The Kangaroo Mother Care adventure : science and tenderness

Nathalie Charpak on behalf of the KMC research team
and the "Kangaroo Foundation" of Bogota, Colombia, 2013

Background

- Among the population of developing countries, children and mothers are particularly vulnerable.
- 20 millions of Low Birth Weight Infants are born each year because of either prematurity or impaired prenatal growth or both, mostly in less developed countries.
- These births are associated with more than 30% of the global neonatal mortality and morbidity.
- Even when general neonatal mortality decreases, LBW remain as a main cause of death. These infants present early and late complications:
  - ✓ Hypothermia
  - ✓ Hospital-acquired infections
  - ✓ Suboptimal feeding
  - ✓ Overcrowding
  - ✓ Non-hygienic conditions

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The development of KMC in Colombia

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Origins

- In the 70's massive overcrowding on Neonatal Units was the norm in Bogotá, leading to:
  - ✓ Death of many LBW infants in the stable growth because of cross infections
  - ✓ Abandonment or physical abuse of many survivors by parents who had not bond to them
  - ✓ LBW infants graduated from NCU that were almost never breastfeed
  - ✓ High morbidity and mortality during the first year of life

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Origins

- In 1978, Dr. Edgar Rey initiated KMC at the *"Instituto Materno Infantil"* in Bogotá, Colombia:
  - ✓ To stop the practice of placing two or three babies in the same incubator.
  - ✓ To decrease nosocomial infections.
  - ✓ To reduce the time of separation between the mother and the baby and the risk that she abandons the newborn.
  - ✓ To promote exclusive breastfeeding.

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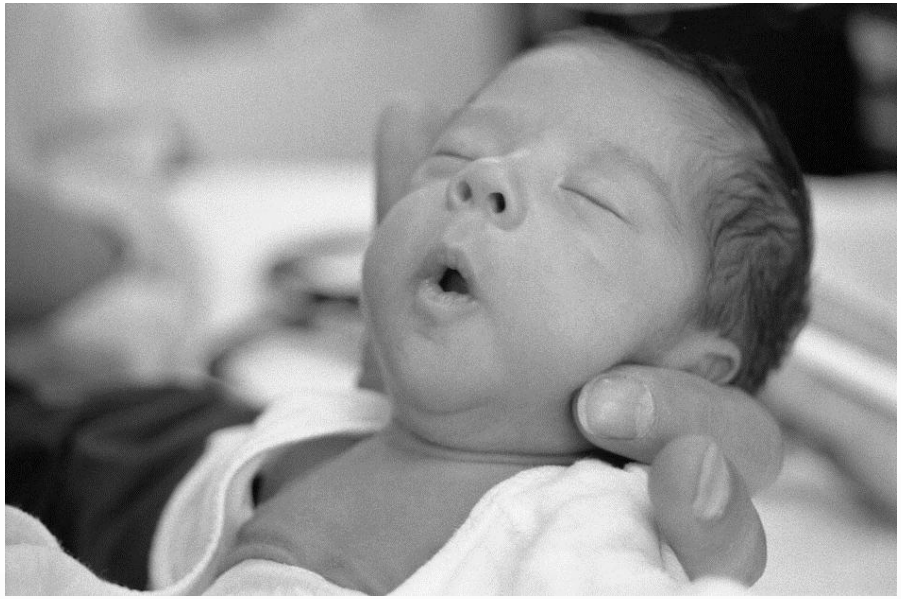
KMC: Concepts and definitions



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Definition of KMC

- The Kangaroo Mother Care Method is a standardized and protocol-based care system:
  - ✓ Offered to preterm and/or low birth weight infants.
  - ✓ Based on skin-to-skin contact between the preterm baby and the mother.
  - ✓ Aimed at empowering the mother (parents or caregivers); to gradually transfer the skills and responsibility to become the primary caregiver for their child.
  - ✓ Complements and enhances health care interventions performed on the LBW newborn.
  - ✓ 3 components: Kangaroo position, kangaroo nutrition and KMC discharge policies

