

Sudden Unexpected Postnatal Collapse (SUPC): One Newborn Death is One Too Many: Current Concepts

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Introduction

A single potentially preventable episode of Sudden Unexpected Postnatal Collapse (SUPC) and a recently publicized lawsuit in Oregon (1) generated a lot of attention about optimal and safe early skin-to-skin contact and breastfeeding after delivery of a newborn infant in hospitals everywhere (2). SUPC has been defined as a presumably healthy infant born at greater than 35 weeks of gestation age, with a 10-minute Apgar score of greater than 7, who without warning has an event resulting in temporary or permanent cessation of breathing or cardiorespiratory failure within the first postnatal week of life (3). Garofalo and colleagues modified a definition of SUPC, by Becher et al. (4), which is summarized in Table 1. (1)

Approximately one-third of SUPC episodes occur in the first 2 hours after birth, one third occur between 2 and 24 hours after birth, and one third occur between 1 and 7 days after birth (3). The majority of these cases can be potentially preventable. In a recent paper, about 53% of the SUPC cases were felt to be secondary to airway obstruction. (4)

Quality Improvement (QI) Initiatives

Here we will summarize some of the QI and educational initiatives to reduce the incidence of SUPC and near-miss SUPC. An initiative by Pearlman, Igboechi, and Paul in the Christiana Healthcare System, which was presented at the 2018 Vermont Oxford Network annual meeting, is described:

During the pre-intervention period, the clinical practice guideline for infants born vaginally recommended initiation of skin-to-skin care after an assessment by the labor and delivery nursing staff of muscle tone and breathing in infants ≥ 37 weeks. The guideline deferred initiation of skin-to-skin care for infants who were 36 weeks until a brief assessment by a pediatric provider was completed to ensure no additional supportive care was necessary. We also deferred placing the baby on the mother's chest if mothers were receiving magnesium sulfate, felt to be overly sedated, or demonstrated or verbalized signs of fatigue. Infants placed skin-to-skin were positioned, so the infant's face was visible, nose and mouth were not covered, the head was in the sniffing position and turned to one side, neck and shoulders were straight, and the

back was covered with a blanket. An apical heart rate, respiratory rate, and temperature were obtained before starting skin-to-skin care. Infants were monitored visually by the labor and delivery nursing staff. The nursing staff was asked to remain in the room with the mother and baby during skin-to-skin care. Mothers were encouraged to provide skin-to-skin care for a minimum of one hour but could opt to continue until being transferred out of labor and delivery. Breastfeeding was recommended during the first hour and, for mothers not planning to breastfeed, formula feeding within the first two hours after birth. For infants born by Cesarean section, skin-to-skin care was initiated once the mother's condition allowed.

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In response to two cases of SUPC in May 2015 despite the use of the above guideline, a bundled intervention was developed to prevent SUPC. A multidisciplinary team, including neonatology staff, labor and delivery nursing, physician and nursing leadership and representatives from the hospital Quality and Safety Department, developed the intervention. The final intervention implemented was additionally informed by a systematic review of the medical literature and communication with other large delivery centers. Post-intervention, the criteria for initiating skin-to-skin care did not change. Positioning during skin-to-skin care also was done the same way as in the pre-intervention period. In addition to the previous measures, the bundled intervention included: 1) monitoring oxygen saturation by pulse oximetry starting at 10 minutes of age and 2) The "RAPP" (respiratory activity, perfusion, and position) skin-to-skin assessment tool (5,6.) (Table 2). The oxygen saturation level was monitored by placing a Masimo pulse oximeter probe (TM, Irvine, CA) on the baby's right hand. Oxygen saturation along with other vital signs were monitored by the labor and delivery nurse and recorded every 15 minutes for the first hour after delivery and every 30 minutes subsequently for the duration of skin-to-skin care. The pulse oximeter was set to alarm for any saturation $< 90\%$. RAPP (Respiratory effort, Activity, Perfusion, and Position) was used and scoring began immediately after an infant was placed skin-to-skin by the labor and delivery room nurse. Any score < 2 in the "position field" required RN action/intervention. Mothers could opt out of skin-to-skin care at their discretion in both periods. Monitoring by pulse oximetry and RAPP scoring continued until the completion of skin-to-skin care during mother and infant's stay on Labor and Delivery.

