



Clinical. Lactation

Vol. 5, Issue 2, 2014

Print ISSN: 2158-0782

Online ISSN: 2158-0537

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Official Journal of the
United States Lactation Consultant Association

Does the Mother's Posture Have a Protective Role to Play During Skin-to-Skin Contact?

Research Observations and Theories

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Skin-to-skin contact during the first hour following birth is the gold standard in breastfeeding. Although consecutive meta-analyses report no adverse effects, a recent review shows an increase in idiopathic sudden unexpected postnatal collapse (SUPC) in healthy term babies identifying three main risk factors: skin-to-skin contact, breastfeeding, and baby lying prone. Concurrently, authoritative visual materials tacitly promote maternal supine postures illustrating the breast crawl, a form of birth skin-to-skin contact. The naked baby lies on top of his or her mother's body, in close ventral contact with torso parallel to the floor—a position strongly associated with sudden infant death. Biological nurturing (BN) research, the first to examine maternal postural effects on breastfeeding success, suggests that a semireclined maternal position is optimal for breastfeeding initiation. The maternal body slope ensures that the baby lies tilted, a position known to promote oxygenation. The angle of maternal recline, a variable central to BN but hitherto ignored in the skin-to-skin and SUPC literature, is unrelated to dress level. This commentary develops a postural argument to increase understanding of the potential role played by the maternal body slope to reduce the risk of idiopathic SUPC.

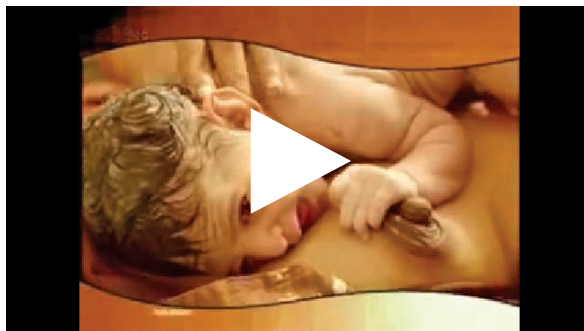
Keywords: biological nurturing, skin-to-skin contact, sudden unexpected postnatal collapse

Consecutive Cochrane meta-analyses promote early skin-to-skin contact (SSC) as the gold standard in breastfeeding initiation stating that there are no adverse effects (Anderson, Moore, Hepworth, & Bergman, 2003; Moore, Anderson, & Bergman, 2007; Moore, Anderson, Bergman, & Dowswell, 2012). However, in a recent review, Herlenius and Kuhn (2013) report that some infants have died during early SSC, noting a sharp increase in idiopathic, sudden unexpected postnatal collapse (SUPC) in healthy term babies. Although SUPC is rare, most cases occur during the first 2 postnatal hours with baby lying prone,

breastfeeding in SSC. The mother's posture during these events is ignored.

Experts writing in the mainstream literature, internet photo banks, and social media depict mothers of healthy term infants breastfeeding in SSC in various positions: upright, side-lying, laid-back, and flat-lying (Bergman, 2014; Fotolia, 2014; Smillie, Frantz, & Makelin, 2007; Watson Genna, 2013; YouTube, 2014). However, some of the most widely circulated videos and photos of the breast crawl show mothers lying flat or almost flat on their backs and by doing so, tacitly promote a

Breast Crawl—Initiation of the Breast Crawl (UNICEF).



<http://www.youtube.com/watch?v=YW72pFFEIUo>

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supine position. The United Nations Children's Fund (UNICEF) Breast Crawl video has been widely shown around the world and was developed to demonstrate that babies are capable of getting to the breast by themselves. As such, it is a useful teaching tool. Unfortunately, those watching it often assume that placing a mother lying supine or almost flat on her back is the best position to use when in early SSC.