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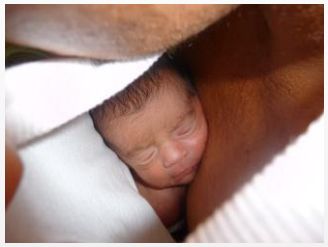

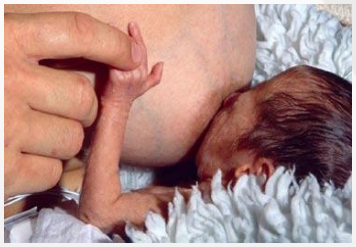

Why KMC is so appealing

- ✓ Gentle and appealing ("tender") image (visual).
- ✓ 90% of LBW and premature infants are born in developing countries.
- ✓ Mother and child: most vulnerable population.
- ✓ Immediate impact of the skin to skin contact on hypothermia and child abandonment , thus on mortality.
- ✓ Attracts donors .
- ✓ KMC is presented as low cost o no cost intervention: not true and source of failure once the new KMC program is implemented in the target country.

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Warning: “Minimizing” KMC for massive diffusion could trivialize the intervention and lose benefits

It is not sure that KMC will be perceived as **a tool for development** when it is clear that the expectation of developing countries is development itself.

The risk is that it will be perceived again as the **“poor man alternative”**.

Introducing KMC as an **alternative for hospital-based neonatal care** is deceiving and against empiric evidence from methodological Randomized Controlled Trials.

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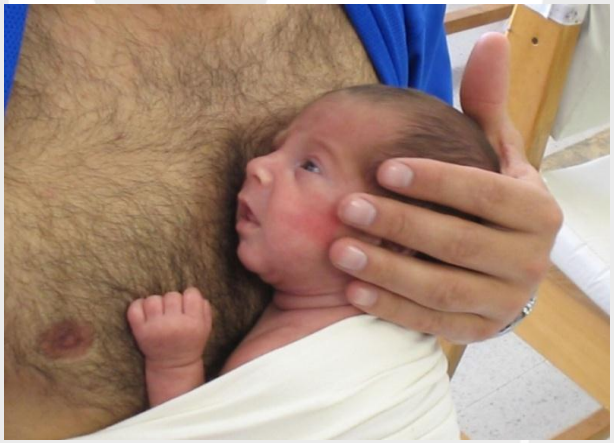
• Kangaroo Position



- ✓ Skin-to-skin contact 24 h/day
- ✓ Upright position

Modalities of the Kangaroo Position

✓ **Continuous, at home or in the hospital**

- After stabilization: well documented for temperature, oxygenation and heart rate regulation.
- For stabilization: not well documented.

✓ **Intermittent at the beginning when the baby is too fragil for continuous KMC**

- Promotes emotional and breastfeeding benefits.
- Optimal duration: minimum 2 h/cycle.

KMC trivialized: Kangaroo position for as long as the mother or health professional define, not as long as the baby needs

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• Kangaroo Nutrition:

- ✓ Based on breast feeding (hind milk, suction, dropper or spoon).
- ✓ Addition of vitamins.
- ✓ Fortified or supplemented with premature formula in infant not thriving properly (15g/Kg/day) with a dropper or a cup.

KMC nutrition trivialized: exclusive breastfeeding as it is usually the only nutrition available even if the infant needs a complement.

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- **Kangaroo Discharge in Kangaroo position and follow up policy**

✓ Early discharge independently of weight or gestational age

✓ Strict follow up up to term

✓ High risk follow-up at least during 1 year

Modalities

- Early discharge home
- Early discharge to a 'kangaroo ward'

KMC trivialized : follow up is inexistent because no culture and no interest in long term outcomes. Good follow-up considered "expensive" and "unfeasible"

