SUPC: Sudden Unexpected Postnatal Collapse
When "Normal Transition" Fails
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- Director of Education and Professional Development
- I currently present/receive financial reimbursement
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SUPC: Clinical Exemplar
A 39 weeks' gestation girl is born to a 31-year-old gravida 2, para 2 woman via spontaneous vaginal delivery. Prenatal labs reveal mom's blood type as A positive and her serologies are unremarkable. Rupture of membranes occurs at 7 hours and her amniotic fluid is clear. The infant's APGAR scores are 9 at 1 and 5 minutes and her initial exam is normal.

She is placed skin to skin with her mother. She is then breast fed and falls asleep in her mother's arms. Within 2 hours, nursing staff notices the infant to be limp and cyanotic.
A full resuscitation is initiated with chest compressions and the infant is intubated. Her arterial blood gas shows a pH of 7.17, partial pressure of carbon dioxide of 19 mm Hg, partial pressure of oxygen of 142 mm Hg, and a base deficit of 20. She is placed on mechanical ventilation. On physical exam, her birthweight is 3 kilograms (30th percentile). She has some agonal respirations and clear breath sounds.

Her cardiac exam is normal with a split S2 and no murmurs. Her abdomen is non-distended with no abnormal masses. She is hypotonic with minimal response to stimuli and her pupils are 4mm bilaterally with sluggish response to light.

She is admitted to the neonatal intensive care unit and started on a 72 hour cooling protocol. Multiple fluid boluses are given for metabolic acidosis and an insulin drip is initiated for her hyperglycemia. A blood culture is drawn and she is placed on empiric antibiotics. She is started on low dose dopamine. An echocardiogram is unremarkable.

Her EEG results suggest severe, diffuse cerebral dysfunction. Upon re-warming, the infant has shallow respiratory efforts with no gag reflex and no response to movement. Her repeat EEG results are unchanged and brain MRI is performed and is suggestive of acute ischemia or infarction.

Her family decides to withdraw support.
SUPC: Definitions

- **SUPC** Sudden Unexpected Postnatal Collapse
- **eSIDS** Early Sudden Infant Death Syndrome
- **ALTE** Apparent Life Threatening Event
- **SUDI** Sudden Unexpected Death in Infancy
- **SUEND** Sudden Unexpected Neonatal Death
- **ENSUND** Early Neonatal Sudden Unexpected Death
- **ESUDI** Early Sudden Unexpected Death in Infancy


SUPC: Definitions

- The lack of consistency in the definition of SUPC makes determining its incidence challenging. Difference in inclusion criteria, with some excluding newborns in which an underlying reason can be identified and others including those newborns, wide range of occurrence rates exists, from as few as 2.6 per 100,000 to as many as 133 per 100,000 newborns.

- At a rate of SUPC of 2.6 to 133 per 100,000 newborns, we estimate that between 91 and 4,634 apparently healthy newborns could be afflicted by this condition each year in the United States.

SUPC: Description

"A rare but devastating neonatal event involving a well-appearing, full-term newborn."
SUPC: Description

- Sudden Unexpected Postnatal Collapse
  - APGAR scores of eight or more
  - Suddenly collapse/crashes
  - Often with full respiratory/cardiac arrest
  - Greatest risk during first 2 hours of life
  - Coincides with the time frame when nurses encourage breastfeeding and uninterrupted skin-to-skin contact (SSC)
  - 50% of newborns with SUPC die
  - Survivors may suffer neurological damage

SUPC: Described

- “The time frame during which the event must occur to be characterized as SUPC has not been standardized.”
  - 1/3 during the first 2 hours of life
  - 1/3 between 2 to 24 hours of life
  - 1/3 between 1 and 7 days of life
  - “However, there is agreement that the period of greatest risk is the first 2 hours after birth.”

- What Else is Happening During this Time?


“It may look like I’m doing nothing but on a cellular level I am really quite busy.”

