What’s In the Future for Kangaroo Care?

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Purpose is to convey new applications in relation to:

- Epigenetic programming by mother on risk of developmental delay
- Epigenetic programming by mother on HPA axis responses to Stress, and on cytokine release and duration, and changing methylation & demethylation processes
- Neonatal Abstinence Syndrome
- Congenital Heart Defect and Seizure Patients
Epigenetic Programming: Dev. Delay

- It is known that proximity vs distance from mother during newborn period changes expression of genes in rats and in humans.
- Separation from mother is modus operandi today for preterms and fullterms.
- No data exist showing that incubator is better than KC, or that swaddled holding is better than KC, in fact data for the opposite exist.
No Matter what the Environmental (NICU) hazards are, we want families to be together.
Epigenetic Programming

• Conducting KC for 3 hours/day for 4/days per week from 28-40 weeks postmenstrual age when controlling for apolipoprotein E 2,3, or 4 alleles at birth

• Determine if change in circulating quantities of alleles at 40 weeks pma after KC or MINIMAL KC care (unethical for us to do RCT), and

• Do Brain development assessments (Dysmaturity index, Dimensional analysis of Complexity, MRIs) and protect SLEEP
Brain Maturation
Approximate Ent

T3 - O1

C3 - O1

T3 - C3

Cz - C4

Pre transformed data of preterms only
In the NICU, infants demonstrate a very chaotic version of this cycling pattern. Cycling is needed for normal development. Quiet Sleep is needed to produce Active Sleep.
What do we see during Kangaroo Care?
This is the Best quiet time in the NICU for brain maturation and oxygenation and sleep
Epigenetic programming

• Next study will be to measure dosage need to significantly change level of circulating alleles,
• To determine if KC can alter methylation and demethylation processes of select lipoproteins for development over 1-2 year follow-up,
• Determine amount of KC for optimal brain development outcomes up to 40 weeks pma
Maternal Programming for Stress

• NICU is clearly stressful for infants- KC is not
  (↑physiologic stability, ↓pain, ↓cortisol, ↑sleep,

• Control for intrauterine stress by taking cord blood
  samples at birth and use as co-variate

• Expose infants to structured KC vs minimal KC to
  determine effect on altering/impacting stress
  biomarkers (ie. Genotypes for stress, cytokine release
  and duration (referring to Sukys work at Northwest
  University in Chicago), and dermal cortisol + salivary
  cortisol (Narendran et al., 2010) throughout NICU stay
Babies want to be somewhere else than in the incubator
And with Mommy is where they want to be
Neonatal Abstinence Syndrome

- NAS = Finnegan score of 8 or more
- Conventional wisdom says that infants need decreased lighting, decreased activity, extremely tight swaddling, extreme patience with feeding
- Experts cannot believe that KC will really help, but I remember Sukys and case study data that follows.
Neonatal Abstinence Syndrome

• Case Studies at Grant Medical Center in Columbus, OH
  – 1) 4 Moms willing to do KC immediately after birth and while doing KC for up to 24 hours post-birth no Finnegan Scores >4
  – 2) When Mom come in to do 3 hours of KC, prekc Finnegan Scores = 11, 12, 14 and postkc scores were 3
  – 3) Mom did KC for 3 hours each day for 4 days, Finnegan score dropped from 10-15 to 3-4 right after KC, and baby fed well, and then was 3-6 at end of next 3 hours without kc (Residual effect) and again fed well. Next three hrs without KC Finnegan scores were back to 8 or more and poor feeding.
Neonatal Abstinence Syndrome

- Study is to give Birth KC for 2-3 hours which is standard care at Grant Medical Center for all infants unless they need resuscitation
- Will be RCT because KC for NAS is not routine care
- Then have mother give 3 hours of KC starting on day of diagnosis of NAS and give 3 hrs/day for 4 days in first week of life to determine if KC reduces Finnegan Score and to determine how moms tolerate/prefer to give KC and satisfaction with KC (nicotine patches are a must!)
Future with NAS

• Can KC prevent NAS?
• Does KC get moms to come in more regularly, especially after first postpartum week when visits drop off?
• What is optimal dose to prevent rise in Finnegan Score, and what maternal/infant factors contribute to optimal dose of KC?
Congenital Heart Defect Infants

• Work began with Gazzolo in Italy who gave 2 hour periods of KC alternating with 2 hour periods of routine PACU care after open heart surgery to 5 month old infants and found that group was extubated earlier than expected and much better physiologic stabilization during KC than when lying under radiant warmer or in crib.

• Held infants skin to skin, chest to chest and had no problems with infant discomfort or chest swelling (Gassolo,
Create the KC Habitat and don’t leave your babies out in the cold
Remember to help when one fails to tow the BEST PRACTICE line

• The Best Practice is Kangaroo Care as soon as possible, for as long as possible, and as uninterrupted as possible (Nyqvist et al., 2010, May Acta Paediatrica)
I hope I have given you the lift you may need to go with KC
Thank you

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References for Epigenetics

Epigenetic References Cont.

Stress Programming References


Kangaroo Care References