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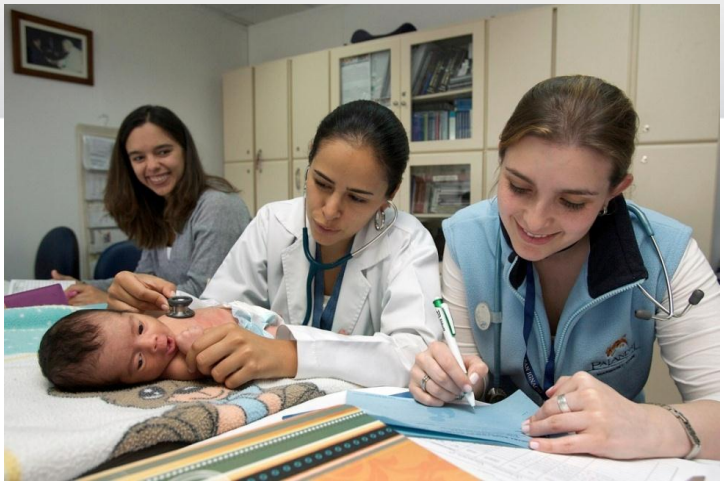

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What we have done *for the last* 20 years

FOUR STRATEGIC AXES TO IMPACT (in parallel)

From bottom to top

1. **RESEARCH**
2. **PILOT CENTERS IN KMC**
3. **NATIONAL and INTERNATIONAL DIFFUSION OF THE KMC METHOD**
4. **COLLABORATION WITH HEALTH AUTHORITIES FOR DIFFUSION AND EVALUATION OF THE KMC METHOD: National and supra national (WHO) Health Policies**

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The Kangaroo Foundation chose the **rigorous scientific research path** to document the safety and efficacy of the KMC method, and to convince health professionals all over the world, but especially from developing countries, to change their practice and to integrate KMC in the routine care of the LBW infant.

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What we have done *for the last* 20 years

FOUR STRATEGIC AXES TO IMPACT: RESEARCH

Scientific situation of KMC in 1989

- Is appealing
  - ✓ Seems rational (common sense)
  - ✓ Emotionally correct
  - ✓ Might save medical costs
- Is a target of criticism
  - ✓ Seems primitive, anti-technological
  - ✓ What are the scientific bases?
  - ✓ Early discharge may jeopardize infants
- Reality
  - ✓ The KMC intervention had not been rigorously evaluated at that time

The answer of the Kangaroo Foundation

- Establishing safety
  - ✓ Two Cohort study (1989-1992)
- Study of effectiveness
  - ✓ Randomized controlled trial (1993-1996)
- Refining the KMC intervention
  - ✓ Explanatory research (1996-2013) with emphasis in neurodevelopment and long term impact of KMC
  - ✓ Pragmatic research (1996-2013)
- Research translation into health care
  - ✓ National and international diffusion (1994-2013)
  - ✓ Identification of barriers and quality assurance (1994-2013)

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KMC and infant mortality

<u>Can we answer now to the question:</u>

Is there any evidence that Kangaroo Mother Care method reduce neonatal mortality?

YES

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‘Kangaroo Mother Care’ to prevent neonatal deaths due to preterm birth complications

Joy E Lawn, Judith Mwansa-Kambafwile, Bernardo L Horta, Fernando C Barros and Simon Cousens
Corresponding author. Saving Newborn Lives/Save the Children-USA, 11 South Way, Pinelands, Cape Town 7405, South Africa.
E-mail: joylawn@yahoo.co.ukI **2010**

Lawn 2010 performed a systematic review and meta-analysis to establish the effect of KMC on neonatal mortality due to direct complications of preterm birth . The results of the present review also suggest that KMC reduces the risk of mortality at discharge or at 40-41 weeks of gestational age and at latest follow-up.

The 2 studies providing majority of data for this review are the 2 studies we conducted with our research group between 1989-1996

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Kangaroo Mother Care to reduce morbidity and mortality in Low Birth Weight infants (Review)

Conde-Agudelo A, Belizán JM, Diaz-Rossello J

The Cochrane Library

2011, Issue 3

http://www.thecochranelibrary.com

Kangaroo mother care to reduce morbidity and mortality in low birth weight infants (Review)

The 2011 Cochrane review update included seven trials that assessed mortality at discharge and at 40-41 weeks. These trials reported **a statistically significant reduction in the risk of mortality among KMC infants, compared with babies receiving traditional care.** The review concluded that there is **sufficient evidences** to recommend the use of KMC in stabilized infants.

