Intermittent Kangaroo Mother Care: A NICU Protocol
Riccardo Davanzo, Pierpaolo Brovedani, Laura Travan, Jacqueline Kennedy, Anna Crocetta, Cecilia Sanesi, Tamara Strajn and Angela De Cunto

*J Hum Lact* published online 4 June 2013
DOI: 10.1177/0890334413489375

The online version of this article can be found at:
http://jhl.sagepub.com/content/early/2013/06/03/0890334413489375

Published by:

SAGE
http://www.sagepublications.com

On behalf of:

International Lactation Consultant Association

Additional services and information for *Journal of Human Lactation* can be found at:

Email Alerts: http://jhl.sagepub.com/cgi/alerts

Subscriptions: http://jhl.sagepub.com/subscriptions

Reprints: http://www.sagepub.com/journalsReprints.nav

Permissions: http://www.sagepub.com/journalsPermissions.nav

>> OnlineFirst Version of Record - Jun 4, 2013

What is This?
Interruption of Kangaroo Mother Care: A NICU Protocol

Riccardo Davanzo, MD, PhD\(^1\), Pierpaolo Brovedani, MD, PhD\(^1\), Laura Travan, MD, PhD\(^1\), Jacqueline Kennedy, RN\(^1\), Anna Crocetta, RN\(^1\), Cecilia Sanesi, BPhy\(^1\), Tamara Strajn, RN\(^1\), and Angela De Cunto, MD\(^1\)

Abstract
The practice of kangaroo mother care (KMC) is steadily increasing in high-tech settings due to its proven benefits for both infants and parents. In spite of that, clear guidelines about how to implement this method of care are lacking, and as a consequence, some restrictions are applied in many neonatal intensive care units (NICUs), preventing its practice. Based on recommendations from the Expert Group of the International Network on Kangaroo Mother Care, we developed a hospital protocol in the neonatal unit of the Institute for Maternal and Child Health in Trieste, Italy, a level 3 unit, aimed to facilitate and promote KMC implementation in high-tech settings. Our guideline is therefore proposed, based both on current scientific literature and on practical considerations and experience. Future adjustments and improvements would be considered based on increasing clinical KMC use and further knowledge.

Keywords
breastfeeding, kangaroo mother care, neonatal intensive care unit, preterm, protocol, skin-to-skin care

Background
Kangaroo mother care (KMC) is the practice of skin-to-skin contact between the preterm low birth weight (LBW) infant and his or her mother.\(^1\) During KMC, the infant, clad in a diaper and cap, is held in an upright prone position against the bare chest of the mother and covered with clothing and/or a blanket.\(^2\) Kangaroo mother care is based on the guiding principle that preterm infants should be considered extero-gestational fetuses needing protection and stimulation from their own mother. Since its introduction nearly 35 years ago, continued research and clinical practice have demonstrated that this method is effective and beneficial for thermal control, breastfeeding, maternal–infant relationship, and health of both preterm, low birth weight and full-term infants.\(^3\)-\(^8\) With a better understanding of the benefits of KMC in high-income settings (Table 1), enhanced KMC practice has been strongly recommended also in high-tech neonatal intensive care units (NICUs).\(^3\) In spite of that, clinical guidelines for KMC implementation in these settings are lacking. Often, NICUs do not have explicit institutional protocols on KMC, as shown by some European surveys.\(^9\),\(^10\) Many European units applied restrictions regarding KMC frequency (sometimes or on parents’ request only, rather than routinely), method (conventional rather than skin-to-skin), and clinical conditions (especially mechanical ventilation and presence of umbilical lines) that would prevent its practice.\(^11\) Inconsistent positions on KMC practice might be due to cultural, educational, or environmental factors. Moreover, suboptimal staff attitude may result in KMC not being prioritized in the NICU. Therefore, protocols for KMC are needed to promote and optimize this practice.

Guidelines should clarify the definition of KMC, address accurate criteria of inclusion and exclusion, and provide detailed indications about staff roles and responsibilities, parent information and support, and material and training requirements. In addition, promoting KMC, selecting kangaroo babies, and supervising kangaroo dyads require professional skills for both nurse and medical NICU staff.\(^12\)-\(^15\)

Based on recommendations from the Expert Group of the International Network on Kangaroo Mother Care,\(^1\) we developed a hospital protocol in the neonatal unit of the Institute for Maternal and Child Health in Trieste, Italy, a level 3 care center with 10 intensive care cots and 10 special neonatal care cots. The nurse-to-patient ratio is 1:3 in the NICU and 1:8 in the special care area.