The intervention included more objective components to identify at-risk infants using both a visual (RAPP) and auditory alarm for the labor and delivery nursing staff (pulse oximeter). The use of

TABLE 1. Diagnostic Criteria for Sudden Unexpected Postnatal Collapse

- ≥ 37 weeks' gestation at birth
- Apgar score ≥ 8 at 5 minutes of postnatal age
- Collapse within 12 hours of birth in hospital
- Required resuscitation after collapse with positive pressure ventilation
- Died or received ongoing intensive care

Modified from Becher et al, 2012. (1)

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TABLE 2 ■ RAPPT Infant Scoring System

Sign	0	1	2
Respiratory	Apneic	Grunting/flaring/retracting/tachypneic	No distress, easy regular breathing
Activity	No response	Whimpering, crying, and/or active motion of extremities	Quiet alert, sleeping, or breastfeeding. Arms and legs at rest.
Position	Nares and/or mouth are fully occluded or not visible; and/or neck fully extended or flexed, face into chest or breast	Nares or mouth partially occluded or partially visible; and/or neck partially extended or flexed, partial head turn	Nares and mouth uncovered and visible; neck midline, hands up by neck, head turned to side
Perfusion	Pale, dusky	Acrocyanosis	Visible parts pink
Muscle tone	Flaccid, no flexion of extremities	Extremities fully flexed or vigorous motion	Extremities fully flexed and/or slow, deliberate movement
No recoil			

Abbreviation: RAPPT = Respiratory, Activity, Perfusion, Position, and Tone.

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the pulse oximeter allowed the baby to be continuously monitored while the nursing staff completed other critical tasks including charting and clinical care of the mother. The use of the RAPP assessment tool further mitigated the risks of under monitoring by standardizing vital sign measurements along with an evaluation of babies' positioning and perfusion, rather than just relying on less structured visual monitoring as was done pre-intervention.

Other healthcare facilities have also developed specific approaches to more intense monitoring of infants in the first two hours following delivery. For example, Goodstein and colleagues devised a selective approach to close monitoring and wellness checks for infants during the first 2 hours following delivery based on their York Hospital Skin to Skin Risk Assessment (Goodstein, personal communication 2019).

Garofalo and coauthors have created a SUPC educational module that is now a part of the orientation of all clinical providers who work in labor and delivery as well as in postpartum. They have used the term "pink and positioned" to summarize these concepts for the parents of the newborn when they have their baby skin-to-skin: Airway- the mother can see that the baby's nose and mouth are unobstructed. Breathing- a parent can see the rise of

the baby's chest. Color- a parent can see that the lips and tongue are pink and the baby does not look blue/dusky. This module is outlined in a recent paper in *Neonatology Today* (7).

Davanzo and colleagues have also outlined a detailed initiative to prevent SUPC, while making skin-to-skin contact and breastfeeding safer, especially during the first 2 hours of postnatal life in the care of maternal-infant dyads in Italy (8). Their initiative includes (1) a checklist for newborn infants during the first 2 hours of postnatal life, and (2) advice to mothers and healthcare professionals aimed at the prevention of SUPC during and after the first 2 hours of postnatal life. (8).

Prevention and Outcomes

Based on the international and limited U.S. literature, it is clear that not all SUPC episodes are potentially preventable (2). It is also true that the range of incidence figures for SUPC that have been reported in the literature supports the point made by many clinicians that SUPC is a "rare" event (2-11). However, I think all of us would agree that a single SUPC event, if felt to be potentially preventable, is, as we state in the title of this article, one newborn infant death too many. As we more closely examine SUPC, we also find that there are events or episodes that are referred to as "near misses" (2-11). However, up to 50% of SUPC survivors have residual neurodevelopmental impairment (4).

We have designed several initiatives based on this hypothesis: A percentage of SUPC events may be preventable by implementing a safety monitoring bundle for all newborn infants. The efficacy and generalizability of each approach need to be determined through further implementation and evaluation. Some portion of SUPC may be effectively prevented by frequent assessment post-delivery of the mother/infant dyad, and educating staff and parents to ensure that the infant is "pink and positioned" during "distraction-free" breastfeeding and skin-to-skin contact, as recommended by the AAP (12). We will present and discuss these initiatives in detail in Part 2 of our paper.

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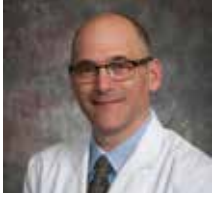
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Perinatal Substance Use

5 ways you can improve care during pregnancy and beyond

Pregnancy presents unique opportunities for patients to make positive changes in their substance use. When you become an informed provider you empower patients to make those changes.



Educate Yourself

Learn more about the pharmacology of substance use. Promote evidence-based care by communicating with patients in a way that separates fact from fiction. Understand the cycles of sobriety and relapse so that you can help patients plan for their recovery. Advise on the risks associated with polysubstance use.



Use the Right Words

Know the difference between substance use, substance misuse, and Substance Use Disorders (SUDs). Recognize that substance use is stigmatized and that stigma is a barrier to seeking care. Reject language that shames. Embrace the principles of Harm Reduction as a way to support any positive change.



Screen Every Patient

Talking about substance use should be a routine part of everyone's medical care. Get comfortable discussing it. Ask questions and listen to what your patients have to say. You may be the first person to ever ask.



Get Trained to Offer MAT

Medication-Assisted Treatment is the Standard of Care during pregnancy, but there are not enough providers. Contact SAMHSA to become an OTP*. Make naloxone available to all your patients who use opioids.

*opioid treatment program



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