Immediate Parent-Infant Skin-TO-Skin Study - IPISTOSS research update.

Dr Niels Bergman
MB ChB, DCH, MPH, MD
(USA equiv. MD, MPH, PhD)
Karolinska, Stockholm.

Kangaroo Mother Care: Restoring the Original Paradigm for Infant Care

INTRODUCTION
“It is easier to build strong children than to repair broken men.”
Frederick Douglass (1817–1895)

PUBLIC HEALTH IMPERATIVE

IMPACT OF SSC ON NEONATAL MORTALITY BY INITIATION DAY

**STABLE = NEGLIGIBLE IMPACT**

Lawn 2010 reviews | Conde-Agudelo 2014 reviews added
--- | ---
Worku | unstable
Suman Rao |stable
Charpak |stable
Cattaneo |stable
Rojas |stable
Ghavane |stable
Kadam |stable
Conde-Agedulo 2014 reviews added
Impact of SSC on Neonatal mortality by initiation day

Descriptive studies on UNSTABLE NEONATES (NBn)

CONTINUOUS EARLIER UNSTABLE

Worku unstable

Impact of SSC on Neonatal mortality by initiation day

Descriptive studies on UNSTABLE NEONATES (NBn)

CURRENT DEFINITION IS ONLY FOR STABLE

Worku 2005 Works because UNSTABLE

According to definition - WORKU 2005 is NOT KMC!

EXCLUDE THIS STUDY ... THERE IS NO CASE AT ALL FOR KMC MORTALITY REDUCTION!

Kangaroo Mother Care: A Randomized Controlled Trial on Effectiveness of Early Kangaroo Mother Care for the Low Birthweight Infants in Addis Ababa, Ethiopia

Historical control

The ‘kangaroo-method' for treating low birth weight babies in a developing country

Mortality 1000g-1500g

Pre-KMC 10% survival

With KMC 50% survival

KMC = 50 % reduction in mortality

0 % excluded
Impact of SSC on Neonatal mortality by initiation day

**Descriptive studies on UNSTABLE NEONATES (NBn)**

- Worku unstable 24h
  - Bergman 1994 Unstable VLBW 54h
  - Lincetto unstable 16h

- 45% reduction
- 40% reduction
- 50% reduction

Impact of SSC on **EARLY STABILISATION**

- Bergman 1994 Unstable VLBW 80h
- Bergman 2004 Unstable 1.2-2.2kg 0h

- Zero separation

Unstable = major reduction

**Scientific basis for SSC**

- Skin-to-skin STABILISATION and DYS-REGULATION
- Incubator

Hourly average of SCRIP score, 2nd to 6th hour

[http://gorillaaccess.com/gorilla-safari-rwanda-4-days/](http://gorillaaccess.com/gorilla-safari-rwanda-4-days/)
SEPARATION CAUSES INSTABILITY

SEPARATION DYSREGULATES

SEPARATION CAUSES INSTABILITY

SEPARATION EXCITEMENT

SAFE UNSAFE

Underlying scientific rationale

Skin-to-skin is NECESSARY for emotional and social health. Separation disrupts.

MAMMALIAN RESEARCH
Myron Hofer →

REGULATION
Maternal separation dys-regulates

Impact of SSC on EARLY STABILISATION

Impact of SSC on EARLY STABILISATION

Impact of SSC on EARLY STABILISATION

Impact of SSC on EARLY STABILISATION

The BOND is made up of the sensory inputs from the parent to the infant.


Psychobiological Roots of Early Attachment

Psychobiological Roots of Early Attachment

Psychobiological Roots of Early Attachment

Psychobiological Roots of Early Attachment
Images courtesy of Prof Peter Hartmann, UWA

Warming, feeding and protection behaviours are intricately, inseparably linked to the right place.

(Alberts 1994)

"... creates a kind of invisible hothouse in which the infant’s development can unfold."