The study which is providing main data for this review is the study of our research group conducted between 1993-1996

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KMC and morbidity outcomes

(KF document that can be downloaded for free)

- **Evidence-based statements have been formulated and consensus has been achieved for**

  - **KMC and Thermal regulation:** 4 RCT,1Cross Over Study,6 PrePostest (PPT),1Observational Study **(+++)**
  - **KMC and Physiological stability:** 3Cross Over Study,1PPT,1Observational Study **(+++)** ***after stability*** (FC, FR, Apneas), 2 RCT **(-)** ***before stability***
  - **KMC and Apnea:** 5RCT,5PPT,3Observational Study, **Analogy (++)**
  - **KMC and Gastro-esophageal reflux:** 3Cross Over Study,1PPT,1Observational Study, **Analogy (++)**
  - **KMC and Bonding and attachment and neurodevelopment:** 7 RCT,3PPT,1Observational Study, 1 Historical Study,1Case Control Study, **(+++)**
  - **KMC and neonatal transport:** 1Observational Study, **(+), Experts' opinion**
  - **KMC and pain control:** 1Cross Over Study, 2 PTP, **(++)**
  - **KMC and growth:** 6RCT **(+) Head Circumference**
  - **KMC and the dying infant:** *No evidences,* **(+), Experts' opinion**
  - **KMC and successful breastfeeding** 6 RCT, **(++)**
  - **KMC and early discharge** 2 RCT, (++)
  - **KMC and empowerment of the family**
  - **KMC and staff and parents satisfaction**
  - **KMC and cost utility of the KMC intervention**
  - **KMC and maturation ex utero of the brain**

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Brain motor function in adolescents born very preterm and influence of Kangaroo Mother Care : a pilot study with transcranial magnetic stimulation

Cyril Schneider, Ph.D[2], Nathalie Charpak, M.D.[1], Juan G Ruiz, MSc.[4] and Réjean Tessier, Ph.D[3].

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REGULAR ARTICLE

Cerebral motor function in very premature-at-birth adolescents: a brain stimulation exploration of kangaroo mother care effects

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2.Department Rehabilitation, Faculty of Medicine, Université Laval, Québec, QC, Canada
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ABSTRACT

Aim: Given that prematurity has deleterious effects on brain networking development beyond childhood, the study explored whether an early intervention such as Kangaroo Mother Care (KMC) in very preterm preemies could have influenced brain motor function up to adolescence.

Methods: Transcranial magnetic stimulation (TMS) was applied over the primary motor cortex (M1) of 39 adolescents born very prematurely (<33 weeks' gestational age, 21 having received KMC after birth, 18 Controls with no KMC) and nine adolescents born at term (>37 weeks' gestational age, >2500 g) to assess the functional integrity of motor circuits in each hemisphere (motor planning) and between hemispheres (callosal function).

Results: All TMS outcomes were similar between KMC and term adolescents, with typical values as in healthy adults, and better than in Controls. KMC adolescents presented faster conduction times revealing more efficient M1 cell synchronization ($p < 0.05$) and interhemispheric transfer time ($p < 0.0001$), more frequent inhibitory processes with a better control between hemispheres ($p < 0.0001$).

Conclusion: The enhanced synchronization, conduction times and connectivity of cerebral motor pathways in the KMC group suggests that the Kangaroo Mother Care positively influenced the premature brain networks and synaptic efficacy up to adolescence.

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Conclusion of this pilot study

- ✓ Hemispheric and callosal motor circuits worked better in KMC preterm adolescents.
- ✓ This finding provides new information about the critical periods of brain plasticity in infants ex-utero and shows that **early KMC could promote functional connectivity and synaptic efficacy.**

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What we have done *for the last* 20 years

FOUR STRATEGIC AXES TO IMPACT: EXCELLENCE KMC CENTERS

Goal:

- **Guarantee the 100% coverage** of preterm and LBWI with follow up and a high quality service in Colombia as a first step.