The breast crawl is a form of birth SSC thought to aid breastfeeding and self-regulation (Healthy Children Project, 2010, 2012; UNICEF UK Baby Friendly Initiative, 2010; UNICEF/WHO Baby-Friendly USA, 2012; Widström, 2013; Widström, Lilja, Aaltomaa-Michalias, Dahllöf, Lintula, & Nissen, 2011). In the birth SSC breast crawl, the mother lies supine and the baby is placed prone between the mother's breasts, eyes level with maternal nipples; baby's torso lies flat or horizontal. This position is potentially quite dangerous because it has been strongly associated with sudden infant death (Fleming et al., 1996; Skadberg, Morild, & Markestad, 1998). This prompts a question: Does the mother's breastfeeding posture have a protective role to play during SSC?

Is Maternal Posture Protective of Infant Breathing?

Biological nurturing (BN) research is the first to report the impact of maternal posture on breastfeeding success (Colson, 2005a, 2005b, 2006; Colson, Meek, & Hawdon, 2008). For many years, mothers were instructed to initiate breastfeeding sitting upright or lying on their sides, yet BN results, published elsewhere, show that a mean 45° angle of maternal recline is optimal (Colson, 2010a, 2010b, 2012; Colson et al., 2008). Like the birth SSC breast crawl, in BN, the baby also lies prone. But his or her torso is tilted upward; the tilt maintains the baby's head, shoulders and arms elevated, a position noted to increase oxygenation and optimize lung function (Jollye & Summers, 2012; Thoresen, Cowan, & Whitelaw, 1988). BN findings suggest potential drawbacks to placing mothers lying flat, or almost flat, on their backs at any time—especially during the first hours following birth. But so far, researchers studying SSC have not looked at the degree of maternal recline (Moore et al., 2012).

This commentary proposes that maternal posture does make a difference in healthy term infants in the immediate postpartum period, the time when most neonatal SUPC cases occur (Herlenius & Kuhn, 2013). The commentary first summarizes salient aspects of

SUPC events, then compares and contrasts the BN mechanisms with the birth SSC breast crawl, and finally makes practice and research recommendations.

Sudden Unexplained Postnatal Collapse

SUPC is an emergency situation, occurring during the first week, characterized by neonatal apnea for ≥ 10 seconds, muscle limpness, pallor, bradycardia, cyanosis, collapse, cardiac or respiratory failure, and/or death (Becher, Bhushan, & Lyon, 2012; Poets, Steinfeldt, & Poets, 2011). Herlenius and Kuhn (2013) found such diversity in operational definitions that overall incidence is not comparable. However, national surveys in Germany and Britain, where data for time and neonatal position are available, report 2.6 and 3.5 idiopathic SUPCs per 100,000 live births, respectively; death rates are 1 per 100,000 (Becher et al., 2012; Poets et al., 2011). The authors acknowledge that the incidence is likely underestimated because of restricted time definitions (≤ 2 hours), and exclusion of SUPC having rapid and favorable outcomes.

Herlenius and Kuhn (2013) found that roughly half of the SUPC case studies identify the baby's position at the time of the event, and 74% of these are associated with baby prone, skin-to-skin, and cobedding. Typically, a first-time mother and her baby appear healthy and infection free; the baby, born ≥ 35 gestational weeks, with APGAR scores of ≥ 8 at 5 minutes and 10 at 10 minutes is placed prone by the birth attendant, skin-to-skin. Mother is alone or with baby's father in the delivery room, initiating breastfeeding. The mother may doze, but awake or asleep, she may not recognize that the baby has collapsed. If the baby dies, the cause, where there is no underlying pathology or other explanation, is "presumed accidental suffocation." See Figure 1.

In view of documented benefits, a professional consensus continues to promote SSC except in cases of maternal sedation, sepsis, extreme fatigue, and lack of continuous professional supervision (Becher et al., 2012; Herlenius & Kuhn, 2013; Poets et al., 2011). These recommendations, although sensitive, fail to consider the role played by the angle of maternal recline, a variable central to BN.

