A Brief History of Sudden and Unexpected Death in Infants

Eileen Tyrala, MD, FAAP
Medical Director, Cribs for Kids
• Record of official dictum forbidding mothers to take infants under three years of age into their beds
The History of SUID

• 14th Century England

Overlay of one’s infant regarded as a sin

Medieval Church Injunctions against taking infants to bed upon pain of punishment if overlay should occur

Punishment may have been penance for as long as three years, bread and water for a year and no chance of absolution
The History of SUID

- 16th Century Florence, Italy
  - Penalties given to unwed mothers whose infants suffocated in bed
  - Old women were accused of being witches who killed babies and replaced them in their parents’ bed
sometimes suffocated, she replied at once, “No, Signor, but then the arcuccio is always used. It is a wooden framework, with arches of iron to prevent the child being overlaid. It is placed in the bed between the husband and wife. In my country (Pisters) we call them ‘arococchi.’” In answer to the question whether they were in common use in Florence, she

replied in the affirmative, and offered to borrow one for inspection from a neighbour who had brought up a large family. Within five minutes the arcuccio arrived. It had evidently seen much hard use, but was still serviceable. It consisted of a wooden head piece, measuring 10 inches by 13 inches, two wooden sides 30 inches long and an inch or so...
The “Arcuccio”

• Described in “The Art of Nursing”, London, 1733

• Mentioned in edition of “Philosophical Transactions of the Royal Society of London”
History of SUID

• 1862, Dr Anthony Leared writing in the “English Women’s Journal”

• “Nor must we forget a lamentable but frequent cause of death that in which the infant is “overlaid” in its’ slumbers by a careless, perhaps drunken nurse or mother.”
History of SUID

• 1872, Philadelphia

• “The Physical Life of Women: Advice to Maiden, Wife and Mother”

• “One cause of death to which infants are peculiarly liable .... is being overlain by parents. For this reason, some physicians caution the mother against having the infant in bed with her while she sleeps”
History of SUID

• Transition for punishment for infanticide from ecclesiastical to secular authority gradually evolved in the 19th century

Civil and Coroner’s courts began investigating cases of overlying and smothering and began to perform autopsies
448 Thymus: Superior Mediastinum—I

The sternum and ribs have been excised and the pleurae removed.

Observe:

1. The thymus lying in the superior mediastinum; overlapping the upper limit of the pericardial sac below; and extending into the neck, here farther than usual, above.

2. The longitudinal fissure that divides the thymus into two asymmetrical lobes, a larger right and a smaller left. These two developmentally differ, with the right having larger blood-distributing veins.
Theory of Thymic Asthma

- 1763, Morgagni “On the Seats and Causes of Disease” speculated
  - The thymus “gland impinged on the trachea, cutting off the airway or the blood supply to the head resulting in adverse stimulation of nerves controlling respiration and thereby causing suffocation”
History of SUID

• Thymus Theory

—Created a more humanitarian attitude towards nurses and mothers who otherwise would have been accused of negligence and face prosecution
Thymus Theory

Contributed to ill conceived theory of Thymic irradiation of Infants and Children that went on in US from 1926-1947
History of SUID

- 1892, Scotland: Report of Surgeon of Police
- Reported overlay deaths of 258 infants

  - Principle causes of death:
    1. Ignorance and carelessness of mother
    2. Drunkenness
    3. Overcrowding
    4. Illegitimacy
    5. Life insurance of infant
Templeton, 1892

Advocated

- Passage of laws prohibiting parents sleeping with their infants
History of SUID

- Condemned the practice of
- “…placing for feeding the unattended infant in its’ mother’s bed where death from overlaying may be caused by the mother who falls asleep’
- Noted “…inattention to style, weight, and fit of infant clothing and the misuse of pillows, rubber sheets, easily untucked sheets, blankets and unnecessary decorative articles for cribs and carriages were potential causes of infant suffocation”
History of SUID

• “The Ballad of Moll Magee”

• W.B. Yeats, 1889
The Ballad of Moll Magee

...“I lay upon my baby; Ye little childer dear,
I looked on my cold baby
When the morn grew frosty and clear.

A weary woman sleeps so hard!
My man grew red and pale,
And gave me money, and bade me go
To my own place, Kinsdale.

