CRITICALLY APPRAISED PAPER (CAP)

FOCUSED QUESTION
How does a uniformly long duration of kangaroo care affect the safety and health (as measured by cardiorespiratory and thermal responses) of healthy preterm infants in a Level II neonatal intensive care unit?


CLINICAL BOTTOM LINE:
From the cardiorespiratory and thermal status results reported in this study, the authors of this article conclude that kangaroo care (KC) is safe for infants in a Level II neonatal intensive care unit (NICU). The breathing patterns observed also show that KC is an important therapeutic intervention to routinely use with healthy preterm infants in a Level II NICU. Both findings support the use of this intervention by occupational therapists working in a NICU environment to help safely promote the mother–infant bond. However, limitations included the time of treatment, and who delivered the treatment was not stated. Further research should be conducted to determine long-term effects of KC.

RESEARCH OBJECTIVE(S)
List study objectives.

To determine by randomized controlled trial (RCT) the safety and effects of a uniformly long duration of KC on the cardiorespiratory and thermal status of a preterm infant.

DESIGN TYPE AND LEVEL OF EVIDENCE:

- RCT
- Level I
- Pretest–posttest control group design

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? Circle yes or no, and if no, explain.
Multiple sclerosis and its symptoms are a known topic. Length of time for an exercise regime has not been stated in the literature.

Only a few RCTs are available in the literature, and most are descriptive or quasi-experimental. Most RCTs that are available have been completed in other countries that may have different measurements, routine practices, and maternal expectations than the United States. There also have not been many studies that have reported on long sessions of KC.

SAMPLE SELECTION
How were subjects selected to participate? Please describe.

Consecutive sampling; infants were chosen based on availability but also based on specific inclusion characteristics (gestational age, medical status, type of NICU care).

Inclusion Criteria
Infants age 32–36 weeks’ gestation at birth, Level II NICU, medically stable, discharge expected within 4 weeks

Exclusion Criteria
Infants had received medication in the last 24 hours, had another known condition that would affect the dependent measures

SAMPLE CHARACTERISTICS
N = 24

<table>
<thead>
<tr>
<th>% Dropouts</th>
<th>NR</th>
</tr>
</thead>
<tbody>
<tr>
<td>#/ (%) Male</td>
<td>13 (54%)</td>
</tr>
<tr>
<td>#/ (%) Female</td>
<td>11 (46%)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>NR</td>
</tr>
</tbody>
</table>

Disease/disability diagnosis
Preterm infants in Level II NICU

Check appropriate group:

| <20/study group ✓ | 20–50/study group | 51–100/study group | 101–149/study group | 150–200/study group |

INTERVENTION(S) AND CONTROL GROUPS
Add groups if necessary

Group 1

Brief Description
Infants were studied during one pretest session, 2.75–3.25 hours long, laying on their right side in an open crib, clothed in a diaper, cotton t-shirt, and cap, wrapped in a receiving blanket and covered with a cotton thermal blanket. They received a KC session, 2.75–3.25 hours long, laying skin-to-skin against the mother’s chest with their back covered by the mother’s jacket. They then received the pretest conditions for a third session.
Setting | Level II NICU
---|---
Who Delivered? | NR
Frequency? | 3 interfeeding intervals, 2.75–3.25 hours each
Duration? | 1 day

Group 2

| Brief Description | Infants were laying on their right side in an open crib; clothed in a diaper, cotton t-shirt, and cap; wrapped in a receiving blanket and covered with a cotton thermal blanket for all three sessions; not receiving KC during the test session. |
| Setting | Level II NICU |
| Who Delivered? | NR |
| Frequency? | 3 interfeeding intervals, 2.75–3.25 hours each |
| Duration? | 1 day |

Intervention Biases: Circle yes or no and explain, if needed.

Contamination

YES/NO | Control group did not receive KC

Co-intervention

YES/NO | To participate in this study, infants could not have had medication in the past 24 hours and were considered medically stable; therefore, the infants were most likely not receiving other treatment.

Timing

YES/NO | Study occurred over three sessions in 1 day, only one of which was the KC test interval. There may not have been enough time studied to determine effectiveness and safety.

