Kangaroo Mother Care: Restoring the Original Paradigm for Infant Care

THE SCIENTIFIC AND EVIDENCE BASE FOR SKIN-TO-SKIN CONTACT

Ignaz SEMMELWEISS 1818 - 65

Hungarian obstetrician 1840's - Vienna 30% died of puerperal fever - Pushed handwashing, cleanliness & standards: Maternal death rate from 12% to 1% in 2 years Ostracised by peers, Died insane

ROBERT KOCH 1843 - 1910

Tuberculosis
Anthrax
Cholera

BACTERIOLOGY: Koch's four postulates ...

Semmelweis's observations conflicted with the established scientific and medical opinions of the time and his ideas were rejected by the medical community.

Semmelweis could offer no acceptable scientific explanation for his findings ....

LOUIS PASTEUR 1822 - 95

Germ theory did NOT EXIST!
Was being researched
Between 1860-64, same decade Semmelweis died
The Semmelweis reflex

… reflex-like tendency to reject new evidence and knowledge because it contradicts established beliefs, paradigms.

What is a paradigm?

Kuhn defines a paradigm as:
“an entire constellation of beliefs, values and techniques, and so on, shared by the members of a given community”

What is a paradigm?

paradigm 3. A set of assumptions, concepts, values, and practices that constitutes a way of viewing reality for the community that shares them, especially in an intellectual discipline.

What is a paradigm??

Kangaroo Mother Care: Restoring the Original Paradigm for Infant Care

WHAT IS THE CURRENT PARADIGM FOR INFANT CARE?
Old Paradigm: Restoring the Original Paradigm for Infant Care

Stephane Tarnier (1828-1897)
French obstetrician

- Saw a warmed box for hatching chickens, had one designed for "weaklings"
- Invented incubator

Paradigm Source

Pierre Budin (1846-1907)
- Friend of Tarniers... took incubators, made centres for the care of weaklings, wrote book on subject.
- Political support... France versus Germany

Budin was very particular to include mother, reason for the glass window...
Martin COUNEY 1860 - 1950
Born in Germany
claims he learned the techniques for Budin ....

Berlin Exhibition 1896, success!

Photograph: Pan-American Exhibition in Buffalo, New York, 1901.

Martin COUNEY 1860 - 1950
Berlin 1896, success
to USA: Buffalo →
Omaha 1902-4,

Chicago Fair 1932 2nd highest receipts,
Last show New York 1940.

Martin COUNEY 1860 - 1950
... famous for “preemie road show”.

MONEY MAKING SHOW

PERMANENT pavilion in Dreamland

Martin COUNEY 1860 - 1950
Couney successfully raised 5000 prems!
BUT - used wet-nurses, excluded mothers
(mother got free pass to the shows!)

Mothers were excluded - “germs” ...

Martin COUNEY 1860 - 1950
Born in Germany
claims he learned the techniques for Budin ....

Berlin Exhibition 1896, success!
London World fair 1898, fiasco!
ALL THE BABIES DIED ....
“MOTHERS TO BLAME”

ALL THE BABIES DIED ....
“MOTHERS TO BLAME”

New York World Fair, 1939

Baby Incubator, 1904 St. Louis Fair

19

20

21

22

23

24
Sarah Morris Hospital, Chicago 1923, others followed – accepting the “policy of strict separation”.

Clincs in Perinatology, June 2004, Vol 31(2) p293
Robert White
“Mothers’ arms – the past and future locus of neonatal care?”

“(Our care) still views the infant as a solitary individual who sleeps most of the time in a bed.”