First 2 Hours of Life are of Greatest Risk
- Role of dynamic, rapid, transitional physiologic changes in both mother and infant
- Coincides with the time frame when nurses encourage breastfeeding and uninterrupted skin-to-skin contact
- Period of potentially increased distraction for everyone involved

Neonatal Risk Factors
- Infant required PPV
- Low APGAR scores
- Late preterm and Early Term (37-39 weeks GA)
- History of difficult delivery
- Mother receiving medications (pain, general anesthesia, MgSO4) that may affect infant
- Excessive sleepy mother and/or infant
**Maternal Risk Factors**

- Primiparous mothers
- Prone infant positioning
- Unsupervised breastfeeding
- Low ambient temperature; low lighting
- No support person—parents alone with baby
- Distraction—cell phones, social media, visitors
- Others

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**Racial and Ethnic Trends in Sudden Unexpected Infant Deaths: United States**

- AIAN American Indian/Alaska Native
- NHB Non-Hispanic Black
- NHW Non-Hispanic White
- API Asian Pacific Islander

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**"Triple Risk Hypothesis" of SUPC**

- Borrowed from the current concept of SIDS
- Presence of an underlying genetic or developmental predisposition
- Combined with an external "trigger"
- Event occurs synergistically
- During a vulnerable period of development

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AAP Committee on Fetus and Newborn

"As hospitals are making progress towards providing skin-to-skin care and rooming-in, which facilitate breastfeeding initiation, it is important that infants are adequately supervised to ensure safety, prevent falls, and prevent sudden unexpected postnatal collapse."


Published Reported Cases of SUPC Vary...

- Criteria
- Definitions
- Inclusion criteria
- Exclusion criteria
- Sweden, France, England, Germany, Austria, Italy, and the US

However... “SUPC is associated with prone positioning, skin-to-skin care, co-bedding in 74% of reported cases.”


SUPC...And So It Began

**SUPC: Benefits of Skin-to-Skin Care (SSC)**

- Benefits of Skin-to-Skin Care
  - Optimal regulation of the newborn’s respiratory, temperature, and glucose status
  - Promotes a calm, supportive transitional environment
  - Separation may adversely affect mothering behaviors
  - Improvement in initiation, duration, and exclusivity of breastfeeding and enhanced milk production
  - Improves potential for breastfeeding success
  - Facilitates the establishment of infant’s microbiome
  - American Academy of Pediatrics (AAP) considers skin-to-skin positioning as the safest place for healthy newborns

**SUPC: Dissonance**

ACOG Paper
- Optimizing Support for Breastfeeding as Part of Obstetric Practice

AAP Committee on Fetus and Newborn

"Practicing a standardized approach to infant monitoring, which includes optimal infant positioning and observation, is vitally important in order to avoid adverse events".

Nursing Surveillance

"Nursing surveillance is likely the most significant way to reduce the risk of SUPC."
- In 77% of incidences studied:
  - The mother or both parents were alone with the newborn at the time of the episode
  - When alone with their newborns, mothers recognized signs of trouble only 1/3 of the time
  - When both parents were present, recognition rose
- Surprisingly, only 12.5% of health care workers recognized signs of distress in their own newborns
**RAPP Score**

**Respiratory, Activity, Perfusion, and Position Tool**

- A simplified and rapid newborn assessment tool that incorporates safe position requirements
- Monitoring of the infant's head, neck, nose, and mouth is critical for prevention of SUPC
- Should continue after resuscitation completed

**RAPP Score: RESPIRATORY EFFORT**

- *Is the infant breathing easily?*
- Normal respiration (40–60 breaths per minute)
  - Not irregular, no apnea, and no ↑ WOB
  - No grunting, nasal flaring, nor retractions
- If the answer to the question posed above is "Yes" the infant is breathing easily
  - Continue to the next assessment parameter
- If answer is "No" infant is not breathing easily
  - Proceed with current NRP procedures

**RAPP Score: ACTIVITY**

- Refers to what the infant is doing and in which state (asleep, quiet alert, active, crying)
  - Healthy infants generally move about
  - Alternating movements with rest periods
  - Movements cease for up to ten minutes
  - *Breathing is an infant behavior in an awake state*
    - If a 'quiet' infant does not respond to tactile stimulation the infant is "non-responsive"
    - Ominous sign
  - If unresponsive initiate resuscitation measures
• **RAPP Score: PERFUSION**
  - Perfusion represents oxygenation which can be described using the *color of the skin*
    - Ideal color is pink (mottled, spotty pink, pale)
    - May be cold - peripheral vasoconstriction
    - Delayed transition or underlying illness
  - If infant’s skin pale, gray, dusky, or blue cyanotic
    - Suggests impaired circulation or perfusion
    - Infant should be removed from SSC
    - Placed in a radiant warmer
    - Comprehensive evaluation.