Date Submitted: March 24, 2013; Date Accepted: April 16, 2013.

\(^1\) Division of Neonatology, Institute for Maternal and Child Health–IRCCS “Burlo Garofolo,” Trieste, Italy

Corresponding Author:
Angela De Cunto, Institute for Maternal and Child Health–IRCCS “Burlo Garofolo,” Via dell’Istria 65/1, 34137 Trieste, Italy.
Email: angela.decunto@libero.it
The original KMC method with ideally 24 h/day of mother–infant skin-to-skin care, namely, continuous KMC, was intended as an alternative to conventional care in incubators in low-income settings. As in many other NICUs in affluent settings, in our NICU KMC is implemented as limited sessions with mother–infant skin-to-skin care in kangaroo position, for 1 to 3 hours, occurring over a limited period, namely, intermittent kangaroo mother care (I-KMC). Extensive KMC is reported to be implemented also in some high-income settings, such as in Scandinavia, where many NICUs have facilities for 24-hour kangaroo care, and socioeconomic factors are advantageous. Nevertheless, also in these settings, the existence of barriers is well recognized; for instance, keeping the same skin-to-skin position throughout the night could hardly be sustainable to parents, interfering with their sleep. Each KMC session should ideally last at least 1 hour, in order to take the infant’s state of adaptation into account. Kangaroo mother care practice is accompanied by breastfeeding promotion and parental support and empowerment. Kangaroo mother care should be regularly and safely practiced in stable preterm infants and their mothers, for the documented positive health benefits and to promote an adequate relationship between the mother and her child.

**Initiation of KMC: Inclusion and Exclusion Criteria**

Kangaroo mother care can be implemented both in the NICU and in the special care neonatal ward. Mother and/or father should be present, fully informed, and psychologically and physically ready for active participation.

The decision about the appropriate gestational age for KMC cannot be predetermined. According to Nyqvist, early sucking competence has been observed from 29 weeks postmenstrual age (PMA) onward, with attainment of full breastfeeding as early as 32 weeks PMA. Nevertheless, the decision to practice KMC does not depend per se on either neurodevelopment degree or postmenstrual age but is based on infant stability (Table 2). In Sweden, extremely preterm infants experience first kangaroo care at a median age of 6 postnatal days. The candidate baby might still be in an incubator as well as already in the crib and completely dressed. In fact, it is well known that when preterm infants reach 1500 to 1600 g and if the environmental temperature is 25°C, they can be cared for in a crib without increased thermal risk, growth risk, or delayed hospital discharge.

Exclusion criteria are based both on infant clinical condition and on organization of care. Clinical criteria may be absolute or relative. In Table 3, we list the criteria identified for our NICU. There are many other clinical conditions or situations that might be reasons for not implementing I-KMC that should not be considered as real contraindications (Table 4).

**Parent Information**

- There should not be any restrictions regarding parents’ presence in the NICU. Other relatives and siblings are usually not allowed in our unit, although it is a

### Table 1. Benefits of Kangaroo Mother Care in High-Tech Settings of Care

<table>
<thead>
<tr>
<th>Benefits for infant</th>
<th>Benefits for breastfeeding</th>
<th>Other possible benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Prevents hypothermia by warm transfer from mother to child</td>
<td>Facilitates access to breast and increases production of human milk</td>
<td></td>
</tr>
<tr>
<td>Improves and/or maintains stability even in very preterm infants</td>
<td>Increases breastfeeding rate, proportion of exclusive breastfeeding at NICU discharge, and longer breastfeeding duration</td>
<td></td>
</tr>
<tr>
<td>Oxygen saturation and episodes of apnea and bradycardia are reduced</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reduces stress, decreasing cortisol release during KMC session</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Has positive effects on infants’ sleep patterns as a result of improved brain maturation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Improves neurobehavioral and psychomotor development</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Decreases pain response in preterm infants during painful procedures</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### Suggested Protocol for I-KMC, as Practiced at the Institute for Maternal and Child Health

We therefore propose the protocol used in our NICU, a level 3 care unit, at the Institute for Maternal and Child Health. This protocol has been elaborated both in current scientific literature and in practical considerations and experience. Far from being a general rule, this is intended to be a possible example of guidelines applicable in a high-tech setting.
Table 2. Inclusion Criteria for Intermittent Kangaroo Mother Care