PARADIGM CONSTRUCT
Paradigm has internal Intelligence
Honesty
Integrity
Consistency

BASIC ASSUMPTION:
INFANT SLEEPS ALONE

FOUNDATION / PLATFORM / BASE

From James McKenna, Notre Dame Sleep Laboratory

Culture Producing Science Producing Culture: How A Folk Myth Achieved Scientific Validation

From James McKenna

#1: Initial test condition
Infant sleeps alone, is bottle fed, and has little or no parental contact

#2: Derive measurements of infant sleep under these conditions

#3: Repeat measurements across ages, creating an “infant sleep model”

#4: Publish clinical model on what constitutes desirable, healthy infant sleep

#5: To produce “healthy” infant sleep, replicate the test condition

“Scientific” validation of solitary infant sleep as “normal” and “healthy”
PARADIGM CONSTRUCT

Paradigm: “in the philosophy of science, a generally accepted model of how ideas relate to one another, forming a conceptual framework within which scientific research is carried out.”

BASIC ASSUMPTION:
= INCUBATORS STABILIZE
FOUNDATION / PLATFORM / BASE

Slide courtesy of Susie Ludington-Hoe
Both babies and their parents may experience a stay in the newborn intensive care unit (NICU) as a traumatic or a "toxic stress," which can lead to dysregulation of the hypothalamic–pituitary–adrenal axis and ultimately to poorly controlled cortisol secretion.

… strongly linked to poor health outcomes

… trauma-informed care is an approach to caregiving based on the recognition of this relationship.

Specifically, all the recommendations involving clinical medicine in a CME activity must be based on evidence that is accepted within the profession of medicine as adequate justification for their indications and contra-indications in the care of patients.

… reflex-like tendency to reject new evidence and knowledge because it contradicts established beliefs, paradigms.

SEPARATION is a 20th century PARADIGM

… reflex-like tendency to reject new evidence and knowledge because it contradicts established beliefs, paradigms.

Origin of Immediate KMC

Drs Rey & Martinez
1979 Bogota, Colombia
LATE KMC

1985 Andrew Whitelaw

1987 Agneta Jurisoo
BIRTH KMC
**DEFINITION of KMC (1990)**

**MANAMA, ZIMBABWE**

- Skin-to-skin contact from birth, continuous
- Breastmilk from birth & exclusive breastfeeding
- Psychological support to mother

KMC as above used regardless of weight and gestation. KMC provides the baby with very intensive care.

KC (in the USA) – In-hospital skin-to-skin contact, any duration, primarily adjunct to CMC (Conventional Method of Care).

---

**Results - Manama**

- (Born 1000g to 1500g)
- Survival before KMC: 10%
- Survival with KMC: 50%
  (Stabilized in 6 hours)
- Weight gain per day: 30 g/d
- Breastfeeding rate: 100%
Mortality 1000g-1500g pre KMC 90%
with KMC 50%
KMC = 40 % reduction in mortality

1994
INCLUDED UNSTABLE

Is there an alternative for premature infants ??

Is THIS an alternative for premature infants ??

The Semmelweis reflex

… reflex-like tendency to reject new evidence and knowledge because it contradicts established beliefs, paradigms.

NEUROSCIENCE & EVIDENCE
& SKIN-TO-SKIN CONTACT

1996 - 2003

… baby’s condition MUST BE STABLE, ...
breathing without additional oxygen.

WHO, 2003

The PLACE MODEL

→ scientifically derived
→ alternative approach
→ hypothesis falsifiable/testable
**IMMEDIATE SKIN-TO-SKIN CONTACT**

the primary ecology for mothering, and also NICU care.

Dr Nils Bergman
MB ChB, DCH, MPH, MD
Cape Town, RSA

www.skintoskincontact.com

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**IMMEDIATE SKIN-TO-SKIN CONTACT**

the primary ecology for mothering, and also NICU care.

