

JOHNS HOPKINS ALL CHILDREN'S HOSPITAL

# Kangaroo Care in the Neonatal Intensive Care Unit Clinical Pathway



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*This pathway is intended as a guide for physicians, physician assistants, nurse practitioners and other healthcare providers. It should be adapted to the care of specific patient based on the patient's individualized circumstances and the practitioner's professional judgment.*

# Kangaroo Care in the Neonatal Intensive Care Unit Clinical Pathway

## Rationale

To provide all clinical staff with the benefits, criteria and procedure to effectively and safely promote and provide skin-to-skin contact between family members and infants during neonatal intensive care unit admission.

## Background / Published Data and Levels of Evidence

Kangaroo care was reintroduced in 1978 in Bogota, Columbia as a method to provide care for low birth weight (LBW) infants in their overcrowded low-resource neonatal units. Empirical evidence has identified the importance of early skin-to-skin touch to optimize newborns' neurodevelopmental outcomes later in life. Gentle skin-to-skin contact is especially important for the brain development of preterm infants who often spend their first days or weeks of life in neonatal intensive care units. Leading organizations recommend skin-to-skin contact, among them the World Health Organization, American Academy of Pediatrics, Academy of Breastfeeding Medicine and the Neonatal Resuscitation Program.

There are physiologic benefits to newborns when they are held skin-to-skin, such as stabilization of heart rate, breathing patterns and blood oxygen levels, gains in sleep time and weight, decreased crying, greater breastfeeding success, and earlier hospital discharge. Ongoing research has also identified benefits to the family caregivers that skin-to-skin contact can provide: decrease of parental stress that can interfere with bonding, health and emotional wellness, and the interpersonal relations of parents, as well as breastfeeding rates. We elucidate each of these below.

### A. Neuroprotection and Neurodevelopment

Mother and fetus can be viewed as basically one biological organism. Study and convention suggest that birth is a trauma that can affect the separated newborn throughout life. At birth, a mother's smells, touch and voice naturally reduce and control birth stress.<sup>3</sup>

Skin-to-skin contact between healthy newborns and their mothers during the first 2 hours after birth has demonstrated better self-regulation and less emotional negativity and irritability in infants at one year of age than infants held swaddled or separated from their mothers in the first 2 hours of life. Lack of initial KC during the first 2 hours after birth could not be compensated for by rooming-in.<sup>4</sup> This study supports evidence suggested

by Klaus et al<sup>5</sup> of an early sensitive period in humans in which mothers and infants have a unique chance to bond and influence each other, which carries into their long-term relationship.

Acceleration of preterm infant brain maturation and brain complexity (measured by electroencephalogram) occurred in one study of infants receiving 1.5 hours of kangaroo mother care per day for 4 weeks starting at 32 weeks postmenstrual age (PMA) and continuing until 40 weeks PMA. Preterm infants who did not receive any KC lagged behind their counterparts by about 2 weeks and had more immature brains (as measured by the EEG-based Dymaturity Index) than their KC preterm peers, while preterm infants who received KC approximated term brain maturation by 40 weeks PMA.<sup>6</sup>

Two cohort studies of infants receiving KC showed higher scores on the Bayley Scales of Infant Development at 6 or 12 months of age. Of the infants enrolled in the second study, 117 were followed until 10 years of age, and it is reported that children who received KC showed attenuated stress response, improved autonomic functioning, better organized sleep, and better cognitive control.<sup>7</sup>

## **B. Infant Stability**

A study cohort of 300 in-born LBW infants and their mothers with data from 265 mother-baby pairs analyzed, demonstrated improvements in axillary temperature, respiratory rate, heart rate, and oxygen saturation during KC sessions. Infants receiving KC showed modest but statistically significant improvement in vital physiological parameters on all three days of study.<sup>8</sup>

Early (by day 4 of life) versus late KC in low birth weight infants (1.0-1.8kg) resulted in significantly reduced apneic episodes (11.9% vs. 20%), and reduced recurrent apnea requiring ventilation (8.8% vs.15%).<sup>9</sup>