How:

- **Creating and giving support** to 3 pilot centers in KMC able to receive health professionals for KMC training and to be research centers for enhancing the KMC method
  - PMCI at the *Hospital Universitario San Ignacio – Bogota*
    1000 average Kangaroo's child included per year.
  - PMCI at the Hospital Universitario Infantil San José – Bogota
    600 average Kangaroo's child included per year
  - PMCI at *Campo Valdés – Medellin*
    700 average Kangaroo's child included per year (the poorest population of the city)

2300 LBWI enrolled each year in the 3 centers

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Train the trainers program
“See one, do one, teach one”

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What we have done *for the last* 20 years

FOUR STRATEGIC AXES TO IMPACT: NATIONAL DIFFUSION OF THE METHOD

Goals:

- **Training teams** of health professionals to build one pilot center in each Colombian State
- Teaching agreement with various universities in Bogotá and Medellin
- Establishing a KMC network for the LBWI in all the country

How:

- Teaching KMC to pediatric residents, neonatology fellows, students of psychology, nursing and other areas of health in a monthly rotation.
  - **Train the trainers program**, to learn the clinical and administrative issues needed to establish a KMC pilot center, in his hometown.
- Offering to see different modalities of KMC implementation.(3 KMC centers in Bogota) or other KMC centers
- 2 to 4 weeks training in theses pilot center in Bogota.

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SPREADING IN ALL PUBLICS HOSPITALS

Kangaroo Foundation Pilot centers

20 Trained KMC centers (big public hospitals)

20 Centers waiting to be trained

In Colombia 12% of all deliveries are LBW, which means that from 850.000 deliveries a year,100.000 are LWBI.

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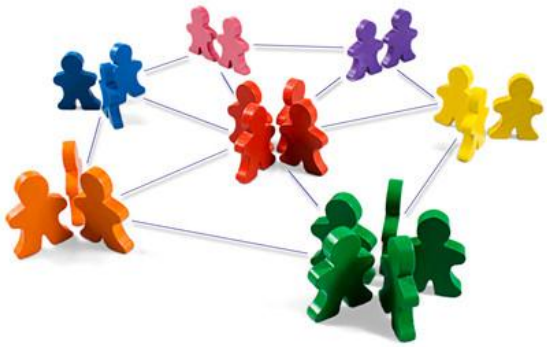
What we have done *for the last* 20 years

FOUR STRATEGIC AXES TO IMPACT: INTERNATIONAL DIFFUSION OF KMC



Goals:

- **Training teams** of health professionals to build one pilot center in each country.
- Establishing a KMC network for the LBWI in all the countries.

How:

- **Using the same training we used for the national diffusion** to instruct about the clinical and administrative issues needed to establish a KMC pilot center in its countries.
  - To implement a pilot center by country.
  - Support their functioning in the country.
  - The trained team is responsible of replicate the training locally.
  - Design and implementation of universal educational tool for KMC coaches.

