

The Science Behind Kangaroo Care

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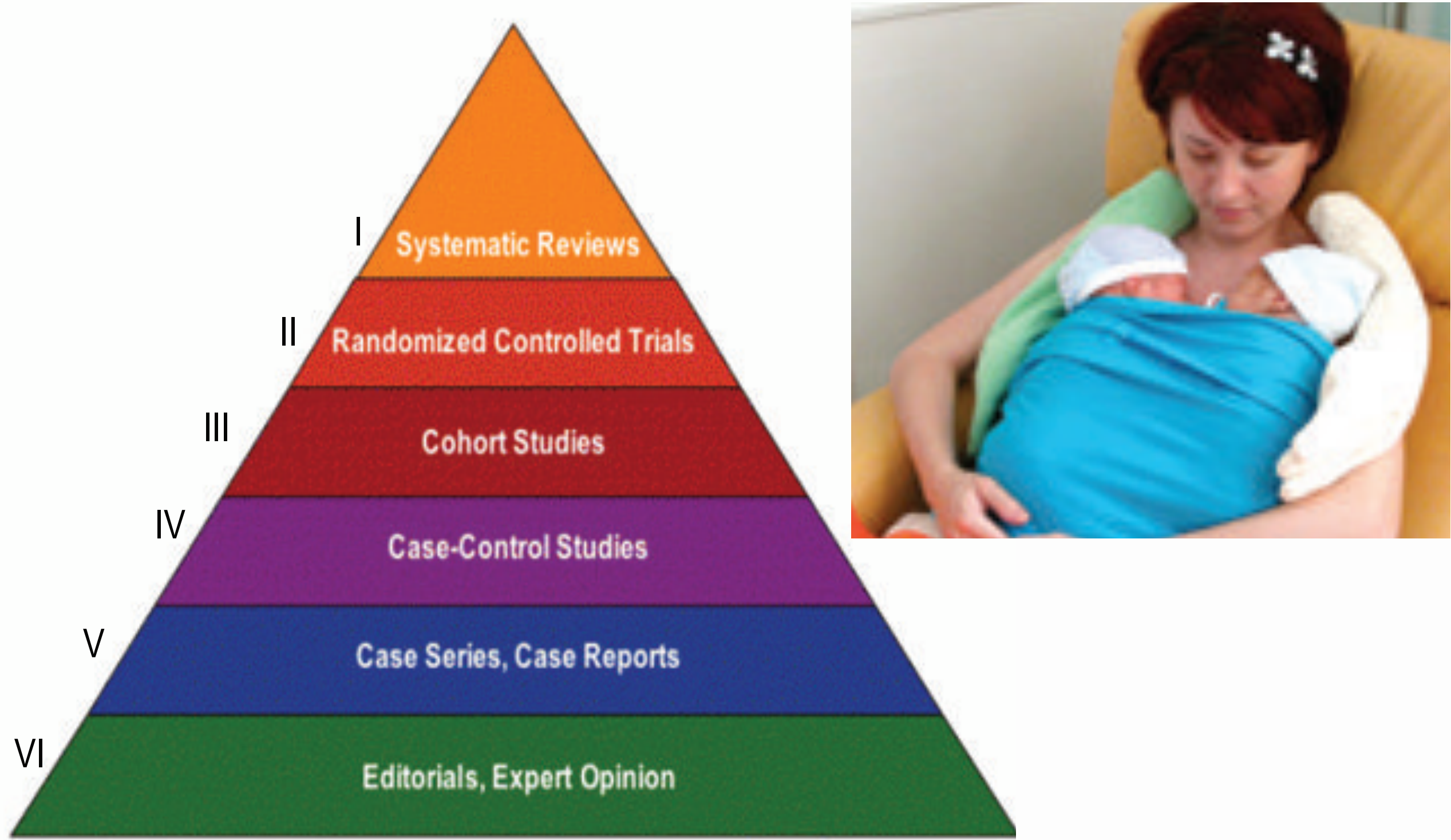
THE PROBLEM