Monitoring, nursing and medical care should be provided in situ during KC. If instability occurs, nursing and medical measures should be taken with the infant remaining in kangaroo position. Kangaroo care should only be discontinued if these measures do not result in expected improvement.<sup>10</sup>

## **C. Infection Control**

Meta-analysis of RCTs in resource limited countries have shown decreased incidence of sepsis, necrotizing enterocolitis, and pneumonia.<sup>11</sup>

A study of 26 premature infants born at 24/0 to 28/6 demonstrated that early initiation of KC within the first week of life is associated with significant reduction of nosocomial infection. The sooner the infant is in contact with the mother, the more his/her body is colonized with the mother's nonpathogenic flora which therefore results in a lower risk of nosocomial infection. Daily dosage greater than 3 hours of KC per day, every day, demonstrated increased nosocomial infection prevention.<sup>12</sup>

In another study of 102 mother/baby dyads wherein the infants (1.3-1.8kg) were colonized with MRSA/MRSE at first nasal culture, the culture negative mothers held their infants in KC for 1 hour twice per day for 7 days and more than half of the colonized

infants were decolonized at the end of the 7 days of KC treatment. One possible explanation given is the phenomenon of bacterial interference.<sup>13</sup> One study described KC as a risk factor in MRSA infection in LBWs in a Level II/III NICU, but authors did not state that there was a causal relationship.<sup>7</sup> Parents of vulnerable infants (VLBW, open neural tube defects, abdominal wall defects) should be monitored for skin lesions and may need to defer KC or have their skin cleaned prior to skin-to-skin contact.<sup>14</sup>

#### **D. Bonding**

Mothers who provide KC for their infants describe feelings of being needed, increased knowledge of their infant's needs, and confidence in their role as mothers.<sup>15</sup> Oxytocin levels rise in the infants as well as mothers and fathers during KC. A sense of calm and well-being occurs under the influence of KC and oxytocin release.<sup>1</sup>

Near the time of discharge, mothers and fathers who held their infants skin-to-skin were observed to look at and touch their infants more frequently, be more adaptive to their infant's cues and show a more positive affect. In a study that followed families after discharge, both parents provided a better environment and were more sensitive to their infant's needs.<sup>16</sup>

#### **E. Mother's Own Milk (MOM) Production**

KC has an impact on breast milk production and is associated with higher volumes expressed. A study on 26 mothers of very low birth weight infants and 1642 milk expressions were analyzed to determine if pumping during KC or immediately afterward versus pumping outside of the proximity of the infant impacted milk volumes. Pumping sessions that were conducted at home or in a separate room from the infant were associated with lower milk volumes. When mothers pumped beside the incubator they expressed an average of 96.9 mL, mothers who pumped during KC had an average of 107.7mL and when they pumped after KC they had an average of 117.7mL<sup>17</sup> Milk expressed during and immediately after KC is associated with significantly higher milk volumes.<sup>17</sup>

#### **F. Breastfeeding Pathway**

A significant body of evidence has shown that immediate and prolonged skin-to-skin contact (birth KC) increases success of first breastfeeding.<sup>18</sup> Further study has demonstrated an average of 10.6 days in infants receiving KC to exclusive breastfeeding vs. 19.2 days in a control group receiving conventional care only.<sup>19</sup> A Cochrane review,<sup>20</sup> concluded that early KC significantly increases earlier breastfeeding achievement. Adding to this is a study demonstrating exclusive breastfeeding rates remained high one month after discharge in low birth weight infants receiving intermittent early KC of at least 4 hours per day and initiated by day 4 of life.<sup>8</sup>

Early breastfeeding competence has been observed, with nutritive suckling occurring in infants from 29 weeks PMA when KC has been the early and ongoing standard of care. Full breastfeeding has been achieved several weeks prior to due date and as early as 32 weeks PMA.<sup>21</sup>

