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Skin-to-Skin Care for Term and Preterm Infants in the Neonatal ICU

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abstract

"Kangaroo mother care" was first described as an alternative method of caring for low birth weight infants in resource-limited countries, where neonatal mortality and infection rates are high because of overcrowded nurseries, inadequate staffing, and lack of equipment. Intermittent skin-to-skin care (SSC), a modified version of kangaroo mother care, is now being offered in resource-rich countries to infants needing neonatal intensive care, including those who require ventilator support or are extremely premature. SSC significantly improves milk production by the mother and is associated with a longer duration of breastfeeding. Increased parent satisfaction, better sleep organization, a longer duration of quiet sleep, and decreased pain perception during procedures have also been reported in association with SSC. Despite apparent physiologic stability during SSC, it is prudent that infants in the NICU have continuous cardiovascular monitoring and that care be taken to verify correct head positioning for airway patency as well as the stability of the endotracheal tube, arterial and venous access devices, and other life support equipment.

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BACKGROUND

"Kangaroo mother care" (KMC) was first described as an alternative method of caring for low birth weight infants in resource-limited countries, where neonatal mortality and infection rates are high because of overcrowded nurseries, inadequate staffing, and lack of equipment. In the original version of KMC, the infant is placed in continuous skin-to-skin contact in a vertical position between the mother's breasts and beneath her clothes and is exclusively (or nearly exclusively) breastfed. A meta-analysis of 988 infants enrolled in 3 randomized controlled trials of continuous KMC begun in the first postnatal week in low- or middle-income countries found a 51% reduction in mortality among infants with a birth weight <2000 g (relative risk: 0.49 [95% confidence interval: 0.29–0.82]).[1] Although the methods of this review have come under question,[2] a Cochrane meta-analysis of 18 trials of continuous KMC begun before postnatal day 10 in infants with a birth weight <2500 g also showed significantly reduced mortality and morbidity at discharge or 40

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to 41 weeks' postmenstrual age and at follow-up; it also found a decreased incidence of health care–related sepsis and an improvement in some measures of infant growth, breastfeeding, and mother-infant attachment.[3] Thirteen of these 18 studies were conducted in low- to middle-income countries.

Intermittent skin-to-skin care (SSC) in NICUs in resource-rich countries differs from traditional KMC in that it is usually used for varying, shorter periods of time; can be offered to less stable and technology-supported infants; and can be performed by both parents. Intermittent SSC in resource-rich countries has not been associated with decreased mortality, although data are currently insufficient to determine an effect.[3] However, it is widely offered to parents for other perceived benefits, such as enhancing attachment, parental self-esteem, and breastfeeding.[4,5]

EVIDENCE

Benefits

The most substantial evidence of benefit from SSC is for breastfeeding. Individual randomized controlled trials and a systematic review have shown that intermittent SSC is associated with longer and more exclusive breastfeeding and higher volumes of expressed milk.[6,7] The systematic review reported that short periods of SSC (up to 1 hour at all visits) increased the duration of any breastfeeding, variably reported by different studies as 1 month after discharge (relative risk: 4.76 [95% confidence interval: 1.19–19.10]) or for more than 6 weeks (relative risk: 1.95 [95% confidence interval: 1.03–3.70]) among clinically stable infants in industrialized nations.[7] A number of studies have also indicated that SSC may improve a mother's attachment or bonding and her feeling of being needed by or comfortable with her infant.[3,8–12] In addition, SSC promotes the participation of the mother and father in the infant's care, strengthens the family role in the care of a fragile infant, and decreases feelings of helplessness.[10] Mothers report less stress and more satisfaction with NICU care, and both parents are more responsive to their infant's cues.[3,8–12]

The evidence is less clear for a beneficial effect regarding sleep and neurobehavioral maturation. One report found increased frontal brain activity during both quiet and active sleep, which is thought to be predictive of improved neurobehavioral outcomes.[13] Other studies using electroencephalography and polysomnography data indicate that preterm infants who receive SSC have more mature sleep organization, with increased total and quiet sleep, decreased REM sleep and arousals from sleep, and an improvement in sleep cycling.[14,15] They also appeared more alert and observant and spent less time crying. Two cohort studies found that infants receiving SSC demonstrated better autonomic regulation and maternal–infant interactions at term gestation, as well as higher scores on the Bayley Scales of Infant Development–Second Edition at 6 or 12 months of age.[8,16] Of the infants enrolled in the second study, 117 were followed up to 10 years of age, and the authors reported that those who received SSC showed attenuated stress response, improved autonomic functioning, better-organized sleep, and better cognitive control.[17]