*ecology* (from Greek: οἶκος, "house", or "environment"; -λογία, "study of")

---

**MATERNAL DEPENDENCE**

HABITAT

MATERNAL MOTHER

OTHER

ALTERNATE

**MATERNAL SEPARATION**

There are only these two habitat choices available

---

**MATERNAL DEPENDENCE**

HABITAT

MATERNAL MOTHER

OTHER

ALTERNATE

**AM I SAFE HERE??**

---

**MATERNAL DEPENDENCE**

HABITAT

MATERNAL MOTHER

OTHER

ALTERNATE

**THE OLD BRAIN HAS 3 PROGRAMMES**

- DEFENCE
- NUTRITION
- REPRODUCTION

---

**HABITAT NICHE**

SAFE ? → YES

SAFE ? → NO

**THE OLD BRAIN HAS 3 PROGRAMMES**

- BREAST-MOTHER FEEDING
- OTHER PROTEST-DESPAIR
THE PLACE MODEL

SKIN-TO-SKIN CONTACT

SKIN-TO-SKIN CONTACT

OXYTOCIN

BREAST- VAGAL
MOTHER FEEDING (PSNS) GROWTH

OTHER PROTEST, STRESS SURVIVAL or
DESPAIR (SNS)

CORTISOL

SEPARATION

THE PLACE MODEL

SKIN-TO-SKIN CONTACT

BREAST-VAGAL
MOTHER FEEDING (PSNS) GROWTH

OTHER PROTEST, STRESS SURVIVAL or
DESPAIR (SNS)

CORTISOL

→ alternative approach
→ hypothesis falsifiable/testable

KANGAROO MOTHER CARE
FROM BIRTH
COMpared TO CONVENTIONAL
INCUBATOR CARE

Research funded by
THRASHER RESEARCH FUND, U.S.A.

Admin and stats by
MEDICAL RESEARCH COUNCil, R.S.A.

Primary hypothesis

SSC (skin-to-skin contact) from birth is superior to incubator care for low birthweight infants

ONLY PLACE DIFFERS

THE ONLY DIFFERENCE =
THE PLACE or the HABITAT

Primary hypothesis

SSC (skin-to-skin contact) from birth is superior to incubator care for low birthweight infants

ONLY PLACE DIFFERS
**Results**

Minimisation technique ensured groups balanced for confounders.

(n = 34) KMC CMC
Mean weight 1813g 1866g
Mean GA 34.2w 35.3w
Approp' GA 65% 64%
Male 60% 50%

**BAILOUT points**

"Physiological parameters exceeding normal limits, requiring medical assessment and or intervention"

1. Skin temp consistently <35.5°C
2. Heart rate <100; or >180 bpm
3. Apnoea longer than 20 seconds
4. O₂ sats below 89% (x2), (CPAP/80% O₂)
5. Blood glucose < 2.6mmol/l, (laboratory)

Bergman et al 2004

**H1b (SPECIFIC)**

Doctor summoned:

**INCUBATOR** 92%

**SKIN-TO-SKIN** 17%

**THE PLACE MODEL**

**SKIN-TO-SKIN CONTACT**

**17% UNSTABLE**

**92% UNSTABLE**

**SEPARATION**

**STABILITY**

Score allocated for a five minute period of continuous observation, maximum six for period

Fischer et al 1988
"100% SCRIP STABILITY"

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<td>1200g to 1800g</td>
<td>I - 6h</td>
<td>56%</td>
<td>11%</td>
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<td>@ 6h</td>
<td>100%</td>
<td>46%</td>
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<tr>
<td>1200g to 1800g</td>
<td>I - 6h</td>
<td>44%</td>
<td>0%</td>
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<tr>
<td></td>
<td>@ 6h</td>
<td>100%</td>
<td>25%</td>
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Stabilization 1200g - 1800g

Skin-to-skin

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<thead>
<tr>
<th></th>
<th>KMC all</th>
<th>KMC &lt;1800</th>
<th>CMC all</th>
<th>CMC &lt;1800</th>
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<tr>
<td>Stabilization first 6 hours, average hourly SCRIP score</td>
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<tr>
<td>2nd</td>
<td>5.1</td>
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<td>6th</td>
<td>5.5</td>
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<tr>
<td>Hourly average of SCRIP score, 2nd to 6th hour</td>
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Physiological stabilisation

Physiological stabilisation

THE PLACE MODEL

Skin-to-skin contact

MOTHER

OTHER

STRESS

SURVIVAL or

DESPAIR (SNS)

STABILISATION

DYS-REGULATION

SEPARATION

CORTISOL
Premature babies are not in incubators because they are unstable.

