

Skin-to-skin parental contact with fragile preterm infants

GERARD M. CLEARY, DO; SUSAN S. SPINNER, MSN;
ERIC GIBSON, MD; JAY S. GREENSPAN, MD

Skin-to-skin contact has been implemented recently to facilitate maternal-infant bonding of preterm infants. The technique allows the removal of fragile preterm infants from an incubator to the bare chest of a parent or caretaker. When specific guidelines are followed, thermal stability can be maintained, parent-infant bonding can be facilitated, and parental satisfaction can be enhanced. We illustrate a case in which a preterm infant has skin-to-skin contact while being monitored for physiologic parameters, including heart and respiratory rate, oxyhemoglobin saturation, and nasal airflow. Improvements in breathing patterns in this infant during skin-to-skin care and maintenance of a normal temperature suggest that this technique may not only be safe and psychologically beneficial, but it may also promote physiologic improvement.

(Key words: Skin-to-skin care; kangaroo care; pediatrics; apnea, premature; breathing, periodic)

One of the many challenges in caring for the preterm infant is the maintenance of an optimal thermal environment. Innovation in incubator technology during the past several decades may be responsible for more reduction in the morbidity and mortality of these infants than any other single intervention.¹ Maintaining an infant in a thermal neutral range, with a minimal metabolic rate, promotes optimal weight gain and healing.

Conventional methods for maintaining a preterm infant's thermal stability have historically relied on convective or radiant heaters (or both). Although effective, such heaters essentially eliminate the possibility for close parental contact

with the infant. It is not until the infant is larger and older that parents traditionally have been allowed to hold their infant for the first time.²

Recent research has suggested that placing even a small, fragile infant on a parent's bare chest may be safe. This skin-to-skin method of nurturing an infant, also referred to as kangaroo care because of the marsupial analogy, promotes thermal stability and improves parental bonding.³⁻⁵

We describe a preterm infant who was nurtured with skin-to-skin contact while being monitored for heart and respiratory rate, arterial oxygen saturation, and nasal air flow. This infant demonstrates that this form of contact may not only be safe and satisfying for parents, but it may also improve the infant's physiologic parameters as well.

Report of case

A 33-year-old primagravida mother delivered a baby boy N.S. who was a 29-week twin, weighing 1180 g. The baby was delivered vaginally following

spontaneous preterm rupture of membranes 4 hours before delivery. The cause of the premature labor and rupture of membranes remains undetermined. He was active in the delivery room, and APGAR scores were assigned at 8 at 1 minute and 9 at 5 minutes. The infant was intubated at 2 minutes of age for respiratory distress and to deliver exogenous surfactant therapy. He required moderate levels of support from a mechanical ventilator during the first several days of life, and a second dose of exogenous surfactant was administered on the second day of life. Ventilator settings were lowered following this second dosage, and he started to feed on breast milk via an oral-gastric tube on day 4 of life. He was gradually weaned from ventilator support by day 8 of life, and he had no evidence of intracranial hemorrhage or other complications associated with prematurity. He was weaned from a radiant warmer to an incubator on the second day of life, but he continued to require large amounts of supplemental heating and servo-controlled temperature support for the first several weeks of life. On day 19 of life, skin-to-skin care was suggested to his parents. At that time, the infant weighed 1360 g and required supplemental oxygen by nasal cannula and thermoregulation by a servo-controlled isolette.

The infant met criteria (Figure 1) for skin-to-skin care at Thomas Jefferson University Hospital (Philadelphia, Pa). Informed consent was obtained from the parents. Monitors for heart and respiratory rate, oxyhemoglobin saturation (Nellcor Inc, Hayward, Calif), and nasal airflow were placed. The nurse investigator discussed skin-to-skin care with the parents, offered a special chair that would promote prolonged comfort during the process, and suggested ways of holding the infant (Figure 2). Wearing only a hat and diaper to cover him, the infant was then removed from the isolette. He was placed inside the mother's garment and on her chest (Figures 3 and 4). The infant was allowed to be nestled for 2 hours on the first occasion, with more prolonged periods subsequently being permitted. Both the moth-

From Jefferson Medical College (Philadelphia, Pa) where at the time this article was written Dr Cleary was an instructor of Pediatrics; Dr Gibson is an assistant professor of Pediatrics; and Dr Greenspan is an associate professor of Pediatrics and the director of Neonatology. Ms Spinner is a clinical nurse specialist at Thomas Jefferson University Hospital.