(Hofer in Gallagher 1992)

Preterm birth transition separation fails

Cascade of dysregulation

Instability

Hypothermia

Hypoxia

Hypoglycemia

Infection

Bradycardia

Skin-to-skin stabilizes & prevents instability

Excluded from KMC studies

Skin-to-skin stabilizes & prevents instability

Excluded from KMC studies

Incubator treats instability

Mortality
half a million deaths ... could be prevented

Continuous EARLIER UNSTABLE

Skin-to-skin STABILIZES & PREVENTS INSTABILITY

half a million deaths ... could be prevented ... ONLY IF ... SSC starts at birth

KMC on stable babies: 11000 babies per year.

400 000 deaths ... could be prevented ... ONLY IF ... KMC starts at birth

Stabilization 1200g – 1800g

Skin-to-skin stabilization leads to improved survival in preterm infants.
PRETERM BIRTH TRANSITION
REGULATION
improved physiology

IMPACT OF KMC ON GLOBAL MORTALITY RATE
... currently NEGLIGIBLE!!
For KMC to save lives, SSC must start at birth in UNSTABLE NEONATES
DEFINITIVE RCT is a GLOBAL HEALTH PRIORITY
Skin-to-skin STABILIZES & PREVENTS INSTABILITY

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

acceptable scientific explanation for his findings

SKIN-TO-SKIN CONTACT
Current research and mediating mechanisms.

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

Uptake of KMC and Other Public Health Interventions
Time to Bend the Curve

2008-2018...
IPISTOSS Immediate Parent-Infant Skin-TO-Skin

Research proposal
WHAT IS THE EFFECT OF MATERNAL ABSENCE ON...

**Ipistoss**
Immediate Parent-Infant Skin-TO-Skin

**NurtureScience**
Genome
Connectome
Behaviour
EPIGENETICS
NEURODEVELOPMENT
EVOLUTIONARY BIOLOGY
ENVIRONMENT
ADAPTATION
EXPERIENCE
REPRODUCTIVE FITNESS

**BIRTH BEYOND**

- Separation
- Sensitization
- Breastfeeding
- Feed & Sleep Cycling
- Emotional Connection
- Attuned Interaction
- Resilience
- Wellness
- Vulnerability

**Health**

**Disease**

**Ipistoss**
Immediate Parent-Infant Skin-TO-Skin

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**Environment**

- Genetic Variants
- Gene & Environment
- Stress Responses
- "Stability"
- (MAL) Adaptation
- Immunity
- Microbiota
- Gut Function
- Long Term Follow-Up
- Hospital Acquired Infection
- Mortality

**NurtureScience**
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**Environment**

- Transition
- Resilience
- Neuroendocrine Behaviours
- Bonding → Attachment
- Maternal Neuroplasticity
- Sleep Physiology
- Immediate Parent-Infant Skin-TO-Skin
Attachment Theory


EEA Environment of Evolutionary Adaptedness

Narvaez 2016

EDN Evolved Developmental Niche

Recently, attention has been drawn to caregiving environments that evolved to optimize development of the young. Every animal has a niche for its offspring that matches up with the maturational schedule of the infant and represents a set of inherited extra-genetic features that foster thriving or optimal development in offspring.

Developmental niche: Parental etiologies: Practices (e.g., imaging, schooling) Settings and contexts


Developmental outcomes: Physical health: Mental health: Social competence: Learning, adaptation

The evolved developmental niche in childhood: Relation to adult psychopathology and morality
Maternal-Preterm Skin-to-Skin Contact Enhances Child Physiologic Organization and Cognitive Control Across the First 10 Years of Life
Ruth Feldman, Zehava Rosenthal, and Arthur I. Eidelman

Expected = early difference → but “catch-up”, No long-term difference. Actually – difference increased!