Premature babies are unstable because they are in incubators.

The Semmelweis reflex

... reflex-like tendency to reject new evidence and knowledge because it contradicts established beliefs, paradigms.

Ho Chi Minh City, Vietnam
60,000 deliveries per year
Obstetric beds: 1,200
Neonatal beds: 180
16,200 neonatal cases /year 2012 in neonatal department
Low birth weight rate: Vietnam 9%, this hospital 12.5%
The newborn may appear helpless, but raises its own temperature, has a higher blood glucose, metabolic adaptation faster.
PRETERM BIRTH TRANSITION REGULATION

improved physiology

The Semmelweis reflex

... reflex-like tendency to reject new evidence and knowledge because it contradicts established beliefs, paradigms.

Ignaz SEMMELWEISS 1818 - 65

Semmelweis could offer no acceptable scientific explanation for his findings ....

Ostracized by peers, Died insane
Stabilization 1200g - 1800g

Skin-to-skin

Skin-to-skin 17%

Incubator

Does the incubator make the small baby unstable?

The Science behind Family Centred Care

Cognitive Outcomes of Children Born Extremely or Very Preterm Since the 1990s and Associated Risk Factors
A Meta-analysis and Meta-regression

Feb 19, 2018

Conclusions and Relevance:
Extremely or very preterm children born in the antenatal corticosteroids and surfactant era show large deficits in intelligence. No improvement in cognitive outcome was observed between 1990 and 2008.

Bronchopulmonary dysplasia was found to be a crucial factor for cognitive outcome. Lowering the high incidence of BPD may be key to improving long-term outcomes after EP/VP birth.

The Stockholm Neonatal Family Centered Care Study: Effects on Length of Stay and Infant Morbidity

n = 366

CONCLUSIONS This study demonstrated a reduction in total length of hospital stay for infants born prematurely by providing facilities for parents to stay in the NICU 24 hours/day from admission to discharge. Analyses of secondary outcomes also suggested a reduction in pulmonary morbidity, such as moderate-to-severe BPD.
Introducing NURTURESCIENCE

a new model with ancient roots.

The basic science of pediatrics.

An emerging multidisciplinary science of development supports an EBD framework for understanding the evolution of human health and disease across the life span. In recent decades, epidemiology, developmental psychology, and longitudinal studies of early childhood interventions have demonstrated significant associations (hashed red arrow) between the ecology of childhood and a wide range of developmental outcomes and life course trajectories. Concurrently, advances in the biological sciences, particularly in developmental neuroscience and epigenetics, have made parallel progress in beginning to elucidate the biological mechanisms (solid arrows) underlying these important associations. The convergence of these diverse disciplines defines a promising new basic science of pediatrics.
Hominines were prey at Sterkfontein, “Cradle of Mankind.”

Immediate feeding response to crying

Father frequently and closely involved ...

EXTREME EGALITARIANISM
EQUALITY (gender, age, capacity)
INTENSE SOCIAL COHESION

→ NO AGGRESSION !!!!!

UNIQUE hominin feature: carry food home to share ...

BERGMAN ‘sharing phenotype’

THE HUNTER GATHERER (cont)
Infant care patterns in such societies (which are closest to our origins):
1. Infant carried most of time
2. Mother sleeps with infant same bed
3. Immediate feeding response to crying
4. Breastfeeding 24 months or more
5. Father frequently and closely involved ...
From James McKenna

Introducing NURTURESCIENCE

a new model with ancient roots.