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• **RAPP Score: POSITION**
  - Position of the head (should be upright and turned to one side), neck (should be erect in midline, not bent), nares and mouth (both should be uncovered and visible) and extremities (extremities should be well flexed when infant is lying prone on his/her abdomen).
  - Flaccidity of a limb or whole body is an ominous sign suggesting poor oxygenation of the brain.
  - Position also refers to the mother’s position as she holds her infant to her breast or in SSC. The mother should be semi-upright and supported by three to four pillows. The upright position provides gravitational assistance for infant respiration.

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Components of Safe Positioning for the Newborn While Skin-to-Skin

1. Infant’s face can be seen
2. Infant’s head is in “sniffing” position
3. Infant’s nose and mouth are not covered
4. Infant’s head is turned to one side
5. Infant’s neck is straight, not bent
6. Infant’s shoulders and chest face mother
7. Infant’s legs are flexed
8. Infant’s back is covered with blankets
9. Mother-infant dyad is monitored continuously by staff in the delivery environment and on the postpartum unit
10. When mother wants to sleep, infant is placed in bassinet or with another support person who is awake and alert.
**Nursing Instruction and Education**

- One study found that providing information to parents did not reduce the incidence of SUPC.
- However, the cases were less severe, suggesting that having informed parents leads to earlier recognition and intervention.

> "No substitute exists for nursing surveillance."

**AAP Committee on Fetus and Newborn**

> "Particular attention is required for breastfeeding dyads when the woman is using opioid analgesia."

**Checklist for Newborns During Skin-to-Skin**


Particular attention is required for breastfeeding dyads when the woman is using opioid analgesia.
Quality Bundle to Prevent SUPC (Single Center)

- Pre-/post-intervention model Infants born between January 2014-2017
- Routine skin-to-skin care (Baby-Friendly Requirements)
- SUPC defined as
  - Infants ≥ 36 weeks GA
  - APGAR score > 7 at 10 minutes
  - Considered “healthy”
  - Collapsed during skin-to-skin care or breastfeeding
  - The infant had to receive resuscitation (PPV)
- Do not leave mother’s unattended, especially if primigravida

SUPC: Nursing Intervention


Quality Bundle: Description of SUPC Cases

- Intervention developed by multi-disciplinary team
- Systematic review of the literature
- Two main interventions added
  - Monitoring oxygen saturation by POX from 10 min/age
  - Limits set as <90%
  - RAPP assessment tool initiated
  - Continued for duration of skin-to-skin
- Theory behind the interventions
  - Provide L & O staff with a visual and auditory alarm
  - RAPP mitigates risks of “under-monitoring” by standardizing the timing and components of the assessment

SUPC: Nursing Intervention


Rate of SUPC

Pre-intervention 0.54/1000 live births
Post-intervention 0/1000 live births

SUPC: Nursing Intervention

Parental (n=85) and DR Nursing (n=48) Survey Responses

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<thead>
<tr>
<th>Question</th>
<th>Agree (%)</th>
<th>Disagree (%)</th>
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<tbody>
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<td>Device and Distraction</td>
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Distractions

SUPC: Device and Distraction
Distractions

SUPC: Device and Distraction

Advice to Mothers

- Avoid distraction, particularly the use of electronic devices such as smartphones, during SSC and breastfeeding

SUPC: Nursing Intervention

Maternal distraction from smartphone use: a potential risk factor for sudden unexpected postnatal collapse of the newborn

- In a summarization of risk factors for SUPC, based on international literature, maternal distraction from smart phones was identified

SUPC: Device and Distraction


In 1 report of 26 cases of SUPC in healthy newborn infants, 3 cases occurred during smartphone use by the mother.

Similar to the detrimental effects of texting while driving, which led to a 23-fold increase in the risk for traffic accidents and is comparable with having a blood alcohol level of 1.5 mg/mL.

"Some of the potential risk factors for SUPC are modifiable, and others are not."

Nurses can impress upon parents the need for vigilance during the vulnerable newborn period immediately afterbirth and encourage them to wait until later to share their good news with the world of social media.
“No substitute exists for nursing surveillance.”


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