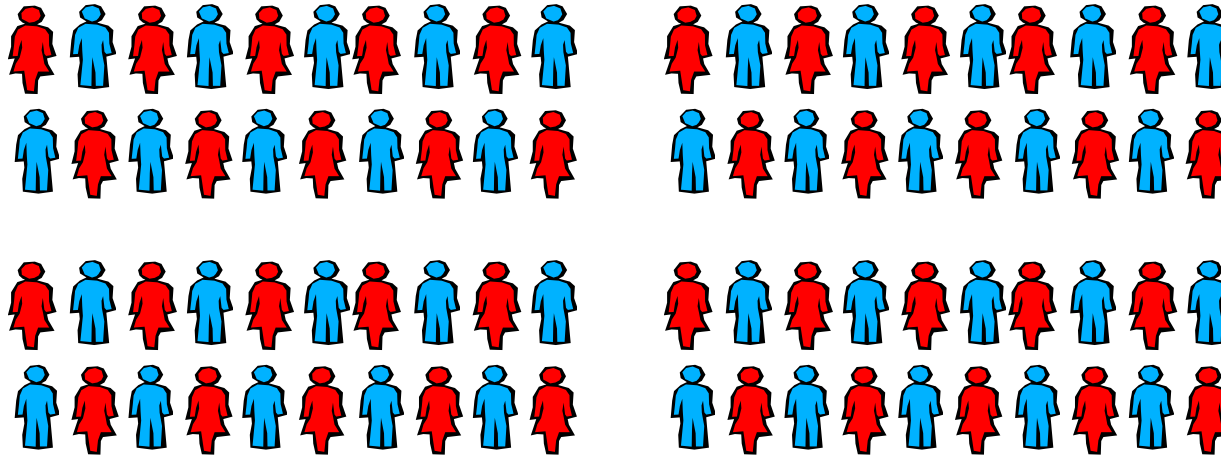


PA Child Death Review Data 2010-2012



Impact of Eliminating Sleep-Related Deaths

- 79 children = equivalent of four kindergarten classrooms



The 's of Safe Sleep



Alone

Not with other people, pillows, blankets, or stuffed animals.



on my Back

Not on the stomach or side.



in my Crib

Not on an adult bed, sofa, cushion, or other soft surface.

York County Cribs for Kids Sponsors

- Ronald McDonald House Charities
- Rotary Club of York
- Wal-Mart
- York County Community Foundation
- York City Health Bureau
- Wellspan Health

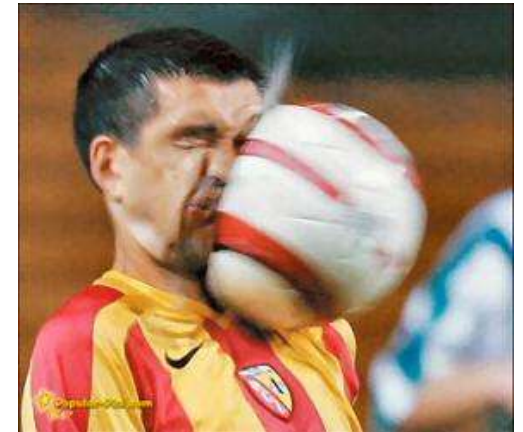


THANK YOU!!!



Contact Information

- mgoodstein@wellspan.org
- Cribsforkids.org



Environmental Similarities in SIDS and Suffocation



RISK FACTOR	SIDS	SUFFOCATION
Stomach Sleeping	yes	unknown
Soft Bedding	yes	yes
Adult or other bed, couch	yes	yes
Over-bundling	yes	yes
Loose Bedding, head cover	yes	yes
Bed Sharing	yes	yes
Cigarette Smoke	yes	unknown