Correspondence to Gerard M. Cleary, DO, Division of Neonatology, Abington Memorial Hospital, 1200 Old York Rd, Abington, PA 19001-3788.



Checklist

Infants

- ☐ weigh > 1000 g;
- ☐ are 26 weeks' to 36 weeks' gestational age;
- ☐ are on < 25 breaths/min of mechanical respiratory support;
- ☐ are on < 40% supplemental oxygen support;
- ☐ have intravenous and intra-arterial lines securely in place; and
- ☐ are considered stable by attending neonatologist

Figure 1. Criteria for skin-to-skin contact.

er and the father took turns performing skin-to-skin care with both of their infants following this initial experience.

Recording of the physiologic response was done for 6 hours before the kangaroo care; during the 2 hours of kangaroo care; and 6 hours following the care. In the period preceding the skin-to-skin contact, the infant experienced two brief episodes of airway obstruction, characterized by increased chest wall movement and mild oxygen desaturation. Many lengthy periods of increased movement and agitation occurred, characterized by disorganized breathing and mild tachycardia. During the kangaroo care, all physiologic patterns were more stable. The heart rate trend showed neither tachycardia nor bradycardia during the 2 hours. No episodes occurred of either central or obstructive apnea. There was no periodic breathing and no oxygen desaturation. The overall impression from the physiologic recording was one of a generally stable, quiet infant, much like an infant in quiet sleep. This impression was noted despite parental and nursing reports that the infant was alert much of the time. This pattern persisted on the recording more than 2 hours after the skin-to-skin contact.