Site

YES/NO | All infants were studied in a Level II NICU.

Use of different therapists to provide intervention

YES/NO | Nurses transported babies to the mother and back to their crib after feeding. However, it was not stated who delivered treatment.

MEASURES AND OUTCOMES

Complete for each relevant measure when answering the evidence-based question:

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article—yes/no/NR [not reported]), and how frequently the measure was used.
Cardiorespiratory monitor: Measured heart rate and respiratory rate; continuous recording of these measures determined apnea, bradycardia, and periodic breathing frequencies
Reliability/Validity: NR
Frequency: Outcomes measured during pretest, test, and posttest sessions. Heart rate and respiratory rate recorded each minute.

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article—yes/no/NR [not reported]), and how frequently the measure was used.

Cole-Palmer thermistor: Measured abdominal skin temperature
Reliability/Validity: NR
Frequency: Outcome measured during pretest, test, and posttest sessions. Recorded each minute.

Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article—yes/no/NR [not reported]), and how frequently the measure was used.

Nellcor 200 Pulse Oximeter: Measured oxygen saturation
Reliability/Validity: Validity $y = 0.70$, reliability $r = 0.90$
Frequency: Outcome measured during pretest, test, and posttest sessions. Recorded each minute.

Measurement Biases
Were the evaluators blind to treatment status? Circle yes or no, and if no, explain.

YES/NO A certified pediatric pneumographer was masked to group and test period when manually scoring data.

Recall or memory bias. Circle yes or no, and if yes, explain.

YES/NO Measures taken were objective measures. No recall was required on the part of mother, infants, or evaluators.

Others (list and explain):

RESULTS
List results of outcomes relevant to answering the focused question
Include statistical significance where appropriate ($p < 0.05$)
Include effect size if reported

Safety: All mean cardiorespiratory and thermal variables remained within clinically acceptable ranges during all 3 periods for both the test and control group. Temperature was the critical assessment to answer the question of safety. No infant experienced a rise or drop in temperature beyond his or her own neutral thermal zone and no body heat was lost ($p = .03$) during KC.
The outcome measures did not change significantly across the three sessions in the control group.

In the KC group, there were changes from period to period for heart rate \((p = .01)\), abdominal skin temperature \((p = .03)\), and oxygen saturation \((p = .04)\). Oxygen saturation was lower than the control group during KC \((p = .04)\).

A drop in oxygen saturation for the overall KC group from the pretest to the test session was statistically significant \((95.3\% \text{ to } 94.3\%)\) but may have been due to increased body temperature that occurred during KC.

Periodic breathing was common in both pretest and posttest periods but almost completely absent during KC \((\text{mean } = 0.75\pm0.34 \text{ percent of the time})\). Periodic breathing continued around the same frequency during all three periods for the control group.

Was this study adequately powered (large enough to show a difference)? Circle yes or no, and if no, explain.

**YES/NO** Although a power analysis was not completed by the authors of this study, only 24 infants were studied overall.

Were appropriate analytic methods used? Circle yes or no, and if no, explain.

**YES/NO** A pretest–posttest control group design was appropriate for this study. A two-factor, repeated measures ANOVA was calculated to determine the changes in variables during treatment. A Wilkes’ lambda post-hoc test was used with each group for interaction effects present with the three periods.

Were statistics appropriately reported (in written or table format)? Circle yes or no, and if no, explain.

**YES/NO** Statistics were given in table format and written format.

**CONCLUSIONS**

State the authors’ conclusions that are applicable to answering the evidence-based question.

Physiologic parameters for infants receiving KC remained within clinically acceptable ranges, and infants did not experience any adverse events. Infants receiving KC showed improvement in regular breathing patterns and experienced almost no periodic breathing patterns, indicating that KC is safe. The researchers stated, “These data support KC as an important therapeutic intervention that merits routine implementation with healthy preterm infants ≥ 34 weeks’ postconceptional age and their mothers in a modern, well-equipped NICU, as recommended by the World Health Organization” (p. 45).
This work is based on the evidence-based literature review completed by Kylie Miller, OTS, and Rebecca von der Heyde, PhD, OTR/L, CHT, Faculty Advisor, Maryville University.


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