Biological Nurturing and Maternal Recline

BN, a new, mother-centered approach, aims to increase breastfeeding continuance (Colson, 2010a, 2010b, 2012; Colson et al., 2008). BN shares much of the rationale supporting SSC, but interpretations are different; the BN mechanisms are independent of dress level. See Figure 2. In BN, the mother sits semireclined—her torso

Figure 1. Unrecognized Postnatal Collapse



Photo reprinted with courtesy of Professor Berger, Swiss Society of Neonatology, www.neonet.ch, on behalf of the parents. Photograph taken by the father.

angled from approximately 80° to 35° from the floor. Even a slight recline increases the dimensions from sternal notch to pubes, thus augmenting the amount of maternal body space available to the neonate. Brushing movements release some 20 primitive neonatal reflexes, promoting latch and milk transfer.

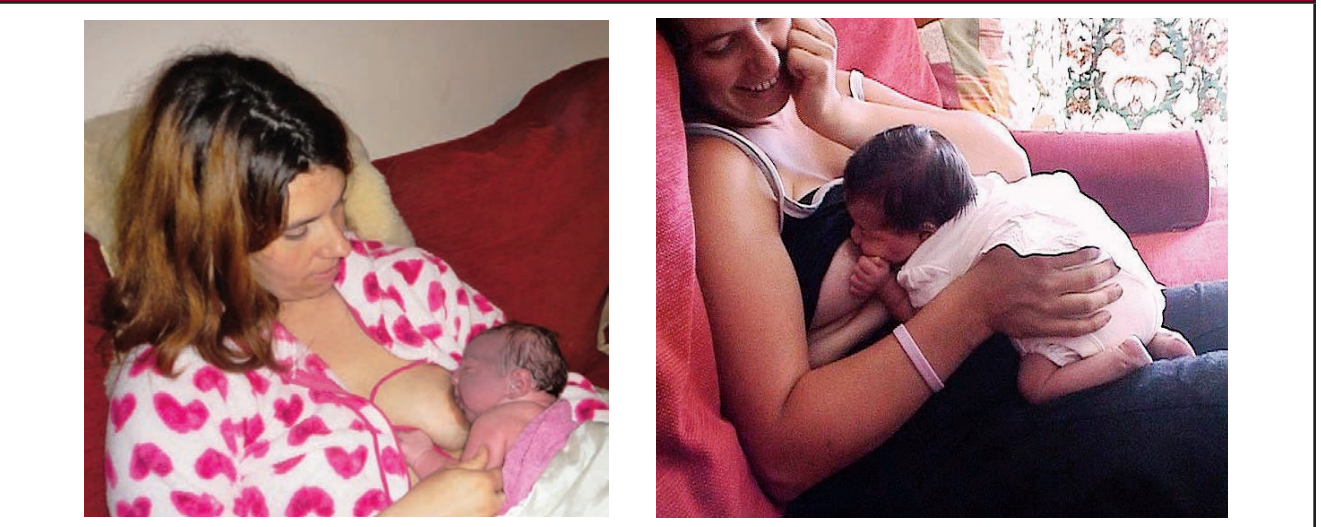
The Role of Primitive Neonatal Reflexes

“Primitive neonatal reflexes” is a collective term for inborn reactions, responses, and reflexes (Touwen, 1984). Endogenous and external stimuli release the reflexes, not intention, behavioral state, or dress level (André-Thomas, Chesni, & Saint-Anne Dargassies, 1960; Brazelton & Nugent, 1995; Colson, 2006, 2010a, 2010b; Colson et al., 2008; Dubowitz, Dubowitz, & Mercuri, 1997; Prechtl, 1977). Offering an alternative interpretation to SSC, the BN mechanisms explain how the SSC breast crawl works: The baby’s thighs, calves, feet tops, and soles brush against the mother’s body, triggering such reflexes as plantar grasping, the Babinski response, placing, stepping, head bobbing, finger flexion/extension, and rooting as the baby pushes up to locate the breast. Simple reflexes combine to aid locomotion, for example, arm and leg cycling or placing and stepping (Colson, 2006, 2010a, 2010b; Colson et al., 2008).