...So now ye little childer
You won’t fling stones at me
But gather with your shinin’ looks
And pity Moll Magee.”
History of SUID

• 1944, Dr Harold Abramson, NYC Committee on Infant Mortality
  – Analyzed infant deaths attributable to accidental suffocation over four year time span
  – 68% of infants were found sleeping on their stomachs
  – 50% found with nose or mouth in contact with bedding
History of SUID

• Drs. Jacob Werne and Irene Garrow, Queen’s County Medical Examiner’s Office, 1942-1953

—Published a series of articles that claimed that fulminating infection was the likely cause of SIDS
History of SUID

NICHD, seeking to spur research interest in SIDS deaths, sponsors Two Conferences:
1963 Conference Conclusion Statement

“one is startled to find that the number of infants who die of the sudden death syndrome is of a comparable order of magnitude to the number of adults who die from carcinoma of the lung. Despite this fact the information is miniscule in comparison to that on carcinoma of the lung.”
History of SUID

• 1965 study by British Government
• “Enquiry into Sudden Death in Infancy”
• proposed three theories of causation
  – 1. Infection
  – 2. Hypersensitivity
  – 3. Suffocation
History of SUID

1969 NICHD Conference
- Attended by scientists from all over the world and by parents who had lost infants to SIDS
- Current Definition of SIDS crafted
- Rallied parents who were upset at lack of progress in understanding causation
  - Lobbied Congress to support SIDS research and provide support for grieving families

Resulted in “Sudden Infant Death Syndrome Act of 1974”
Sudden Infant Death Syndrome Act of 1974

- Mandated that NICHD take responsibility for SIDS Research
- Established the creation of educational and counseling services for families of SIDS victims
Sudden Infant Death Syndrome Act of 1974

• As a direct result of this legislation the number of grants and contracts funded by NICHD on SIDS related topics soared
History of SUID

• Seven Areas Identified as Areas for Research
  – 1. Developmental Neurophysiology
  – 2. Respiratory, Laryngeal, Cardiac
  – 3. Metabolic, endocrine and genetic
  – 4. Immunology and Infection
  – 5. Epidemiology
  – 6. Anatomic Pathology
  – 7. Behavioral
The Apnea Theory of SIDS
PROLONGED APNEA AND THE SUDDEN INFANT DEATH SYNDROME: CLINICAL AND LABORATORY OBSERVATIONS

Alfred Steinschneider, M.D., Ph.D.
From the Department of Pediatrics, State University Hospital of the Upstate Medical Center, Syracuse, New York

ABSTRACT. Little is known of the final physiologic mechanism(s) resulting in SIDS. Five infants participated in this study, three of whom were referred at about 1 month of age because of cyanotic episodes of undetermined etiology. Inspirations and eye movements were recorded during several sleep sessions on each patient. In addition, patients were observed on an apnea monitor and a record was kept of the incidence of prolonged apneic episodes (>15 seconds).

The laboratory sleep studies revealed frequent periods of apnea (>2 seconds) which (1) decreased in amount after a certain age and (2) were most frequent during REM sleep. All infants had a number of prolonged apneic and cyanotic episodes during sleep, some requiring vigorous resuscitative efforts. Prolonged apneas most often occurred in conjunction with an upper respiratory tract infection or when frequent apnea was noted in the laboratory. Two of the infants subsequently died of SIDS.

These data support the hypothesis that prolonged apneas, a physiological component of sleep, is part of the final pathway resulting in sudden death. It is suggested also that infants at risk might be identified prior to the final tragic event. Pediatrics, 50, 640, 1972, Sudden Death, Infants, Apnea, Sleep, NASOPHARYNGITIS.

SUDDEN unexpected, unexplained death in infancy (SIDS) continues to represent a problem of major medical significance. It has been estimated that greater than 10,000 apparently well infants die each year in the United States suddenly and, in spite of detailed autopsy study, without adequate explanation. For an intensive review of the literature see Valdes-Dapena.*

The plethora of suggested etiologic mechanisms of SIDS attests to the lack of agreement among investigators of this problem. This disagreement extends as well to the methodologic approaches employed in the search for the cause of SIDS. The approach taken in the present study derives, in part, from the observation that SIDS occurs in most instances while the infant is asleep. Furthermore, considerable sleep research has demonstrated marked alterations in such fundamental physiologic functions as cardiac rate, blood pressure, and respiration.** Of particular relevance is the observation of periods of apnea in both sleeping adults and infants. For the purpose of providing direction to this study it was proposed that SIDS occurs as the result of an exaggeration of the physiologic changes noted to occur during sleep. This report consists of the study of five infants, two of whom died of SIDS.