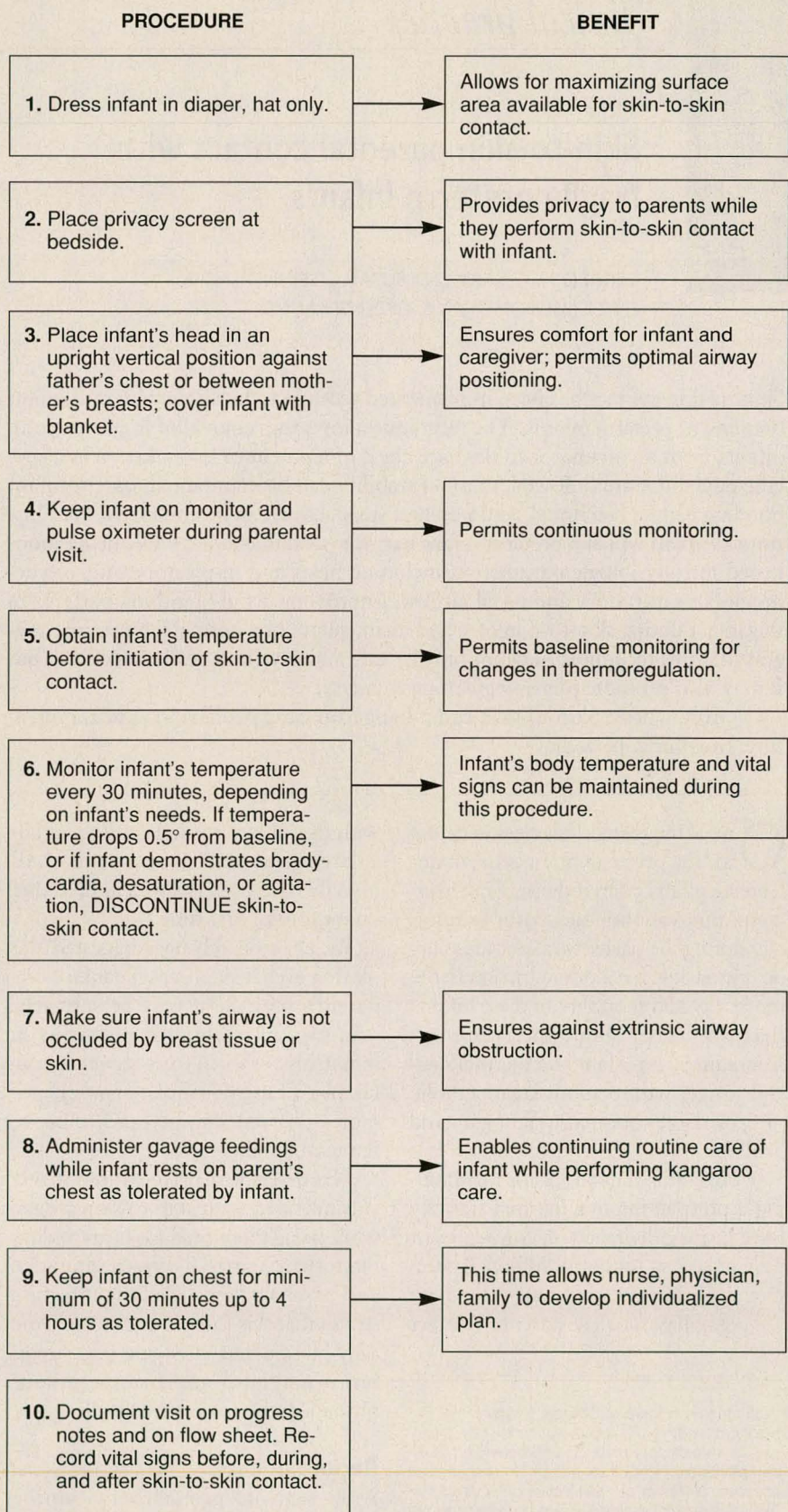


Figure 2. Procedure established at Thomas Jefferson University Hospital for skin-to-skin contact.

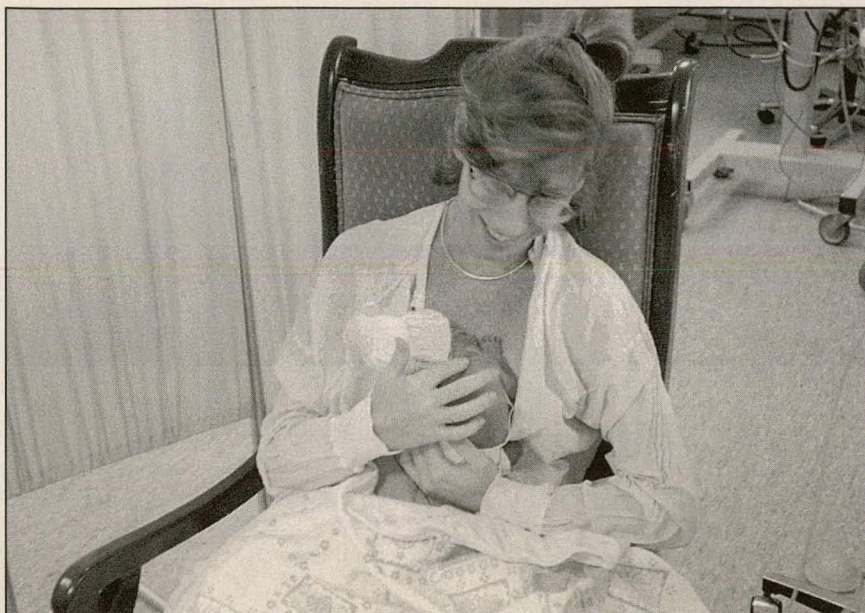


Figure 3. Mother and infant initiation of skin-to-skin contact. The diaper-clad infant wears a hat. He is placed between the breasts and held. Infants may then be covered with a receiving blanket if desired.