There are other similarities. In both BN and the birth SSC breast crawl, the mother’s hands are free; her body supported; her muscles soft; and both shoulders balanced, not hunched. Furthermore, gravity keeps the baby in place; mothers do not have to hold the baby’s back, head, or neck. Gravity also reduces the strength of reflex response, smoothing jerky movements and aiding their expression as latching stimulants.

One could argue, supported by compelling birth SSC breast crawl DVDs (Righard & Frantz, 1992; Stark, 2011; Widström, 1996), that supine postures are optimal for breastfeeding initiation, opening the maternal torso

Figure 2. Biological Nurturing Independent of Dress State



The mother’s body slope may help protect neonatal breathing. Left side: First postnatal hour; mother and baby in biological nurturing and skin-to-skin contact. Right side: First postnatal day; mother and baby lightly dressed in biological nurturing.

dimensions maximally. The science for this argument comes from landmark studies, conducted during the first hour following birth, examining effects of early mother-baby contact for healthy term infants (De Chateau & Wiberg, 1977; Righard & Alade, 1990; Widström, 1988; Widström et al., 1987; Widström et al., 1990). These researchers appear to be the first to illustrate their methods of data collection with photos of breastfeeding mothers lying supine. One objective was to discover if human babies, like other mammals, have species-specific approaching and searching behaviors. Widström (1988, p. 9) and Righard and Alade (1990) asked mothers not to help or “not to push the baby to suck.” Results showed babies crawl unaided to the breast, self-attaching on average 55 minutes postbirth. Interestingly, as early as 1988, Widström questioned whether “it might be tiring and even frustrating for the infant to have to crawl to the breast . . .” (p. 29).

We owe Widström and Righard and their colleagues a great debt of thanks for highlighting neonatal competence. Their pioneering SSC studies have much to commend, changing labor ward practices across the world: delaying or eliminating interventions, such as gastric suctioning, that traditionally separated mothers and babies during the first postnatal hour. However, current research methods continue to restrict maternal assistance.

In 2011, Widström et al. described nine sequential innate behaviors priming neonatal self-attachment during the birth SSC breast crawl; they asked 28 participating mothers not to shift baby’s position. Results reveal that less than two thirds ($n = 18$) of the babies reached the areola (the primary outcome measure); of those who did, 3 did not suck; and it took up to 45 minutes for others to self-attach, extending the time of SSC to 2 hours. Widström et al. (2011, p. 83) insisted that mothers refrain from physically helping their babies who “work hard and need rests,” concluding that babies should stay skin-to-skin for the first hours following birth or until the baby accomplishes the nine behavioral stages culminating in self-attachment and/or sleeps.

Placing the onus for first suckling entirely on the baby disregards neonatal fuel economy at the time of cardiorespiratory transition. The birth SSC breast crawl, now suggested for inclusion in lactation management curricula (Widström, 2013), may place undue stress on the baby. The conclusions drawn by Widström et al. (2011; Widström, 2013) must be viewed with extreme caution, considering that so many idiopathic SUPCs for healthy term infants occur during the first 2 hours.

Maybe the question Widström asked in 1988 was justified.

BN research offers different interpretations. Findings suggest that human mothers, unlike lower mammals, participate spontaneously, unless they are told not to. Mothers appear as competent as their babies, often taking the lead. With both hands free, they instinctively place the baby, somewhere on the frontal body space, wherever it feels right; they adjust positions, stroke, groom, check temperature and breathing, shape their breasts, and, occasionally, physically latch the baby without “pushing” (Colson, 2006, 2008a, 2010a, 2010b; Colson et al., 2008). Although there is some evidence suggesting that neonatal self-attachment reduces nipple sucking (Righard & Alade, 1990; Widström, 2013), the effects of maternal factors, such as posture or spontaneous behaviors stimulating the baby’s self-attachment, have not been studied. Clinical and research observations suggest that without instruction, mothers often compulsively protect and help, and this appears to reduce latching time.