SPECIFICITY
Intervention impacts key process (does not affect other processes)

SENSITIVE PERIOD
Intervention may be small … but has major effect

STABLE COMPONENT
Component key building block → Continuous process → Exerts long term effect

Mechanism: continuity in small steps

MATERNAL CONTACT

MATERNAL REGULATION

MATERNAL INTERACTION

Physiological functions (sleep, cortisol, ANS)
Cognitive development
Executive functions
Emotional control
Dyadic reciprocity

Cortisol reactivity
Regulation of Emotion State
Sleep – wake cyclicity
HRV
Cardiac vagal tone
Milliseconds
Moments
Hours

Physiologic functions (sleep, cortisol, ANS)
Cognitive development
Executive functions
Emotional control
Dyadic reciprocity

Predicted !!!
Moore et al

Epigenetic correlates of neonatal contact in humans

5th WEEK of life:
Contact diary >3 days;
minutes per day.
Distress behaviour diary

5th YEAR of life:
Buccal swabs (n 94)

CANDIDATE GENES
NR3C1   stress biology
OPRM1   reward bonding
OXTR   social bonding
BDNF    neuroplasticity

WHOLE GENOME analysis for DNAm

(Basically 'fishing' for differences)
5 significant areas
LDHAL6A   metabolism
Intergenic  ?
HLA-DRB5   T-cell response, immunity
ZFAN2A   Zinc

Amount of contact in early life leaves a permanent epigenetic signature.

EPIGENETIC AGE DEVIATION.
(Basically 'marks' showing development differences)

High contact NOT DIFFERENT from low contact

HOWEVER – WITH DISTRESS

CRYING baby with HIGH contact:
increased epigenetic age
- shows improved development

CRYING baby with LOW contact:
decreased epigenetic age → IMPAIRED development
A crying baby needs regulation

Crying baby with LOW contact: decreased epigenetic age → IMPAIRED development

The Neuroscience of Birth & Breastfeeding

The DNA → The Brain → Behaviour

EVOLUTIONARY BIOLOGY

ENVIRONMENT

EXPERIENCE

REPRODUCTIVE FITNESS

ADAPTATION

The Brain

EPIGENETICS

BIRTH

BEYOND

BREASTFEEDING

Feed → Sleep Cycling

SEPARATION

MOTHER

BABY

BONDING

Sensitization

Secure attachment

Attuned parenting

Resilience

Vulnerability

DISEASE

HEALTH

A small and fragile baby is expected. Preparations for stabilization according to “ABC”

Danderyd, Stockholm, SWEDEN
28w after caesarean, aunt.

Stabilized with his aunt, after cesarean, since the father did not make it from work. Periferal line inserted SSC. At term age the boy still sleeps very well in his aunt’s arms.

Elvin, 30 min old. 1354g, w28+2

Even sick babies should receive breastmilk from the first day of life

Twins after caesarean, grandma.

Huddinge, Stockholm, SWEDEN

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Experiences from the Scandinavian iKMC study (IPISTOSS)

Siren Rettedal, Head of Neonatal Intensive Care Unit, Stavanger, Norway
Sponsored by Laerdal Foundation

Video Clip

Avoid early cord clamping
Immediate WARM CHAIN
Immediate CPAP
Immediate MONITORING

Parents are present / central
Immediate CONNECTION

Continuous >20 h/day

Thea, 48h old
On CPAP, Phototherapy, IV lines, Trophic feeds etc

Procedures can be done skin to skin

Clinical care must be the same – only place of care differs

Why are we doing this study in Scandinavia?

We want to know if not being separated from the mother is better for premature babies
February 19, 2018

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


Meaning: Despite advancing perinatal care, cognitive outcomes of children born extremely or very preterm did not improve between 1990 and 2008; preventive strategies to reduce the incidence of bronchopulmonary dysplasia may be crucial to improve outcomes after extremely or very preterm birth.

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.

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.

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

The Science behind Family Centred Care

The DNA EPIGENETICS NEURODEVELOPMENT Behaviour EVOLUTIONARY BIOLOGY

ENVIRONMENT ADAPTATION EXPERIENCE REPRODUCTIVE FITNESS

BIRTH BABY MOTHER

BEYOND BONDING

REPRODUCTIVE FITNESS

Disordered attachment

Vulnerability

Resilience

Secure attachment

Attuned parenting

Separation

Sleep Cycling

The Brain

EPIGENETICS

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**NEURODEVELOPMENT**

**The DNA**  
**Behaviour**  
**EVOLUTIONARY BIOLOGY**

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**EXPERIENCE**  
**REPRODUCTIVE FITNESS**

**buffering protection of adult support**

BERGMAN COMMENTARY - NEWBORN

Reducing toxic stress IS VERY EASY!!