NURTURE and NATURE
was all there was.

Nothing an infant can or
cannot do makes sense,
except in light of mother’s body.

ZERO SEPARATION
for 30,000,000 years

a new model with ancient roots.

Figure 6.1. Summary of the current “central dogma”
that underlies the analysis of all biological processes,
including those that mediate basic psychobiological
processes. The only major concept missing from this
schematic is the environment, and these influences
permeate all phases of these transactions.
NURTURESCEINE

Neuroscience developed in the old paradigm of maternal-infant separation.
a new model with ancient roots.

The Neuroscience of Birth & Breastfeeding

The DNA —— The Brain —— Behaviour

ENVIRONMENT

ADAPTATION EXPERIENCE REPRODUCTIVE FITNESS

BABY MOTHER SEPARATION

BIRTH BONDING Sensitization TOXIC STRESS

BEYOND BREASTFEEDING Feed & Sleep Cycling

Secure attachment Attuned parenting

Disordered attachment

Resilience Vulnerability

HEALTH DISEASE

Brain Architecture and Skills are Built in a Hierarchical “Bottom-Up” Sequence

- Neural circuits that process basic information are wired earlier than those that process more complex information.
- Higher circuits build on lower circuits, and skill development at higher levels is more difficult if lower level circuits are not wired properly.

Slide by: Jack P. Shonkoff, M.D.
Higher circuits build on lower circuits, and skill development at higher levels is more difficult if lower level circuits are not wired properly.

Slide by: Jack P. Shonkoff, M.D.

The human connectome is the result of an elaborate developmental trajectory.

Rich-club organization of the newborn human brain

Combining diffusion magnetic resonance imaging and network analysis in the adult human brain has identified a set of highly connected cortical hubs that form a “rich club”—a high-order, high-capacity backbone thought to enable efficient network communication. Rich-club architecture appears to be a persistent feature of the mature mammalian brain, but it is not known when this struct...
The Neuroscience of Birth & Breastfeeding

What is this ‘bonding’?

a. Mother precisely controls every element of her infant’s physiology, from its heart rate to its release of hormones from its appetite to the intensity of its activity.

(Gallagher, 1992)
... infant cues - suckling, vocalisation and tactile stimulation - stimulate oxytocin release in the hypothalamus, which may result in the activation of the dopamine reward pathway leading to behavioural reinforcement.

---

**NURTURESCIENCE**

- Genomic
- Epigenetics
- Neurodevelopment
- Behaviour

**ENVIRONMENT**

- Adaptation
- Experience
- Reproductive fitness

**BIRTH**

- Separation
- Sensitization

**BEYOND**

- Breastfeeding
- Sleep cycling

**HEALTH**

- Resilience
- Vulnerability

**DISEASE**

- Sensitisation
- Insensitive parenting

---

**SOCIAL CONTROL CENTRE**

- Oxytocin
- Dopamine

**REWARD CONTROL CENTRE**

- Oxytocin
- Cortisol

---

**RESILIENCE**

(= STRESS RESISTANCE)

"capacity to maintain healthy emotional functioning in the aftermath of stressful experiences"
Simulation theory: EMPATHY is generated by inner imitation of actions of others.

In humans, oxytocin increases gaze to the eye region of human faces and enhances interpersonal trust and the ability to infer the emotions of others from facial cues.

Specific to OWN BABY

Dopaminergic reward-related brain regions are activated specifically in response to happy, but not sad, baby faces.

In humans, oxytocin increases gaze to the eye region of human faces and enhances interpersonal trust and the ability to infer the emotions of others from facial cues.

Specific to OWN BABY

Dopaminergic reward-related brain regions are activated specifically in response to happy, but not sad, baby faces.

PRATHIBA REEBYE

BIDIRECTIONAL!!

Affect regulation

Emotional connection

Attuned interaction

BIDIRECTIONAL!!