A quick birth is known to be a safe birth, and Diaz, Schwarcz, Fescina, and Caldeyro-Barcia (1978) report how vertical maternal postures together with spontaneous pushing and breathing (compared to taught techniques) significantly shorten labor duration. Although there are strong physiological links between birth and lactation (Odent, 1992), it is unknown if such variables as maternal posture and duration of spontaneous newborn searching and finding behaviors promote safety in the breastfeeding context. No research has examined how maternal posture might affect time to first suckling or if a quick latch is safer. Apart from the aforementioned SSC studies, where mothers are placed supine, few have looked at latching times. In the BN sample, raw data show that all 40 mothers participated spontaneously and 2 were in SSC; the mean time to sustained latch was 5 minutes (range 8 seconds to 16 minutes), and, prompted by their mothers, over half the babies self-attached. Latching technique was not routinely assessed; however, breastfeeding duration was 100% at hospital discharge and 100% (87.5% exclusive) at 6 weeks (Colson et al., 2008).

When episodes were filmed during the first postnatal month, these times concur with Bullough, Msuku, and Karonde (1989), who looked at effects of early suckling on postpartum hemorrhage. They calculated a mean time of 7.25 minutes (range 3.5–15 minutes) from birth to first suckling for a sample of 76 babies with

Table 1. Practice Recommendations to Reduce the Incidence of Idiopathic Sudden Unexpected Postnatal Collapse for Healthy Mothers and Healthy Term Babies

Prenatal Education	For Healthcare Providers
	<ol style="list-style-type: none"> 1. Introduce the need to reduce mother–baby separation at birth, delaying routine procedures such as weighing, dressing the baby, eye care, gastric suctioning. 2. Differentiate BN from SSC and give mothers choice. 3. Encourage mothers to participate spontaneously during breastfeeding (like they do during birth). 4. Discuss the following: <ul style="list-style-type: none"> • A range of laid-back maternal breastfeeding postures where comfort is the priority • How the BN angle of recline influences eye-to-eye contact facilitating baby gazing • How mothers naturally protect their baby’s breathing, sleep, temperature, and so forth • Inborn protective neonatal reflexes • How babies often latch on in light sleep and drowsy states • That mothers need to be in awake states when they are in SSC or breastfeeding (highlight that the drowsy state for the mother is an “awake” state) 5. Show photos or DVDs of mothers interacting with their babies, that is, placing babies up their bodies, shaping their breasts, helping babies latch when needed when baby is in light sleep and drowsy states in SSC and lightly dressed. 6. Promote maternal breastfeeding enjoyment showing mothers who are laughing, stroking, and nurturing. 7. Discourage the use of mobile phones and texting during birth and the first postnatal hours. 8. Discuss safe sleep factors and neonatal back to sleep positions.
Immediate Postpartum	For Doctors, Nurses, Midwives, Doulas, LCs Attending Birth
	<ol style="list-style-type: none"> 1. Promote BN in SSC, ensuring that every part of the mother’s body is supported and that she does not lie supine. 2. Ensure that the angle of maternal recline facilitates eye-to-eye contact. 3. Replace knitted bulky baby hats or towels that might block eye-to-eye contact with slim cotton baby bonnets and prewarmed cotton receiving blankets for baby’s back warmth. 4. Encourage mother to participate, giving her permission to help her baby suckle as she feels necessary.

(Continued)

Table 1. Practice Recommendations to Reduce the Incidence of Idiopathic Sudden Unexpected Postnatal Collapse for Healthy Mothers and Healthy Term Babies (Continued)

