

Kangaroo Mother Care & Developmentally Supportive Care



IAP NEOCON 2015 - Mumbai



Suman Rao PN MD, DM

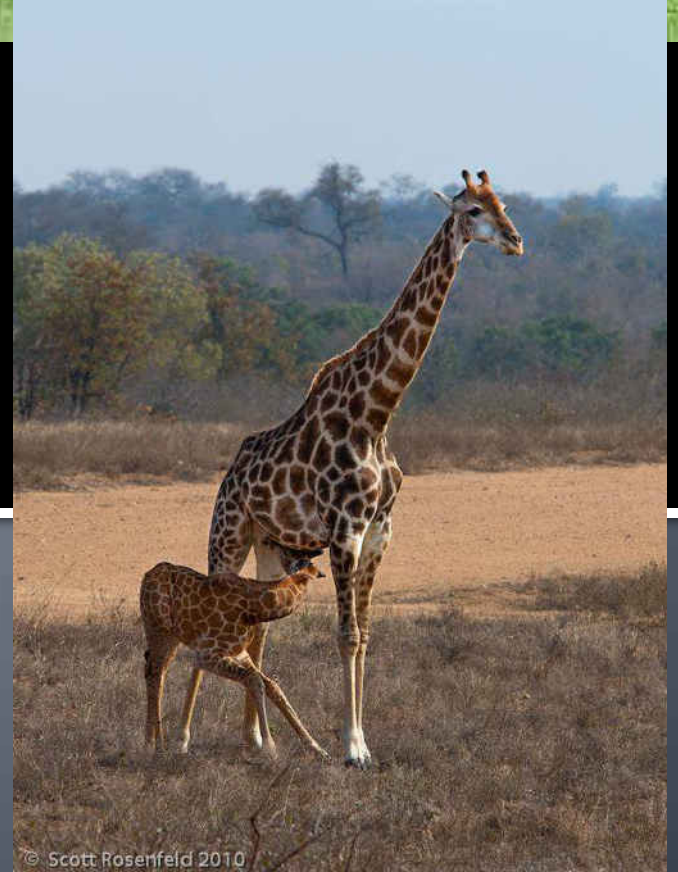
Prof & Head, Dept. of Neonatology

St. John's Medical College, Bangalore

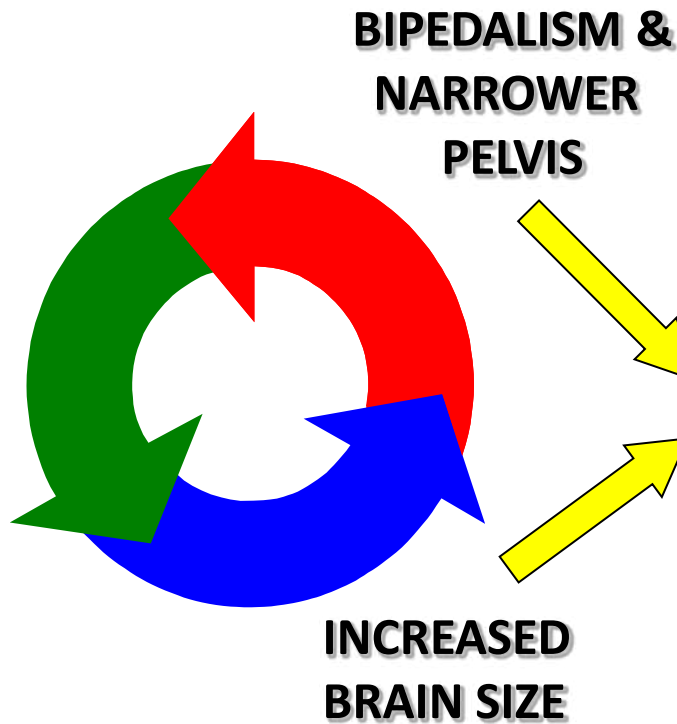
Why ?

.....Back to basics

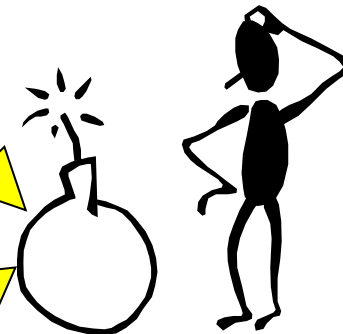
Back to nature



**TOOL USE
&
LANGUAGE**



... PROBLEM ?



**How is the bigger
head going to be
born out of the
smaller pelvis ??**

100%

25%

0%

9/12

21/12



ACTUAL
BIRTH



EXPECTED
BIRTH

Actual birth
takes place at
9 months ...