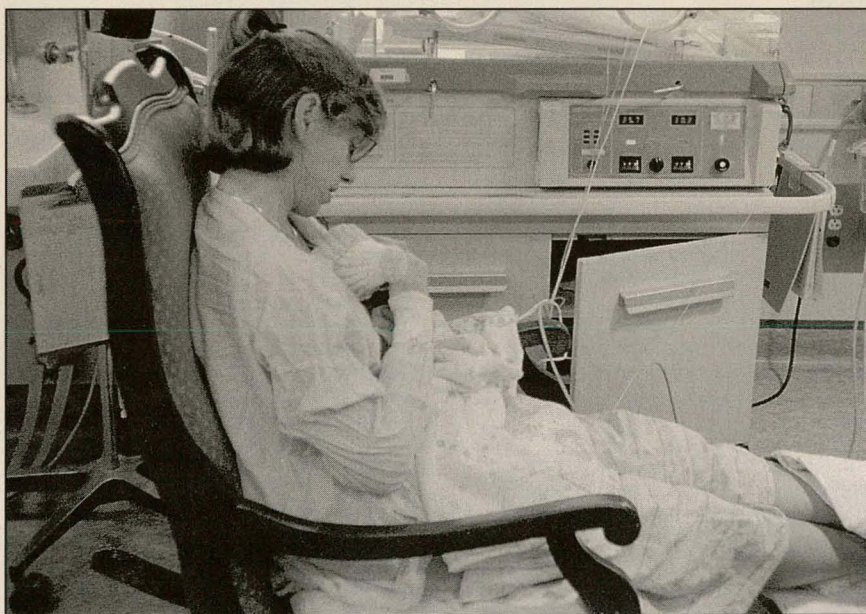


Figure 4. Mother and infant during skin-to-skin contact. Infant positioning and continuous measurement of physiologic parameters are essential. Mom should be seated in a semireclined position, preferably with feet propped to maximize the infant's airway flow, similar to that of an incubator. This position also enhances the mother's comfort, allowing for long-term nurturing if desired.

Discussion

The intensive care environment is radically different from the maternal milieu to which preterm infants have been exposed before birth. In the womb,

sounds consist of maternal heartbeat and voice. Light is minimal, and the infant is continuously rocked by the rhythm of maternal respiration and movement. The bright, noisy intensive care environment

generally finds the preterm infant supine on a firm mattress without parental contact. Skin-to-skin contact has been shown to be a safe means of radically altering this harsh environment, at least temporarily, for the very fragile preterm infant.³⁻⁸ Previous studies have shown improvements in maternal satisfaction, infant temperament, and breast-feeding while still maintaining thermal stability, weight gain, and normal physiologic parameters (Figure 5).^{3,9-13}

The infant's physiologic recording performed before, during, and after skin-to-skin contact suggests that the infant's cardiorespiratory stability may be enhanced. This benefit is in addition to the improvements in parental satisfaction with regard to feelings of involvement and intimacy. In this instance, the etiology of cardiorespiratory stability is unclear; however, the infant may be regulating to the parent's stimuli. For instance, skin-to-skin contact may alter the dominant sleep state and metabolic rate.⁵ Recently, it has been demonstrated that thermoregulation is enhanced during skin-to-skin contact while oxygen consumption remains stable.¹⁴ Although the long-term benefit of this stability remains unknown, it suggests that skin-to-skin contact may not need to be withheld because of mild infant apnea if appropriate monitoring guidelines are followed.

The protocol at Jefferson University Hospital concentrates on premature infants less than 36 weeks' gestation; however, infants older than 36 weeks' gestation who are admitted to neonatal intensive care would also be likely to reap the benefits of skin-to-skin contact. Prolonged mechanical ventilation does not preclude skin-to-skin contact. In fact, it has been shown that infants who received skin-to-skin contact have a significantly shorter duration of receiving mechanical ventilation and supplemental oxygen support. They are also more likely to begin oral feeding earlier, have a reduced incidence of intraventricular hemorrhage, pneumothorax, and severe bronchopulmonary dysplasia and have improved weight gain with shorter hospital stays.¹⁵

Comment

This case illustrates the simplicity and safety of skin-to-skin contact for preterm infants. A carefully designed established protocol for skin-to-skin contact can be used in many nurseries on even the most fragile infants without jeopardizing infant stability. Simultaneously, this protocol elicits benefits including parental empowerment, involvement, and infant bonding.