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**RESILIENCE**  
(- STRESS RESISTANCE)

“capacity to maintain healthy emotional functioning in the aftermath of stressful experiences”

Resilience | Vulnerability
---|---
**HEALTH** | **DISEASE**

---

**NURTURESCIENCE**

**CAREGIVING**

Regulatory and Buffering SYSTEM

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**The Neuroscience of Birth & Breastfeeding**

**The DNA**  
**EPGENETICS**  
**NEURODEVELOPMENT**  
**BEHAVIOUR**  
**EVOLUTIONARY BIOLOGY**

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Underlying scientific rationale

**IPISTOSS**

Immediate Parent-Infant Skin-TO-Skin

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KMC on stable babies: 11000 babies per year.

400 000 deaths ... could be prevented ... ONLY IF ... KMC starts at birth
Planning grant from Bill & Melinda Gates Foundation.

Funded by ($6m) Bill & Melinda Gates Foundation.

KMC: Evidence, gaps and ongoing research
Department of Maternal, Newborn, Child and Adolescent Health
WHO, Geneva

Sponsored & conducted by WHO (Rajiv Bahl).

Evidence: mortality

KMC improves survival of small babies by 40% compared with conventional newborn care

Evidence: mortality
Survival benefit clear for continuous KMC. Insufficient evidence for intermittent KMC.
Evidence gaps: key research priorities

- How can facility based initiation of effective KMC for stable small babies be scaled up?

- Can community-based initiation of KMC reduce neonatal mortality of clinically stable small babies?

- Does initiation of KMC immediately after birth, even for unstable babies, improve survival?

New WHO coordinated research

- Learning how to implement KMC at scale to reach population coverage of at least 80% (ongoing, ~80% coverage reached)

- Efficacy of home-initiation of KMC in reducing neonatal and infant mortality (100% enrolled – in press)

- Efficacy of KMC initiated immediately after birth in reducing neonatal mortality (initiated Dec 17 in India, Jan 18 in Nigeria)
KMC scale up study

- In Ethiopia and India, 7 populations of about a million each in different geographic regions
- Understanding barriers to implementation and addressing them systematically
- Accurate weighing of all newborns, referral, implementing KMC in health facilities, supporting continued KMC at home
- Independent population-based evaluation of coverage

Home-initiated KMC study

- Individually randomized controlled trial in India. Sample size 10,500
- Low birth weight infants <48 hours old, born at home or discharged from health facilities without KMC
- Families allocated to intervention group supported to provide skin-to-skin contact, exclusive breastfeeding
- Primary outcome mortality to 1 and 6 months of age
- Early learnings: almost universal acceptance, average KMC duration about 9.5 hours per day achieved.

Immediate KMC study

- Individually randomized controlled trial: hospitals in Ghana, India, Malawi, Nigeria and Tanzania. Sample size 4,200
- Newborns <1.8 kg will be allocated to intervention or control group
- Those allocated to intervention receive skin-to-skin care starting immediately after birth, and continued thereafter
- Those allocated to control receive conventional care until considered stable, KMC initiated after that
- Primary outcome neonatal mortality

Minimal package of care for a newborn baby

Preparation for birth and newborn resuscitation
Thermal care
Breastfeeding and assisted feeding
Fluid management
Respiratory distress, oxygen, CPAP and monitoring
Infection
Monitoring of newborn baby
Prevention of infection

2 weeks training BEFORE study starts
• WHO «Minimum package of care for small babies»

  • Study sites harmonized, both control and intervention patients receive WHO «minimal package of care for small babies».

  • Any difference in the two study arms may not be attributed to a lack of standard care.

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ETHICAL PRINCIPLES
• Respect for autonomy
• Beneficence
• Non-maleficence
• Justice

“Children’s best interests are of paramount importance in every matter concerning the child.”
(CRC, Children’s Act)

WHAT IS BEST FOR ALL CHILDREN?

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ETHICAL ISSUES

- Research on pregnant and parturient mothers
- Research on neonates … proxy consent
- Research in emergency situations, possible mortality
- Broader perspectives (Helsinki, Emanuel)
  - Research in neonates ethically difficult, yet the most needed
  - Emanuel et al (2000) ask the question “What makes research ethical?”