1. Stable preterm and/or low birth weight infants
2. Term and preterm neonates in case of
   - Difficult mother–infant bonding
   - Difficulty in breastfeeding
   - Terminal care

*Definition of stability is based on infant’s vital signs: temperature 36°-38° (normal range, 36.5-37.5); SpO2 > 90% and FiO2 < 0.4; respiratory rate (RR) < 60/min (RR 60-80/min and mild dyspnea could be acceptable in single cases); heart rate (HR) 80/100-180/min (> 80/min in term or > 100/min in the preterm newborn); mean arterial pressure (mmHg) ≥ postmenstrual age (PMA) (eg, ≥ 30 mmHg at 30 wk PMA); peripheral perfusion evaluated as pink color of the skin; neither episodes of severe apnea in the previous 8 h nor frequent apnea (≥ 4/h).

Table 3. Exclusion Criteria for Intermittent Kangaroo Mother Care

1. Absolute contraindications
   - Unstable or very sick newborns (includes neonates treated with high frequency oscillatory ventilation/high frequency percussive ventilation)
   - Mechanical ventilation for acute disease
   - Treatment with vasopressor drugs
   - Presence of umbilical artery catheter, jugular or femoral venous catheter, thoracic or abdominal drainage
2. Relative contraindications
   - Neonates with birth weight < 750 g or gestational age < 28 weeks in their first week of life (exception allowed only after careful medical assessment)
   - Neonates on phototherapy with jaundice close to exanguino-transfusion (EXT) zone (bilirubin < 2 mg/dL to EXT limit)
   - Neonates in their first week after major surgery
   - Neonates who underwent a major procedure in the previous 6-12 hours

Table 4. False Contraindications for Intermittent Kangaroo Mother Care (I-KMC)

- Ward round in a busy unit
- Previous I-KMC session in the same day. Proposal of I-KMC should be gentle and sensitive, as some mothers may show some emotional difficulties at the very beginning of kangaroo care experience
- Episodes of oxygen desaturation during previous I-KMC sessions. Careful supervision of the baby is required in any case
- Respiratory support with continuous positive pressure or noninvasive ventilation
- Mechanical ventilation in stable infants with chronic disease
- Central venous catheter, umbilical venous catheter
- Previous laser treatment for retinopathy of prematurity
- Infants with neurological conditions
- Infants on phototherapy with jaundice far from exanguino-transfusion (EXT) line (bilirubin < 2 mg/dL to EXT line). It is possible to interrupt phototherapy for a short I-KMC lasting 1-2 h

A desirable standard that other members of the family are allowed, as in many other NICUs worldwide.

- Information about parents and other relatives or legal guardians of the infant visiting policy should be given at the time of first prenatal counseling, as well as information on preterm infants’ care and use of expressed human milk for nutrition of the preterm baby. Information on KMC should also be given, explaining the benefits of this practice for infant and parents, practical aspects of performance, timing of initiation, and possible conditions that could limit KMC implementation.

- Planning of KMC must be shared and agreed on with parents/legal guardians.

- Parents must be informed that a preterm baby needs some time to adapt when transferred from an incubator to kangaroo care as well as when returning to the incubator. Therefore, I-KMC should be started only when parents are ready to do it for at least 1 hour. The cost-benefit ratio for the newborn infant candidate for an I-KMC session must be considered; proven benefits for the baby may or may not compensate for the stress of changing situations and the nurse work time spent for back transport to the incubator or cot. The more stable the baby, the more feasible an I-KMC session shorter than 1 hour is, according to the best some parents can do.

- When I-KMC cannot be implemented, parents must be informed about how to minimize the negative effects of prolonged separation from their baby. Gentle containing touch, proprioceptive sense stimulation, face-to-face visual contact, talking, reading, singing...
soothing lullabies, and olfaction stimuli are good options.

- Parents must be coached to recognize signs of stress in their baby in order to avoid sensitive and sensorial hyperstimulation.

### Supporting Parents’ Role

- Provide adequate recliner chaise lounge, supporting the feet and allowing both to lie down.
- Provide adequate privacy (by screens or curtains).
- Ensure a calming environment with a low level of sound and illumination, keeping monitor alarms at low noise levels and limiting staff traffic as much as possible.
- Inform and encourage parents (empowerment), appreciate their efforts, and highlight every behavioral step the infant takes.
- Coach parents to take over the infant’s care (eg, changing diapers) and to provide assistance in infant transfer in the kangaroo position. Parents are the primary caregivers.
- Breast pump should be available; hand expression should be taught to every mother as it is sometimes preferred over mechanical or electric expression.