Immediate Postpartum	For Doctors, Nurses, Midwives, Doulas, LCs Attending Birth
	<ol style="list-style-type: none"> 5. Protect mother's privacy and promote an environment conducive to high oxytocin pulsatility; assess maternal hormonal complexion: comfort, body support, and reactions to baby and/or people present. 6. Make discrete clinical observations: Ensure constant thermoneutral environment, assessing temperature and pulse thru touch. Assess color and respirations through chest movement. 7. If obstetric need to lie supine or if mother under the influence of labor analgesics, sedatives or exhausted, or if alone or first baby, designate one professional person responsible (midwife, doula) for ongoing one-to-one professional supervision using continuous but discrete and unobtrusive, at a glance assessments of clinical mother–baby well-being, ensuring patency of neonatal airway 8. If mother is awake, aware, and understands protective role, assure continuity of knowledgeable presence (doula or baby's father) during the time of cardiovascular transition. 9. Detect as soon as possible any deviation from normal with pediatric referral.
Hospital Discharge	
	<ol style="list-style-type: none"> 1. Review (through purposeful conversation) how the angle of maternal recline may influence inborn mother–baby protective and breastfeeding behaviors. 2. Review and give pamphlet on safe sleeping (positions and other factors).

Note. BN = biological nurturing; LCs = lactation consultants; SSC = skin-to-skin contact.

spontaneous vertex deliveries who were dried, wrapped, and put to breast within 3 minutes. Without being shown how, mothers repeatedly elicited suckling until baby latched. Taken together, these results suggest that when both mother and baby are allowed to participate spontaneously, latching times may be greatly reduced and relatively stable during the first month. Importantly, maternal spontaneity is not learned behavior; rather, it appears to be released by positions facilitating eye-to-eye contact.

Facilitated eye contact is at the heart of BN. The mother's semireclined body slope places her baby's face 8–12 inches from her face, the ideal distance to optimize neonatal visual acuity (Dubowitz, Dubowitz, & Morante, 1980; Klaus & Klaus, 1985). This BN variation of the enface gaze (Klaus & Kennell, 1976) synchronizes eye-to-eye contact, resulting in an intimate, reciprocal, sensorial conversation (Colson, 2010a). Winberg (1995) suggests that mutual stimulation may increase the release of peptide hormones, such as oxytocin, having behavioral effects.

Gazing or just thinking about the baby is recognized to increase oxytocin pulsatility (McNeilly, Robinson, Houston, & Howie, 1983; Riordan, 2010). In turn, this may contribute to the energy economy of both mother and infant (Uvnäs-Moberg, 1989; Winberg, 1995). The key words are mutual and reciprocal. Videos of BN (Colson, 2008a, 2009; Colson, Frantz, & Mohrbacher, 2011) illustrate how the semireclined maternal postures promote mother–baby visual interactions, where mothers' facial features are suggestive of high oxytocin pulsatility. The BN perspective encourages healthcare providers to adjust the birthing environment to promote this “oxytocin hormonal complexion” as a key factor releasing those spontaneous maternal breastfeeding and protective behaviors described earlier (Colson, 2008b, 2010a, 2010b).

Mothers' Position and Infants' Protective Reflex Behaviors

The baby is also born with protective reflex behaviors and two safeguard breathing: spontaneous head lifting

and a variation of head righting (Colson, 2006, 2008a, 2010a, 2013a, 2013b). Although sleep states reduce the strength of response (Brazelton & Nugent, 1995; Colson, 2006, 2010a, 2013a, 2013b; Prechtl, 1977), the maternal body slope is a constant impetus, a precious, human species-specific niche aiding the newborn, asleep or awake, skin-to-skin, or lightly dressed, to release these antigravity movements when needed. Like blinking protects the eyes and sneezing clears the nostrils, these two defensive reflexes are inborn and independent of dress level. They either protect the neonatal airway or signal the mother, requesting help.

Observe the dynamics in Figure 1. Although mother and baby are in direct ventral SSC, see how the mother's torso is almost horizontal. Her legs in stirrups, she awaits suturing; the angle of her baby's torso mirrors her degree of recline. These semiflat positions may adversely affect the expression of the baby's protective antigravity reflexes; the degree to which the baby must lift or turn his or her head is steep. At birth, the neck muscles of many infants are not able to counteract strong gravitational pull. Even healthy term babies may struggle and then be overcome by threatening environmental stimuli, for example, the blockage of the nasal passages by bed clothes or a part of the mother's body.