7 principles …

ETHICAL ISSUES (2)

  - (1) value-enhancements of health or knowledge must be derived from the research;
  - (2) scientific validity; the research must be methodologically rigorous;
  - (3) fair subject selection; scientific objectives, not vulnerability or privilege, and the potential for and distribution of risks and benefits, should determine communities enrolled as study sites and the inclusion criteria for individual subjects;
  - (4) favorable risk-benefit ratio; within the context of standard clinical practice and the research protocol, risks may be minimized, potential benefits enhanced, and the potential benefits to individuals and knowledge gained for society must outweigh the risks;
  - (5) independent review; unaffiliated individuals must review the research and approve, amend, or terminate it;
  - (6) informed consent; individuals should be informed about the research and provide their voluntary consent; and
  - (7) respect for enrolled subjects; subjects should have their privacy protected, the opportunity to withdraw, and their well-being monitored.

Research on pregnant and parturient mothers

RELEASE TRIAL (retained placenta) Vernon 2006

consent pathway … community information campaign …
  … graded doses of information.
Vernon: being parturient is as such not a contraindication or an obstacle to giving informed consent.

Jackson 2000: concludes “labouring patients are as able to give informed consent as are other members of our patient population”.

Research on neonates … proxy consent

McKechnie and Gill 2005 review consent for neonatal research (90), and continue to define what makes consent valid:

The consent should be given freely and voluntarily.
Sufficient information should be given to make an informed choice.
The understanding of the subject is sufficient to make an informed choice.
The person giving consent must be mentally competent.

On the basis of these, suggestions for improvements to the "consent process" are made, which includes antenatal awareness, clear and well regulated information, training of those asking for consent, and continuing two way communication.

Research on neonates … proxy consent (2)

“formal training in obtaining informed consent” Euricon study

Apart from the clinician training described above, a "continuous consent process" is described, whereby parents are provided with information “at more than one point in the trial so that they will assimilate it better”.
Allmark and Mason (TOBY-Qual study)

NIH Basic HHS Policy #46.205

Research in emergency situations, possible mortality

USA REGULATIONS 45CFR46 and 21CFR50
ENTRY: presence of an acute “life-threatening situation”, which is indeed the case for premature infants without support.

Sloan et al 1999: A proposed consent process in studies that use an exception to informed consent. (“traumatic hemorhagic shock trial”)
  a detailed "proposed consent process" described in a detailed decision tree …
  process with several gateways …
  several opportunities for consent to be refused …
  … sample documentations are provided …
  patient competence verification form.“
Research in emergency situations, possible mortality (2)

Sloan: three alternative consents are described / provided: an "abbreviated consent" for the acutely traumatised but competent patient to sign, another for the Legally Authorised Representative to sign, and finally a "certification form for exception to informed consent". Quite separately, a "consent to continue" document is to be completed after the acute event.

"... valid informed consent can be obtained in a situation for which there is a very narrow therapeutic window".

The principles described in this paper have been adapted to the context of this proposed study.

Ensuring generalizability (1)

- Broad inclusion / eligibility criteria
- LOW APGAR as such NOT exclusion
- UNSTABLE as such NOT exclusion

Maternal exclusions
- Neonatal exclusions
- Statistical analysis on "INTENTION TO TREAT"
- CONSORT criteria for RCTs

Ensuring generalizability (2)

Current Cape Town approved by HREC:

Exclusion criteria
- Severe malformation
- Chromosomal abnormality
- Life-threatening disorders requiring complex technology
- Severe asphyxia at birth (Apgar score < 4 at 5 min
- Incompatible pregancy termination
- Severe maternal illness
- Multiple births (possibly included later as a separate study)

Maternal complications
- Mother too ill to provide SSC
- Father (or other family member) unavailable for caesarean section birth.

HIV status will not be regarded in eligibility, current care allows prolonged SSC.

Managing mortality outcome

- Control group – current care defined:
  - how is mortality managed now?
- SSC group – cultural practices and personal preferences
  - Current view: parents prefer being present / saying farewell
  - need emotional support for grieving, can healing.