### KMC Clothing

- **Mother:** gown open on the chest
- **Infant:** diaper and hat (no gloves or socks); cover back and head with warm blanket for thermal protection

### Transfer between Incubator/Crib and KMC Position

- **Modes of transfer:** Hold the infant with still hands in a flexor position (flexed arms and legs), paying attention to head. A sheet or a cape can be used during both transfer and KMC session. Pay attention to maximal prevention of infant hypothermia and destabilization.
- **Infant with respiratory support:** A nurse disconnects airway tubing during transfer and reconnects it as soon as mother is lying down. Secure tubing and lines with tape on furniture or mother’s clothing.

### I-KMC Monitoring

- Assess infant’s position and monitor temperature. There should not be any textile between mother and baby skin.
- Guide parents in recognizing signs of infant’s instability, according to Newborn Individualized Developmental Care and Assessment Program (NiDCAP) principles, providing simple and clear information.
- During I-KMC, hemodynamic signs (electrocardiogram, pulse oximetry) should be continuously monitored.

- Most nursing procedures can be performed during I-KMC, including oral/nasal or endotracheal suctioning, feeding tube insertion, parenteral nutrition administration, and IV injection.
- In case infant instability persists after controlling or adjusting kangaroo position and oral/nasal or endotracheal suctioning, I-KMC should be interrupted.
- An I-KMC session should last at least 1 hour. There is no maximum time limit for the session, provided the mother enjoys the experience and the baby remains stable. In addition, there is no evidence that a slow rather than rapid and/or casual progression from a short period to longer sessions is preferred.
- Parents can sleep or read during the session. Mobile phones and earphones are not advisable in order to avoid distraction from the KMC experience.
- The exact time when the I-KMC session commences and ends should be recorded as part of routine documentation of nursing care, as well as possible reasons for discontinuation.

### Transfer Back to Incubator/Crib

An I-KMC session usually ends when the parent requests for it to end. Nevertheless, sometimes I-KMC could be suddenly interrupted if the parent is no longer available or becomes sick or if the infant becomes unstable in spite of effective intervention provided by the nurse to restore baby stability.

When I-KMC ends, the same caution must be paid for the back transfer of the baby from the kangaroo position to the incubator or crib.

### KMC Synopsis

In Table 5, a synopsis of the KMC steps is reported: parents’ information, checking baby condition prior to I-KMC, transfer between incubator/crib and kangaroo position, I-KMC session supervision, and data recording.

### Until What Gestational Age Should KMC Be Practiced?

Kangaroo mother care provides health benefits to high-risk infants, involves parents in their care, and humanizes the NICU experience. This is commonly recognized for a model of care for preterms’ early life. Nevertheless, the advantages of KMC are not only limited to very preterm infants cared for in the NICU, but they also apply to those not so preterm and not so tiny, transferred from the NICU or admitted to the special care unit. Consequently, KMC can be offered until the baby reaches term (or at least 37 weeks PMA) and a weight of 2500 g or more, although available guidelines do not give further details on the precise limit. In our clinical experience, we note that some preterm infants become restless in KMC as they become...
bigger and older. On the other hand, other preterms may continue to experience KMC also after discharge as the result of parents’ choice and babies’ acceptance and enjoyment.16

Conclusion
The proposed protocol aims to facilitate KMC implementation in high-tech settings. As uncertainty around how to practice KMC may present obstacles to its implementation, particular emphasis is placed on practical aspects. Indications provided, in particular inclusion and exclusion criteria, are based on current scientific literature but also on practical considerations and on NICU staff opinions and experience. Future adjustments and improvements would be considered based on increasing clinical KMC use and further knowledge. Moreover, a clear protocol on KMC could represent a useful tool to improve research in the field of kangaroo care. Finally, although clear guidelines could facilitate implementation of KMC, this practice must be combined with the adoption of a sensitive way of care and the optimization of the physical environment to increase its efficacy.23,26

Declaration of Conflicting Interests
The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding
The authors received no financial support for the research, authorship, and/or publication of this article.

References

<table>
<thead>
<tr>
<th>Table 5. Synopsis of Intermittent Kangaroo Mother Care Steps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Step</td>
</tr>
<tr>
<td>Prepare and help mother to be ready for I-KMC</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Check infant’s readiness</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Transfer to kangaroo position</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>I-KMC session supervision</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Data recording</td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>