SSC has also been advocated for the nonpharmacologic management of procedural pain. A Cochrane review of the effect of SSC for relief of procedural pain concluded that it seemed to be effective for a single painful procedure such as a heel lance, as measured by using composite pain indicators.[18] The review found that behavioral indicators of pain tended to favor SSC, whereas physiologic indicators were generally not affected, suggesting possible observer bias in scoring behavioral indicators. However, small studies have reported reduced cortisol concentrations and decreased autonomic indicators of pain in preterm infants during SSC.[19,20] The authors of the Cochrane review recommend confirmatory studies of previous findings and call for new studies examining optimal duration of SSC, use in different gestational age groups, effects of repeated use, and long-term effects.[18]

Risks

Investigators initially postulated that continuous KMC would promote colonization with maternal flora rather than resistant hospital flora. Consistent with this hypothesis, meta-analyses of randomized controlled trials in resource-limited countries have exhibited fewer episodes of sepsis, necrotizing enterocolitis, and pneumonia.[1,3] However, infections may be spread among mothers, infants, and caregivers, particularly in multiple-bed units, as has been reported for respiratory syncytial virus and tuberculosis.[21,22] Although a recent report described an association between SSC and development of methicillin-resistant *Staphylococcus aureus* infections among infants in 1 NICU (particularly those with very low birth weights), the authors did not believe that there was a causal relationship.[23] Parents should be monitored for skin infections and might need cleansing of the skin before infant contact. Some experts consider infants with open lesions (eg, open neural tube defects, abdominal wall defects) to be particularly at risk.

Most studies of physiologic stability during SSC have been performed on stable, nonintubated infants. One meta-analysis reported a statistically but not clinically significant increase in body temperature (0.22°C) and a decrease in oxygen saturation (0.60%) in 190 term and 326

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preterm infants receiving SSC compared with incubator care.[24] These effects were most pronounced in nurseries in low- and middle-income settings and in cold environments. There was no change in heart rate before, during, or after SSC, and no difference was noted between preterm and term infants. Although 1 study of 22 infants reported an increase in desaturation and bradycardia during SSC,[25] other studies have shown no significant increase in desaturation, bradycardic or apneic events, or in oxygen consumption.[26–28] Despite apparent physiologic stability during SSC, it is prudent that infants in the NICU be continuously monitored and that care be taken to verify correct head positioning for airway patency as well as the stability of the endotracheal tube, arterial and venous access devices, and other life support equipment. Any infant who requires careful temperature regulation or a high-humidity environment might have SSC delayed until he or she is more stable.

There may be resistance among health care providers regarding offering SSC. This resistance could stem from fear of harm to the infant or from lack of experience, time, or assistance to transfer the infant to the parent and/or monitor the infant's well-being. A nursing simulation training program may help promote acceptance of SSC.[29] Multiple guidelines for the provision of SSC have been published,[30–33] and each facility needs to consider staffing, experience, and resources in the development of its institutional guidelines. Because SSC has been shown to be feasible and safe in the NICU in infants as young as 26 weeks' gestation,[34] with benefits for both parents and infants, facilities are encouraged to offer this care when possible.

IMPLICATIONS FOR CLINICAL PRACTICE

1. It has been shown that skin-to-skin care results in improved breastfeeding, milk production, parental satisfaction, and bonding.
2. Both parents can be encouraged to provide skin-to-skin care, with appropriate guidelines and protocols, for both preterm and term infants in the NICU.
3. Despite apparent physiologic stability during skin-to-skin care, it is prudent that infants in the NICU have continuous cardiovascular monitoring and that care be taken to monitor correct head positioning for airway patency as well as the stability of the endotracheal tube, arterial and venous access devices, and other life support equipment.

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ABBREVIATIONS

KMC: kangaroo mother care
SSC: skin-to-skin care

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