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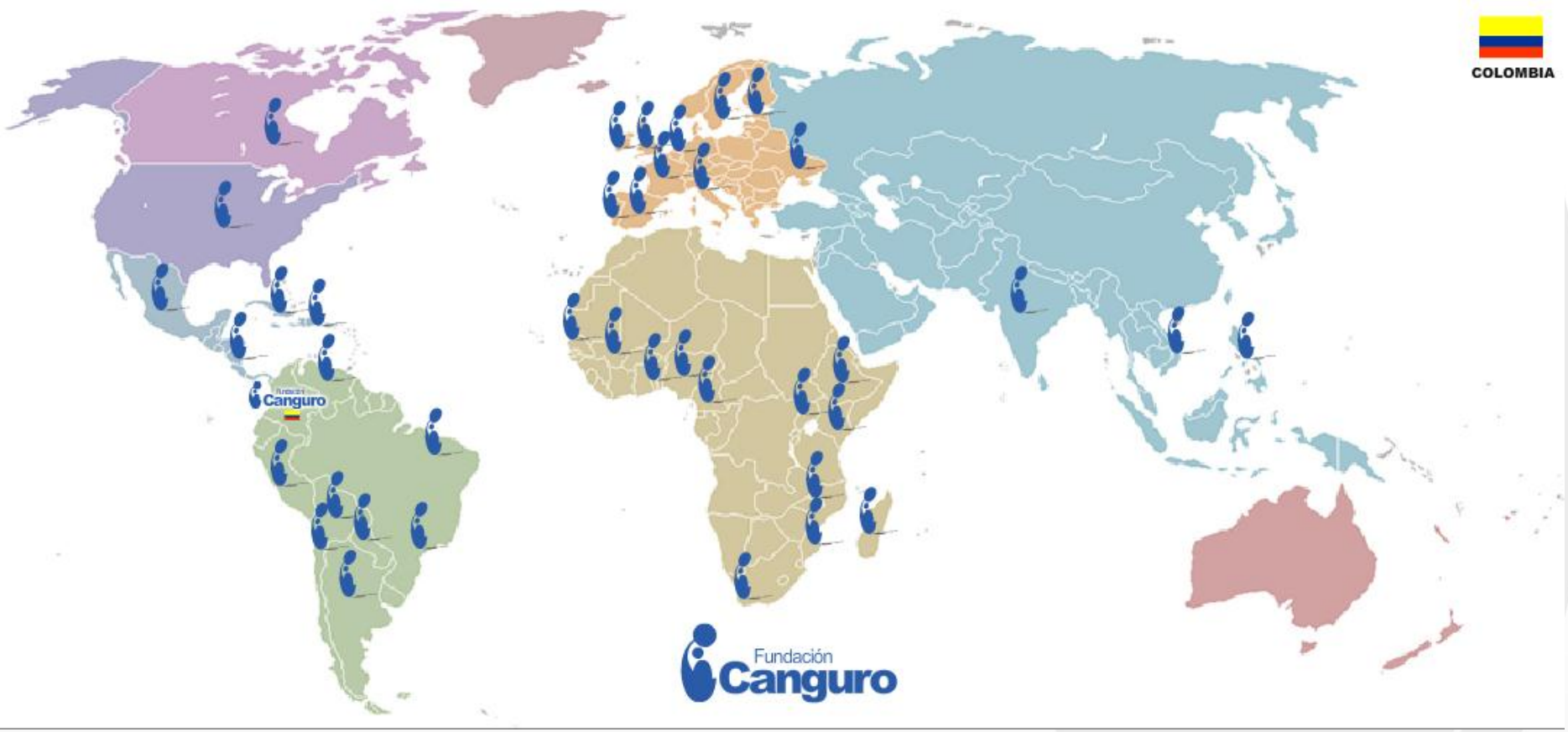
More than 60 teams from 30 countries have been trained in Bogotá, Colombia.



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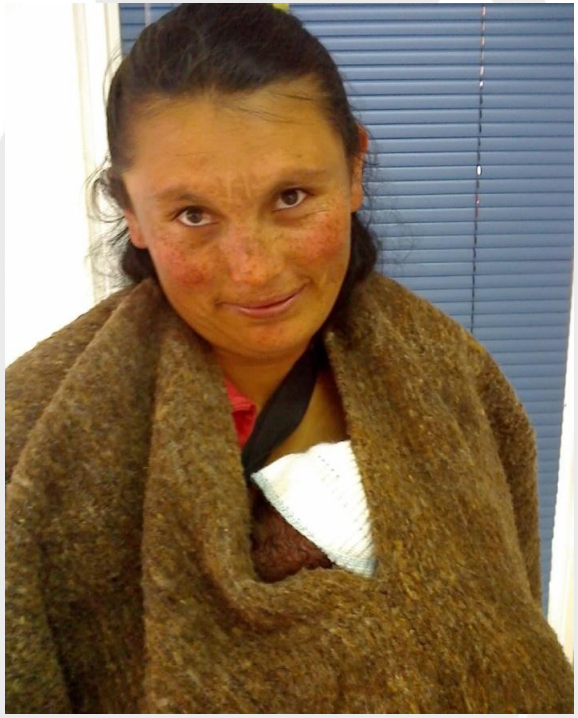
Success of knowledge transfer has been high

In more than 85% of teams trained in Bogotá, KMC implementation has been successful, despite specific needs and difficulties encountered by the program in each setting.