Kangaroo Care (KC), Skin-To-Skin contact relates to holding of an infant on the bare chest. This intervention was invented in 1978 by Edgar Rey in Bogotá Colombia as an alternative to incubator care (IC) and has been investigated and implemented around the world. The neonatal intensive care unit (NICU) can be a hostile sensory environment for the premature and critically ill infant and their vulnerable emerging neurocognitive development. According to the Center for Disease Control and Prevention (CDC) in 2012 premature birth (babies born before 37 weeks of gestation) accounted for 1 in 8 births in the United States and can lead to long-term health problems and lifelong disabilities. They report that the estimated societal economic impact for the country is at least \$26.2 billion annually. There is concern that this unfavorable environment can negatively affect the infants growth, with the brain being particularly vulnerable. Although survival among premature infants has improved over the past two decades, the long term morbidity of survivors remains of serious concern. Follow up studies of preterm survivors into the school years, consistently find reduced cognitive performance and increased behavioral problems in these children.

OBJECTIVES

The objective of this poster is to review and summarize the evidence supporting Kangaroo Care with preterm infants and their families from a biologic basis. We summarize from over 400 formal research studies the type and magnitude of variations based on behavioral response by system, dosage, frequency, tolerance, and potential benefit to the dyad. In this review, as many types of studies have been conducted, the type of research will be included with the strongest evidence coming from randomized control trials and meta-analyses.

LEVELS OF EVIDENCE (LOE)



ALERT, SLEEP AND STATE REGULATION

Study Results	Conclusions	Study's LOE
Better alertness and attentiveness in KC infants	Expect longer alert periods and better orientation in KC infants after 38 weeks PMA	III
	Much longer duration and better quality, fewer arousals of quiet sleep during KC than when in an incubator	II
More and better quality quiet sleep during KC and less active sleep; Better state of regulation	Better state regulation in infants who had KC than infant who did not	III, V
	One study showing no different in behavioral state sleep during 80 minutes in IC and 80 Min in KC	IV