### **G. Pain Control**

Multiple studies have examined well-established signs of pain, both physiological and behavioral indicators including heart rate and crying time and KC appears to reduce infant's pain response from heel sticks, venipunctures, and injections, and assist in the recovery of the infant from these procedures.<sup>22</sup> The pain and stress reduction during KC reduces the sympathetic nervous system's impact on the body, leading to reduction in corticosteroid secretion, consequently decreasing the risk of both skin and systemic stress-induced infections.<sup>12</sup>

### **H. Duration of Kangaroo Care**

Early, regular, and prolonged KC has a positive impact on the premature infants' health. Early KC is associated with lowered risk of cholestasis and nosocomial infection, and of developing BPD. Regular KC further reduces the occurrence of nosocomial infections. Prolonged daily KC of greater than 3 hours duration continues to lower nosocomial infection rates and promotes successful breastfeeding.<sup>12</sup>

Some benefits of KC such as reducing infections are limited to the time when KC is being given and shortly thereafter. Therefore, KC should be offered as soon as possible, regularly and for as long as possible every day.<sup>12</sup>

### **I. Neonatal Abstinence Syndrome**

Kangaroo care with infant's mother is an effective non-pharmacologic therapy. It has been shown that infants in withdrawal demonstrated decreased pain scores and had improved sleep patterns when skin-to-skin therapy was initiated with their mothers.<sup>24</sup> Clinical observations have determined that the number of infants of substance abusing mothers transferred to NICU decreased by 67% since birth KC began being routinely practiced.<sup>23</sup> Three or more hours of KC has been shown to decrease Finnegan scores in babies with NAS.<sup>1</sup>

## Clinical Management

*This CPG supersedes the information provided in Mosby's Nursing Skills and the AACN Manual for Critical Care. For further information regarding neuroprotection provided with KC, refer to: Behavioral and Environmental Adaptations for Neuroprotective Care of the Preterm Infant*

### A. No order is required to initiate or perform KC

- An order will be needed to defer KC under circumstances that require the medical team's review.

### B. Who qualifies?

- Any infant may qualify for KC based on daily, individualized assessment. It is encouraged whether the infant is receiving breast milk or formula.
- Parents or designee (with parental permission) can provide KC. For the purpose of this CPG, parent is used to refer to any individual that will hold infant in KC.
- Skin-to-skin contact may be done simultaneously with multiples

### C. When?

- KC can be done at any time.
- Encourage parents to be available to hold infant for a minimum of one hour, preferable longer.
- Provide family-centered care through communication with family to determine best time for daily KC

### D. How?

#### 1. Preparations:

##### i. Gather Equipment

1. Have a hat and blankets available to cover infant to assist with thermoregulation as needed
2. Privacy covering for mother and room shield (available from EVS)
3. Have clips available to secure tubing
4. KC is preferably completed in a reclining chair with the footrest up and the chair partially reclined at a 40-60 degree angle, or as best tolerated by the infant. Position the reclining chair close to the bedside

##### ii. Parent Preparation

1. Parents should be prepared to sit for at least an hour, they may need to use the restroom and mothers may need to pump prior to KC
2. A button down or zippered shirt, sweater, robe or other article of clothing may be worn by the parent during KC but should not get in the way between the parent and the infant. Bras or undershirts will have to be removed