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What we have done *for the last* 20 years

COLOMBIA HEALTH AUTHORITIES AND KMC

- ✓ **Guidelines for delivering KMC** to LBWI in Colombia have been published in 2000.
- ✓ A first public edict published by Health authorities in 2009,was stimulating heath facilities **to implement and promote KMC**. In the last years, various new edicts (2011, 2013) imposed step by step an obligation to implement and promote KMC in all the institutions working with mother and infant.
- ✓ **Practical KMC Guidelines and instruments to implement and evaluate a KMC Centre** has been designed with the Ministry of Health (2009- 2010).
- ✓ **The new 2013 six evidence based guidelines for management of newborn in Colombia (Ministry of Health**) were edited a month ago and integrated KMC in the delivery room, in the neonatal Unit and in the early discharge and follow up.
- ✓ **The law 1468 of June 2012: maternity leave of 14 weeks AND the mother will recuperate aditionnally all the weeks between 37 weeks and the gestational age of the premature infant at birth!!!!!!!!**

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The multimedia KMC kit (2013)

We have actually a full Spanish version available for free for people already trained in KMC as a working tool. The English version will be available at the end of the month and the French version in 2 months

http://fundacioncanguro.co/KMCT/en/

More than 1000 pages with 20 videos and a multimedia library with KMC videos from Africa, Europe….etc This multimedia KMC kit is available on our home page, construction was supported by the Colombian Health Ministry and the World Food Program and English translation by MCHIP, JSI and the Kangaroo Foundation. We just received a grant for the French translation.

We develop this multimedia KMC kit, free, easy to read, to support local diffusion and to empower the newly trained KMC centre as an excellence centre in their country

All trained teams are provided with this basic tools to help them to translate knowledge into health care actions.

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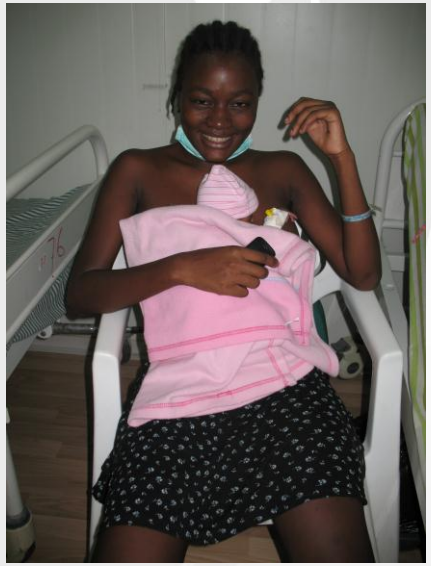
USAIDS and Fundación Canguro
Fruitful and Respectful Collaboration

- KMC Training of Central America y South American countries
  - ✓ El Salvador
  - ✓ Nicaragua
  - ✓ Republica Dominicana
  - ✓ Guatemala
  - ✓ Ecuador
- Full KMC intervention with the 3 components
- Good professional teams
- Implemented their proper KMC program
- Need more support for national diffusion



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Conclusion
Mayor difficulties in KMC diffusion

- ✓ Right selection of the team to be trained.
- ✓ Adaptation of the 3 components of KMC to local circumstances, patient needs and level of care.
- ✓ Early discharge and ambulatory follow up.
- ✓ Insufficient access to Kangaroo network and scientific literature on KMC.
- ✓ Insufficient local research and monitoring capability.
- ✓ Costs: Direct cost of training kangaroo team, cost of KMC staff and physical structure.
- ✓ Quick turnover of administrative and medical staff.
- ✓ Sustainability in the health system: the Kangaroo Package.
- ✓ Integration in the public health policies of each country.

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