CARDIOVASCULAR OUTCOMES

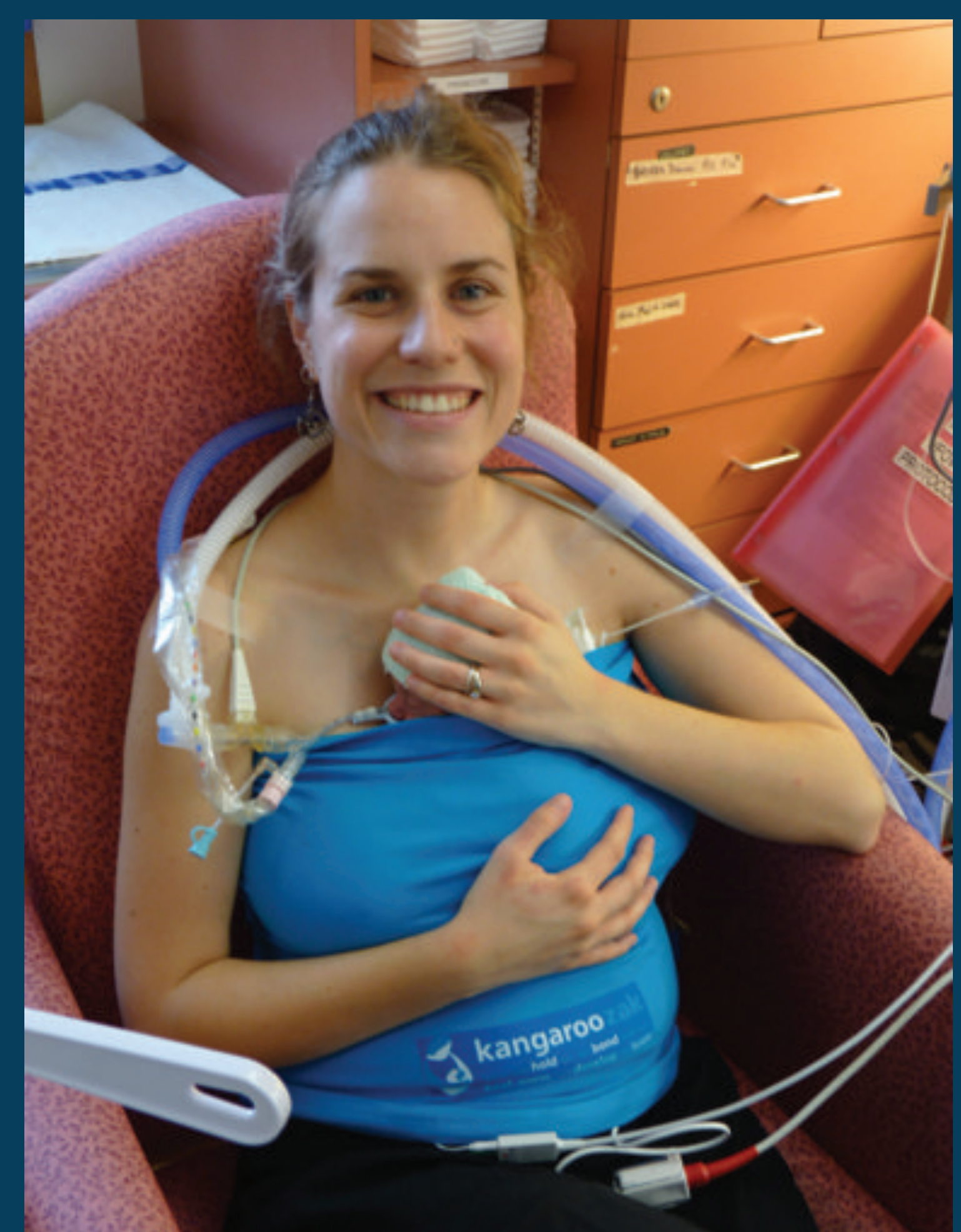
Study Results	Conclusions	Study's LOE
<u>Heart rate stability</u> Minimal increases	Expect HR not to change during KC	I, II
	Expect HR to show better stability during KC	II, IV, V
	Expect more change in HR during 2nd hour than the first	I, II, III
	Monitor HR in infants on CPAP or MV and in infants younger than 30 weeks PMA	I, VI
<u>Bradycardia</u> Unlikely to occur alone but may occur with desaturations in smaller, sicker infants	Expect no precipitous bradycardia during KC in preemies	II
	Expect bradycardia alone to occur rarely during KC in preemies	IV, V
<u>HR Variability</u> Outcome unknown	Expect no differences in HR variability during KC in premature infants	IV
	Expect increases in sympathetic tone during KC in premature infants	III, V
	Expect parasympathetic predominance during KC in premature infants	III, V

METABOLIC / HORMONAL OUTCOMES

<u>Blood Glucose</u> Stability Prevent hypoglycemia	Expect no change between KC for first 90 min post birth and for infants in cots	II
	Expect 90-120 min if KC starting at birth to prevent hypoglycemia in healthy full-term infants	I, III, IV
<u>Bilirubin</u> Stability	Expect no change in plasma bilirubin when KO with fiber optic blanket for 1 hr each day	II
<u>Thyroxine , thyroid stimulating hormone, 17-alpha-hydroxy-progesterone</u> No changes	Expect no difference in infants getting KC and infants not getting KC	II
<u>Cholecystokinin</u> Doubles during tube feedings	Doubles during tube feedings in KC	II
<u>Somatostatin, gastrin, and prolactin</u> Higher levels in KC or no change at all	Expect higher levels in KC than non-KC due to increased oxytocin and vagal nerve activation during KC Somatostatin was no different in KC and non-KC in infants in one study	II, V, VII
<u>Weight Gain</u> Outcome unknown May or may not have faster weight gain than non-KC infants. KC infants generally gain 15-33g/day after 30 weeks postmenstrual age	Expect full-term infants to recover birth weight more swiftly with KC	II
	No difference in weight gain between KC and non-KC infants	II
	Faster/better weight gain in KC infants	I, II, III
	Possible decrease in weight, insufficient weight change in KC, and less weight gain in KC infants than in control group infants	II, III, V, VI