3. Encourage parents to remove necklaces and wear a top that opens in the front
  4. Parents smelling of smoke, perfume/cologne, or other strong odors should wash their chest and change clothing as needed prior to holding the infant
  5. Ask parents to focus on relaxation and steady breathing (not holding their breath), to promote infant stability and co-regulation after transfer
- iii. Infant Preparation
1. Record baseline vital signs
  2. Dress baby in diaper only
  3. Include hat if baby <1000 grams
  4. If your patient is intubated place infant supine or prone depending on the type of transfer as described below:  
*Babies may be placed in KC via seated or standing transfer. Mothers who are experiencing difficulty standing or walking should be offered the seated transfer option. Consideration should be made as to the method that best suits both the safety needs of the mother and provides the least amount of stress to the baby.*
    - a. Seated Transfer
      - i. Position infant prone with small blanket (or blanket folded in four) on infant's back.
      - ii. Position infant's head so that side with ETT is on the surface of the bed – ETT is down on surface of bed – down is down
    - b. Standing Transfer
      - i. Lay infant supine on blanket folded in four.
      - ii. Position infant's head so that side with ETT is not on surface of the bed – ETT up and over opposite shoulder – up is up  
*Refer to Behavioral and Environmental Adaptations for Neuroprotective Care of the Preterm Infant Clinical Pathway - Appendix B, for images and additional information on correct positioning and transfer of the intubated infant*
  - iii. Suction endotracheal tube as needed confirming tube is secure, clear the ventilator circuit tubing of all water
  - iv. Allow for recovery period prior to moving infant
  - v. Ensure all other tubing and lines are secure on one side of baby, confirm length of tubing allows for unrestricted movement to chair
  - vi. Position drainage tubing and collection containers to allow for unobstructed flow
- iv. Assess environment and prepare to move baby
1. Promote smooth transition by educating and directing plan for moving infant
  2. Determine location of incubator and ventilator in relation to reclining chair
  3. Assess type and location of tubing and cables
  4. Assure chair is able to recline



5. Have clips available to secure tubing
  6. Have blankets available to cover and secure infant. Blankets may be warmed by parent prior to holding for infants in high humidity
  7. Position chair at bedside with space behind chair for staff (nurse or respiratory therapist) moving ventilator connections, lines, tubing, wires and/or drains
  8. Position monitor cables and all tubing to allow for unrestricted movement, considering length needed to reach chair
  9. Position drainage tubing and collection containers (chest tube, urinary catheter, etc.) to allow for unobstructed flow of drainage and/or urine
- v. Baby Transfer:
1. Discuss and assign tasks to staff and parent(s) who are assisting with transfer
  2. RT must be available to assist in transferring all patients with an ETT - Refer to *Care of the Mechanically Ventilated Patient Guideline*
  3. Disconnect temperature and CO2 probes temporarily
    - a. Seated transfer:
      - i. Support infant's head with the palm of the hand.
      - ii. Without disconnecting ventilator, hold ETT between two fingers, close to infant's mouth to stabilize and prevent movement of ETT
      - iii. Place other hand on infant's back/body over small blanket
      - iv. Move infant slowly to parent's chest in conjunction with staff attending to lines and tubing
    - b. Standing transfer:
      - i. Place head of bed in flat position and rotate sideways securing ETT and lines while turning
      - ii. Position infant on folded (warm) blanket in reach to pick up easily
      - iii. Lower or raise bed to a comfortable position for parent to pick up infant
      - iv. Parent leans over as close as possible to infant. Both hands placed under blanket holding infant securely and then picks up infant and brings to chest
      - v. Staff member manages ETT assuring no twisting, kinking, or rain out. Do not disconnect ETT
      - vi. Staff member (usually attending to other wires and leads) positions seat of chair at back of mother's knees, locking one side as appropriate
      - vii. When parent can feel back of legs on front of chair seat staff member assists in lowering parent and baby into chair, unlocking chair and repositioning as needed
  4. If surgical wounds are present, the infant may not tolerate chest-to-chest position. Position baby in a manner comfortable for the baby while maximizing skin-to-skin contact. This may include placing the infant in a side-lying position between mother's breasts