WRITTEN GUIDELINE ?? For trial as whole

Data Monitoring Board

- Mortality – suppose intervention ONLY gets the 6 hours of SSC, and then separation → outcome will be delayed mortality, not reduction!
- Contamination – suppose control group does full dose SSC after the 6 hours → study will fail to show mortality difference.
- Termination of study – suppose one or other group shows a clear trend toward increasing mortality, and termination of one arm becomes necessary → ... a priori commitment to significance
  - (Principle of JUSTICE)
  - If "SSC arm" should be terminated – no problem.
  - If "control" should be terminated – is it possible?
PRIMARY OUTCOMES AND METHODS

• MORTALITY
  – Measured at 28 days – Neonatal Mortality Rate
  – Measured at 7 days - Early NMR
  – Measured at discharge … pragmatic …
  – Measured with all details and timing (weight, gestation, etc)

• SCERP score
  – Unifying outcome – reflecting normative standard of biology
  – Analysis of differences observed in SCERS

Immediate Parent Infant Skin-To-Skin Study (PISTOSS) – A Multicenter Randomized Controlled Trial Comparing Skin-to-Skin Contact Initiated Within First 60 Minutes of Life and Continued Until Stabilization with Separation (Conventional Care) in Neonates with Birth Weight of 1000-1800g.

Immediate KMC study

Detailed description of clinical standardized operational procedure (SOP) for intervention and control.

Intervention training given: to regular staff and research team.

Jill Bergman (Norway, Tanzania)
KMC by definition has several components, includes breastfeeding support.

All subjects (intervention and control) get early milk expression.

Intervention subjects support is:
‘put at breast’ - recorded once an hour
Actual breastfeeding is an outcome
### KMC transport

**Safdarjung, New Delhi:**

“MOTHER-NICU”

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## KMC supporter

To achieve IMMEDIATE KMC AND CONTINUOUS
all sites have round the clock **KMC supporter**

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<table>
<thead>
<tr>
<th>LIC</th>
<th>MIC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tanzania Malawi Ghana Nigeria India</td>
<td>Vietnam &amp; RSA Norway Sweden</td>
</tr>
</tbody>
</table>

### iKMC

**Enrolment started**

- December 2017

- **iKMC**
  - Immediate – till stable
  - ~ 4200 babies

- **Mortality reduction**

- WHO

- Bill & Melinda Gates Foundation

**To be completed**

- December 2019

- **Mortality reduction**

- WHO

- Bill & Melinda Gates Foundation

Follow-up for 2 years funding committed.

---

**WHO**

**Bill & Melinda Gates Foundation**

**Results** EARLY 2020

**Funding committed.**

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**NOTE:** not a LIC solution, not a third world, third rate solution ….

**Intervention is state of art neonatal care (IPISTOSS precedes iKMC)**

---

**WHO**

**Bill & Melinda Gates Foundation**

**IPISTOSS**

**Enrolment started**

- Vietnam & RSA Norway Sweden

- **IPISTOSS**
  - Immediate – till stable
  - ~ 1200 babies

**Mechanisms research**

- WHO

- Karolinska, Sweden

- Laerdal, others

- BabyBjorn …

**Results** EARLY 2020

**Funding committed.**

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**WHO**

**Bill & Melinda Gates Foundation**

**IPISTOSS**

**Enrolment started**

- Vietnam & RSA Norway Sweden

- **IPISTOSS**
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**Mechanisms research**

- WHO

- Karolinska, Sweden

- Laerdal, others

- BabyBjorn …

**Results** EARLY 2020

**Funding committed.**
Rajiv Bahl
WHO Director  WNCAH

iKMC
(Immediate – till stable)
~ 4200 babies

Every baby is born with one guardian angel:
Its mother

- RAJIV BAHL
- Department of Maternal, Newborn, Child and Adolescent Health
- WHO, Geneva

"Put the patient in the best position for Nature to act upon him."

Florence Nightingale

SKIN-TO-SKIN CONTACT

HUMANITY FIRST
TECHNOLOGY SECOND