STRESS AND PAIN

<u>Stress reduction</u> Reduction in maternal and infant stress in KC	Expect infant stress to be rapidly reduced during KC	I, II, V, VI, VII
	Expect maternal stress to be lower in KC	II, VI
	KC assists in palliative care	VI
	KC induces calm in infants and mothers and both relax during KC	I, VII
<u>Pain reduction</u> The AAP recommends KC to minimize pain in preterm and full-term infants	KC minimizes pain responses to minor procedural pain	I, II, III, IV
	KC is more effective than swaddling in reducing pain	I
	KC also may reduce maternal pain	VI



MENTAL DEVELOPMENT

Study Results	Conclusions	Study's LOE
Enhanced brain maturation and mental development when KC was given for at least 60 minutes.	Fewer and less severe IVH in NIDCAP ® +KC than non-NIDCAP ® +KC infants.	I, II, III, VI
	Higher Bayley Mental scores in KC infants than non-KC infants	II, V, VI
	Better brain maturation in KC than non-KC preterm infants	IV
	No difference in 12 month memory between KC and non-KC infants	II

MOTOR DEVELOPMENT

Better motor development with KC	Expect better motor development in KC than non-KC preterm infants	I, II, III, VI
	KC infant motor development may be same as non-KC preterm infant	I, II

TEMPERATURE REGULATION

Infants at least 28 weeks PMA are warmer in KC than anywhere else	Infants at least 28 weeks PMA warm up in KC	I
	Maternal breast tissue warms up and conducts heat to infant	II, V
	Maternal breasts regulate infant temperature	II
	Fathers chests warm infants	II, IV
	Use of KC to prevent hypothermia, beginning at birth, and KC is better than swaddling to prevent hypothermia	I, II, III, VII
	Use KC to rewarm infants	I, II
Infants less than 28 weeks PMA do not warm up in KC alone	Infants younger than 28 weeks PMA need a heat lamp during KC to maintain body temperature	IV
	Maternal epidural and oxytocin induction may impair heat transfer during the first 2 days of life	IV



REFERENCE LIST AND MORE INFORMATION
AVAILABLE AT KANGAROO@NURTUREDBYDESIGN.COM



OXYGENATION

Study Results	Conclusions	Study's LOE
<u>Respiratory rate (RR)</u>	Expect RR to be no different than while in an incubator	I
Variable responses	Expect RR to rise 10 up to 10 breaths/min	I, III, IV
	Expect RR to decrease slightly for a short time (3 min)	I, IV
<u>Apnea and irregular breathing</u>	Expect no difference in apnea between incubator and KC periods	I, II, IV
Variable responses	Expect better breathing in full term infants right after birth in KC than in a crib	II
	Expect decreases in apnea during KC	II
	Perhaps no apnea will occur during KC in preemies	V
	Monitor infants for apnea regardless of gestational age and PMA	VI
<u>Oxygenation</u>	Expect SpO ₂ to be the same as in an incubator	II, IV
Variable responses	Expect SpO ₂ to be 2%-3% higher than in an incubator	I, II, IV
	Expect SpO ₂ to be 0.6%-1.0% lower than in incubator	I, II
	SpO ₂ may drop during transfer	V
	Monitor SpO ₂ in all infants	VI
	Cerebral oxygenation improves during KC	IV
<u>Desaturations</u> May occur unexpectedly during KC	Number of desaturations may decrease during KC	II, V
	Number of desaturations may increase during second hour of KC	IV
	Expect no desaturations during breastfeeding in KC	IV

MATERNAL-INFANT INTERACTIONS

Improved interactions dominate; better interaction are due to proximity and release of oxytocin.	Expect more positive maternal behaviors and better quality of maternal-infant interaction in the first year of life in KC days than Non-KC dyads	I, II, IV
	Mothers believe KC promotes better relationships with infants, and KC Mothers are satisfied with their interactions with their babies regardless of their severity of illness	VI
	No difference in interaction between KC and non-KC groups	II
	Poorer play interaction in KC than Non-KC infants	II



CONCLUSIONS

Until the evidence exists that radiant warmers and incubators perform better than KC in improving outcomes, KC should be done as soon as possible, for as long as possible and as continuously as possible (as recommended by AAP, UNICEF and WHO) to support the immediate and long term developmental outcomes of premature infants and their families. KC in addition to non-maternal infant separation, breast milk and parents as primary providers should be everyone's focus.