5. An infant with an umbilical line should be held side-lying
- vi. After Transfer
  1. Adjust infant's position, ensuring that parent and infant are skin-to-skin and chest-to-chest with baby in a tucked position
  2. Ensure that the head and neck are in neutral position, the torso, arms, and legs are in alignment, and that equipment wires are not pulling on infant or mother.
  3. Secure tubing and drains (if applicable), and assure mother is comfortable in reclining chair
  4. Cover and secure infant with blanket folded in triangle, tucking snugly around mother's sides and up to infant's ear. Cover with parent's shirt/gown/robe as needed.
  5. Assure that mother has call button, water, and mirror
  6. Maintain isolette in Neutral Thermal Environment (NTE). If infant is on servo/infant mode, switch to manual/air control while infant is held and close isolette to maintain the baseline environmental temperature. Switch back to servo/infant mode once bay returns to isolette and check axillary temperature
  7. Re-assess infant's status. Infant may require time to adjust to the change in position. If infant is showing signs of physiological instability:
    - a. Make sure infant's head and neck is in neutral position. Check all tubing and lines to assure not pulling on baby
    - b. Adjust parent's reclining angle
    - c. Encourage parent to relax and breathe in a steady pattern without holding their breath
    - d. Assess need for pain/sedation medication
  8. Hands-on nursing and medical care may be completed while infant is held in KC.
- vii. Return transfer:
  1. Follow same process but in reverse order when returning infant to isolette/crib
  2. Provide hand cradling to facilitate infant adjustment to environmental change
  3. Record resting vital signs once infant is comfortably repositioned in isolette/crib

#### **E. How Long?**

1. Mothers should be encouraged to hold for a minimum of 60 minutes.
2. Mothers who cannot hold for at least 60 minutes should be encouraged to practice hand cradling or hold baby bundled rather than skin-to-skin.
3. KC should be offered daily *without time constraints* (may be less than one hour) for infants with Neonatal Abstinence Syndrome (NAS) for the following reasons:
  - i. Mother may not initially tolerate close interaction with her infant for lengthy periods of time.
  - ii. Infants with NAS may initially be irritable and inconsolable exhibiting altered behavioral state regulation especially during first encounter.
  - iii. Encourage mother to increase increments of time for KMC.

**F. Lactating Mothers:**

1. Should be encouraged to breastfeed or provide non-nutritive breastfeeding during KC when appropriate. Provide assistance as needed.
2. Should be encouraged to pump following skin-to-skin contact if not breastfeeding.

**G. Skin lesions:**

Parents/family with history of skin lesions or with current lesions or rash may have to defer KC until medical team has reviewed history and current symptoms.

**H. Special considerations:**

Infants with the following will need special considerations and may require interdisciplinary staff collaboration to determine ability to KC.

1. UAC or UVC line
2. Humidity greater than 75%  
For babies in humidity >75% or in servo/baby isolette - refer to: NICU Thermoregulation Management Clinical Policy
3. Surgical patients in the immediate post-op period
4. Chest tubes
5. Radial Arterial lines
6. ELBW/MLBW infants positioned with head in midline for initial 72 hours
7. For babies that are not able to be moved from their bed - refer to: Hand Cradling – Hand Hugs Guide

**I. End of Life:**

KC should be offered to parents and family during terminal care.

**J. Documentation Reminders**

The following will be documented in the patient's medical record:

1. Time initiated and duration
2. Patient response/tolerance
3. KC sign placed at bedside
4. Parent(s) training/education

## Summary

Kangaroo Care is the optimal place for care of preterm and sick infants and should be offered and encouraged daily for every infant that qualifies. KC should be discussed each shift during nursing hand off and evaluated on daily medical rounds with documentation every day in infant's chart.

## Glossary

- Kangaroo Care (KC): Infant held chest-to-chest in a vertical position wearing only a diaper. Term used to designate continuous 24/7 skin-to-skin holding. Also used to refer to intermittent skin-to-skin holding in high tech NICU settings.
- Skin-to-Skin Contact (SSC): Term used to designate skin-to-skin holding. May be used interchangeably with KC but also refers to infant held in a position other than vertical and chest-to-chest. As in infant with surgical wound or condition that precludes positioning chest-to-chest.

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## **Outcome Measures**

1. Percentage of infants receiving prompt initiation of skin-to-skin care
2. Average day of life when skin-to-skin care was first provided by family caregiver(s)
3. Number (percent) of eligible inpatient days where any family caregiver provided at least one hour of skin-to-skin care
4. Percent of infants receiving any breastmilk feedings at the time of initial disposition

Clinical Pathway Team

Kangaroo Care in the Neonatal Intensive Care Unit Clinical Pathway

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