Figure 1 also shows how gravity works against the mother, blunting her spontaneous reactions. When lying almost flat, maternal mobility appears impaired; placing the baby up her body becomes a monumental task as the blood drains from her arms and hands resisting gravity; her finger tips, identified by Klaus, Kennel, Plumb, and Zuehlke (1970) as primary sensorial exploratory organs, become desensitized (M. Bendig, personal communication, June 6, 2010) and her upper limbs tired; mothers often look or act helpless (Colson, 2010a, 2013a). Furthermore, supine mothers often strain their necks and trapezius muscles when they lift their heads, against gravity, to gaze at their babies. This hampers eye-to-eye contact and may decrease oxytocin pulsatility; mothers, feeling exhausted or bored, may shut out external stimuli or sleep. Together, these observations suggest that visibility in supine postures is not sufficient to release inborn maternal protective behaviors. Even awake, while lying supine or nearly flat, mothers may not be able to see the baby's reflex cues or if his or her nostrils are obstructed. This offers an alternative explanation for the medical observations that first-time mothers do not notice that their baby has collapsed (Becher et al. 2012; Herlenius & Kuhn, 2013; Poets et al., 2011). During the birth skin-to-skin breast crawl, mothers are simply not in a position to do so.

These observations call into question the exclusion of maternal posture from the birth SSC breast crawl intervention and the risk factors for SUPC. The American Academy of Pediatrics (2012) recommends keeping healthy newborns in direct SSC until they breastfeed. Bramson et al. (2010) recommend SSC for at least 2 of the first 3 hours following birth. Such guidance needs to be revised to include the potential role played by the angle of maternal recline. BN brings together many factors which may protect neonatal safety, and healthcare providers should introduce BN during prenatal education, encouraging mothers to participate spontaneously during breastfeeding like they do during birth. Building on recent risk management strategies (Becher et al., 2012; Fleming, 2012; Goldsmith, 2013; Herlenius & Kuhn, 2013; Poets et al., 2011), health professionals should undertake or allocate discrete postpartum assessments to the baby's father or a doula, ensuring that mothers do not lie supine while in SSC or breastfeeding and that their posture optimizes mother-baby eye-to-eye contact (see Table 1 for detailed practice recommendations). Assessments for any mother placed supine for obstetric reasons should be continuous, ensuring professional one-to-one recovery care. Together, these simple measures may help reduce the incidence of rare, but serious, idiopathic SUPC events.

Conclusions

It is well known that a picture is worth a thousand words, and the tacit message conveyed by visual media illustrating the birth SSC breast crawl suggests that a maternal supine posture is the "natural" mammalian way to initiate breastfeeding (Healthy Children Project, 2010, 2012; UNICEF UK Baby Friendly Initiative, 2010; UNICEF/WHO Baby Friendly USA, 2012; Widström, 2013). In Britain, for example, the UNICEF UK Baby Friendly Initiative (2010) promotes SSC with a photo of a mother lying flat on her back. Although no cause and effect relationships can be drawn without further research, it is of note that Becher et al. (2012) report that five healthy term infants died in Britain in 2009–2010 of accidental suffocation during breastfeeding or SSC.

These theories and speculations will likely provoke heated discussion; however, the issues can only be resolved through research. Randomized controlled trials should compare BN in SSC and BN when mothers and babies are lightly dressed with the birth SSC breast crawl as standard care, evaluating time to first suckling and spontaneous mother-baby latching techniques to discover if SSC is the independent variable in the birth

SSC breast crawl and how the angle of maternal recline affects important variables, such as self-attachment, baby's temperature, blood glucose concentrations, and other physiological variables, as well as bonding and breastfeeding outcomes.

SSC is undoubtedly a lovely way to greet the baby at birth; although linked to SUPC, in fact, SSC may not be a safety factor. The mother's breastfeeding posture may play an important role. Regardless of dress state, the risk may be associated with the angle of maternal recline. While awaiting further research evidence, nothing prevents introducing BN into the SSC equation, auditing effects. If a maternal body slope promotes a neonatal body tilt that protects breathing, mothers and babies may have everything to gain and certainly nothing to lose.

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