Further investigation is needed regarding the physiologic advantages of close parental contact. In fact, we have initiated a controlled study to evaluate this process further. In the infant in this case, breathing control seemed to be favorably altered, suggesting a complex—and beneficial—interaction exists between the infant and parent during skin-to-skin contact.

References

1. Baumgart S: Thermal regulation in the fetus and newborn, in Spitzer AR: *Intensive Care of the Fetus and Neonate*. St Louis, Mo, Mosby-Year Book, Inc, 1996, pp 401-416.
2. Medoff-Cooper B: Transition of the preterm infant to an open crib. *J Obstet Gynecol Neonatal Nurs* 1994;23:329-335.
3. Bell RB, McGrath JM: Implementing a research-based kangaroo care program in the NICU, in Brown LP: *The Nursing Clinics of North America*. Philadelphia, Pa, WB Saunders Co, 1996, pp 387-403.
4. Affonso D, Bosque E, Walberg V, et al: Reconciliation and healing for mothers through skin-to-skin contact provided in American Tertiary level intensive care nursery. *Neonatal Network* 1993;12:25-32.
5. Ludington-Hoe S, Hadeed A, Anderson GC: Physiologic responses to skin-to-skin contact in hospitalized premature infants. *J Perinatol* 1991;4:19-24.
6. Ludington-Hoe S, Thompson C, Swinth J, et al: Kangaroo care: Research results and practice implications and guidelines. *Neonatal Network* 1993;12:25-32.
7. Whitelaw A, Heisterkamp G, Sleath K, et al: Skin-to-skin contact for very low birthweight infants and their mothers. *Arch Dis Child* 1988;63:1377-1381.



Checklist

Baby

- ☐ Touches mother's skin
- ☐ Stimulated to start sucking
- ☐ Feels mother's chest movement
- ☐ Calmed by mother's heartbeat
- ☐ Makes sounds
- ☐ Feels mother's reaction; sends more signals
- ☐ Develops confidence in parent

Mother

- Produces hormones that stimulate milk production
- Produces more milk
- Feels baby's chest move
- Calmed by baby's closeness
- Reacts to baby's sounds
- Develops ability to understand her infant
- Gains self-confidence, intuition; feels empowered

Figure 5. "Softer" potential benefits of skin-to-skin contact.

8. Anderson GC: Current knowledge about skin-to-skin (kangaroo care) for preterm infants. *J Perinatol* 1991;11:216-226.
9. Vaughans B: Early maternal-infant contact and neonatal thermoregulation. *Neonatal Network* 1990;8:19-21.
10. Charpak N, Ruiz-Pelaez JG, Carpak Y: Rey-Martinez kangaroo mother program: An alternative way of caring for low birthweight infants? One year mortality in a two cohort study. *Pediatrics* 1994;94:804-811.
11. Loan NL, Camacho LWL, Rojas EP, Stern C, Maternidad Isidro Ayora Study Team: Kangaroo mother method: Randomized controlled trial of an alternative method of care for stabilized low-birthweight infants. *Lancet* 1994;344:782-785.C
12. de Leeuw R, Colin EM, Dunnebie EA, Mirmiran M: Physiological effects of kangaroo care in very small preterm infants. *Biol Neonate* 1991;59:149-155.
13. Legault M, Goulet C: Comparison of kangaroo and traditional methods of removing preterm infants from incubators. *J Obstet Gynecol Neonatal Nurs* 1995;24:501-506.
14. Bauer K, Uhrig C, Sperling P, et al: Body temperature and oxygen consumption during skin-to-skin (kangaroo) care in stable preterm infants weighing less than 1500 grams. *J Pediatr* 1997;130:240-244.
15. Als H, Lawhon G, Duffy FH, et al: Individualized developmental care for the very low-birthweight infant. *JAMA* 1994;272:853-858.