Affect regulation

Emotional connection

Attuned interaction

BIDIRECTIONAL!!

Affect regulation

Emotional connection

Attuned interaction

“Human brains are RELATIONAL”

... co-creating touch

... signature unique to caregiver

“Human brains are RELATIONAL”

... co-creating touch

... signature unique to caregiver

“Human brains are RELATIONAL”

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“Human brains are RELATIONAL”

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... signature unique to caregiver
NURTURESCIENCE

Neuroscience developed in the old paradigm of maternal-infant separation. A new model with ancient roots.

NURTURESCIENCE

Nurturescience now engulfed or embedded in current neuroscience paradigms. Needs dissecting out →

NURTURESCIENCE

Comparison of nurturescience and neuroscience

Immediate AT BIRTH

First 1000 seconds (1st hour) TRANSITION
First 1000 minutes (1st day) REGULATION
First 1000 hours (6 weeks) CONSOLIDATION
Comparison of nurturescience and neuroscience

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<td>1 month – 3 years (ECD)</td>
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Immediate AT BIRTH

First 1000 seconds (1st hour)  TRANSITION
First 1000 minutes (1st day)  CONNECTION
First 1000 hours  (6 weeks)  CONSOLIDATION
First 1000 days  Early Childhood Development

Comparison of nurturescience and neuroscience

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The DNA
Behaviour
EVOLUTIONARY BIOLOGY
ENVIRONMENT
EXPERIENCE
REPRODUCTIVE FITNESS
ADAPTATION
The Brain
EPIGENETICS

FEAR
CONTROL
REWARD
CENTRE
OXYTOCIN
DOPAMINE
CORTISOL
EMOTION
CENTRE

Well-being
Morbidity
Mortality
Resilience
Vulnerability

... there is considerable overlap in the brain structures associated with these neural mechanisms ... functional interactions among the circuits.

Homeorhesis, derived from the Greek for "similar flow", is a concept encompassing dynamical systems which return to a trajectory, as opposed to systems which return to a particular state, which is termed homeostasis.

https://en.wikipedia.org/wiki/Homeorhesis

Comparison of nurturescience and neuroscience

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Dyadic / family (plural)  Individual (singular)
Dynamic systems theory  Reductionistic logic

HOMEORHESIS  HOMEOSTASIS

Comparison of nurturescience and neuroscience

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The branch of biology that deals with the relations of organisms to one another and to their physical surroundings.

(from Greek: οἶκος, "house", or "environment"; λογία, "study of")

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<tr>
<td><strong>Emotions Regulatory mechanism</strong></td>
<td>Viscera / ANS / limbic brain</td>
</tr>
<tr>
<td>Maternal regulation then co-regulation</td>
<td>Self-regulation (within self)</td>
</tr>
<tr>
<td>Open feedback loop (with others)</td>
<td>Closed feedback loop (within self)</td>
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**Emotions Learning mechanism**
- ANS influences on behavior
- CNS influences on behavior
- Pavlovian conditioning
- Operant conditioning
- Critical periods (brief)
- Sensitive periods (long)
- Brain adaptation

**KEY OUTCOME**
- CONNECTION
- RESILIENCE
- ATTACHMENT
- COGNITION

Why is early maternal separation stressful?

**SEPARATION DYSREGULATES**

Co-regulation

Homeorhesis

Self-regulation

Homeostasis

Fig. 2. Schematic representation of the dynamics of early-separation exposure resulting from the loss of regulatory interactions within the mother-infant relationship.

Comparison of nurturescience and neuroscience

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**KEY OUTCOME**
- CONNECTION
- RESILIENCE
- ATTACHMENT
- COGNITION

Nurturescience program now planned for KAROLINSKA, Stockholm

NILS BERGMAN
ULRIKA ADEN
BJORN WESTRUP
INTRODUCTION
“It is easier to build strong children than to repair broken men.”
Frederick Douglass (1817–1895)