SUBJECTS AND METHODS

The five infants participating in this study were from three different families. Patients 1, 3, and 5 were seen initially at 29, 32, and 40 days of age, respectively, because of recurrent cyanotic and apneic episodes. The remaining two patients, 2 and 4,
Steinschneider’s Hypothesis

• “Prolonged apnea, a physiologic component of sleep, is part of the final pathway resulting in sudden death”
THE DEATH OF INNOCENTS
A True Story of Murder, Medicine, and High-Stakes Science

"Unforgettable...a powerful account of scientific error and delusion...Firstman and Talan have created an immense, masterful and very significant work."
—The Washington Post Book World

RICHARD FIRSTMAN AND JAMIE TALAN
NY Academy of Science Congress on SIDS, 1987

- Focused on areas that seemed to have greatest likelihood of contributing to SIDS

Cardiac and Respiratory
NY Academy Congress on SIDS

• Concept of the SIDS infant being the ultimate victim of chronic hypoxia as a result of respiratory and/or cardiac irregularities

• Concept of decreased arousability of SIDS infant to hypoxia and hypercarbia

• Epidemiologic evidence of increased incidence in infants exposed prenatally to smoke, and in preterm and low birth weight infants
History of SUID

- 1970’s: Abrupt Increase in SIDS rates in Netherlands occurred when infant sleep position changed relatively abruptly from predominantly supine to prone:
  - 1969/1971: 0.46/1000 live births
  - 1986: 1.3/1000 live births
■: Accidental mechanical suffocation in bed or cradle; 1969–78 ICD No E913.0.
□: Miscellaneous ill defined causes; 1969–78 ICD No 796.0/796.2/796.3/796.9/E913.9, 1979–87 ICD No 798.9/799.0/799.9/E913.8/E913.9. The arrow indicates the time introduction of the prone sleeping position in The Netherlands.
History of SUID

• 1986: Beal, SM. “Sudden Infant Death Syndrome: epidemiologic comparisons between South Australia and communities with a different incidence”, Austr Paediatric J

• Showed relationship between a decrease in prone positioning and a decrease in incidence of cot death
History of SUID

• 1987, Netherlands: Extensive Media publicity about association between prone sleep position and Cot death

  – 40% decrease in Cot death occurred in the Netherlands between 1987 and 1988
History of SUID

- 1992: AAP Task Force on Infant Positioning and SIDS recommends that most infants be placed on their back or side for sleep

- 1994: “Back to Sleep Campaign”
  - Decrease in SIDS rates in US by 50% by 1999 from 1.2/1000 to 0.57/1000
History of SUID

• 1996: CDC Issues Guidelines for Infant Death Scene Investigation; revised 2006

• For the first time, will allow for comparable data to be collected nationwide on infant deaths adding immeasurably to our knowledge of the cause of sudden and unexpected infant death
Since 2000, SIDS rates have continued to decline but post-neonatal infant death rates have stabilized.

<table>
<thead>
<tr>
<th>Diagnosis</th>
<th>ICD-9/ICD-10 Code</th>
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<tr>
<td>SIDS</td>
<td>7980/R95</td>
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<tr>
<td>Sudden unexpected infant death</td>
<td></td>
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<tr>
<td>Unknown and unspecified causes</td>
<td>799.9/R99</td>
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<td>Suffocation in bed</td>
<td>E913.0/W75</td>
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<tr>
<td>Suffocation &quot;other&quot;</td>
<td>E913.1-E913.9/W76-W77 and W81-W85</td>
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• Recognition that stricter death scene investigative guidelines have caused a “Coding Diagnostic Shift”
• More deaths are identified as being due to suffocation
  —AND
Coding Diagnostic Shift

• More deaths are labeled as
  “unexplained” or “undetermined” when infants are found in adult beds or sleeping on soft surfaces at time of death
2005: AAP Task Force on SIDS Issues New Risk Reduction Guidelines

Back Sleep Position Only- side sleeping not recommended

No smoking during pregnancy
Avoid second hand smoke exposure

Use of Firm Sleep Surface only

Remove All extraneous Objects from Crib
- Toys, Pillows, Quilts, Sleep positioners, thin bumpers, etc.
2005: AAP Task Force on SIDS Risk Reduction Guidelines

Provide a Separate but proximate Sleep environment (NO BEDSHARING!)

Avoid Overheating

Avoid Commercial Devices marketed to reduce the risk of SIDS (i.e. sleep positioners)

Do not use home monitors to reduce the risk of SIDS

Consider offering a pacifier (after one month in breast fed infants)

Avoid development of positional plagiocephaly by encouraging “Tummy Time”
2006

- CDC Releases new “Sudden Unexplained Infant Death Investigation Reporting Form”

- Begins efforts to train and encourage coroners and ME’s and other investigators of infant deaths to collect more accurate data
CDC launches pilot projects in
- New Jersey
- Georgia
- Michigan
- Indiana

Will use the new protocols in a comprehensive and coordinated fashion to obtain the best data possible re causes of SUID