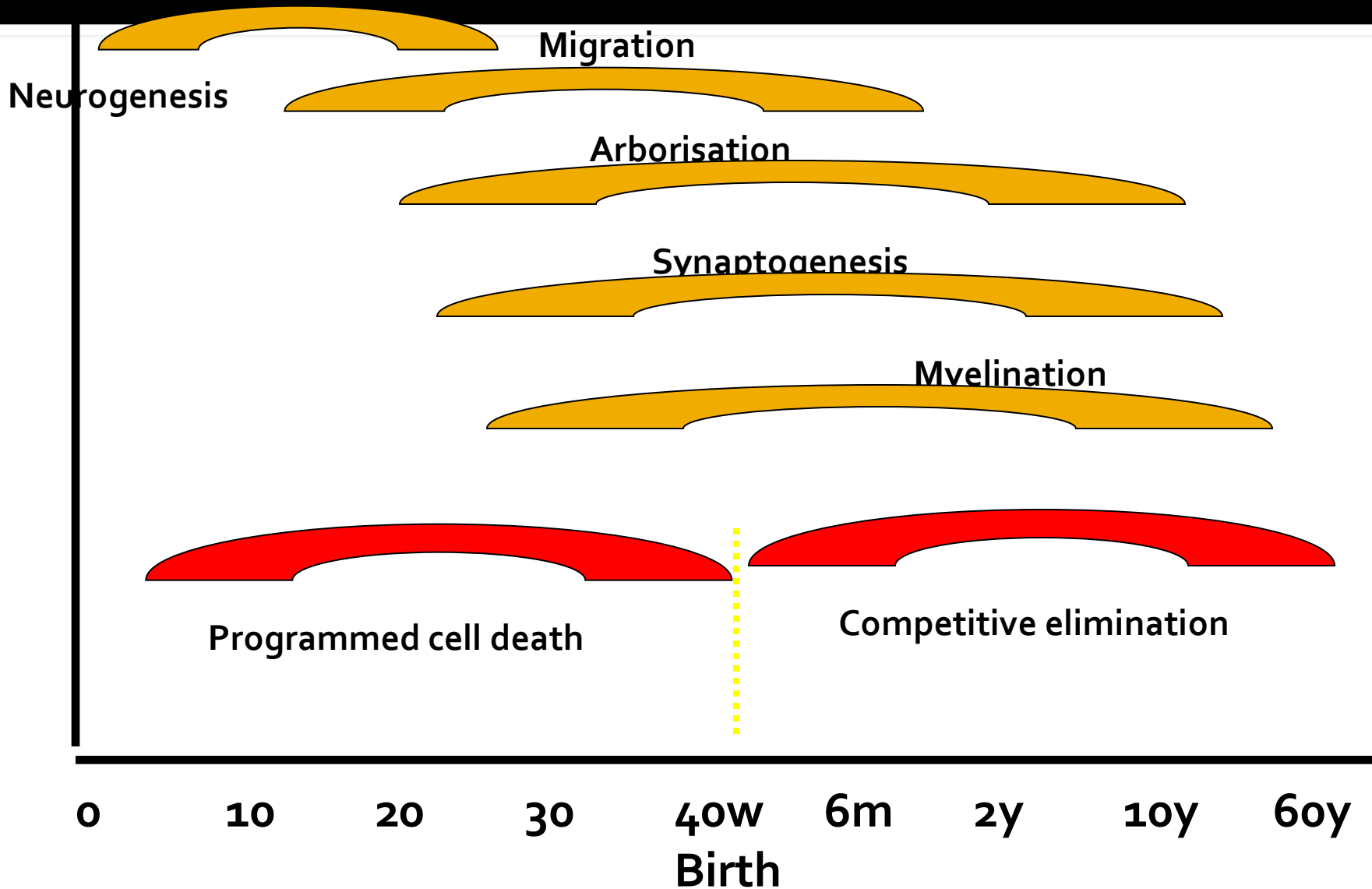
... which makes
the human birth
one year too soon:

**EXCEEDINGLY
IMMATURE**

Kangaroo – Joey - Pinky



Brain growth – Ex utero!



Neonatal Sensory Systems

Tactile → vestibular → gustatory-olfactory → auditory
→ visual

- Stimulation of early maturing senses has + influence on late maturing senses.
- Untimely stimulation within this sequence disrupts normal maturation

Developmentally Supportive Care



Providing a structured care environment which supports, encourages and guides the developmental organization of the premature / critically ill infant.

Developmentally Supportive Care

STRESS



How to provide DSC?

Neonatal sensory system

**Tactile → vestibular → gustatory-olfactory
→ auditory → visual**

Cutaneous system

Tactile, Proprioceptive & Kinesthetic

Stimulation

- Position :Prone
- Nesting
- Swaddling
- Massage
- Gentle rocking

Over-stimulation



Protection of Sleep



Sleep Study SJMCH

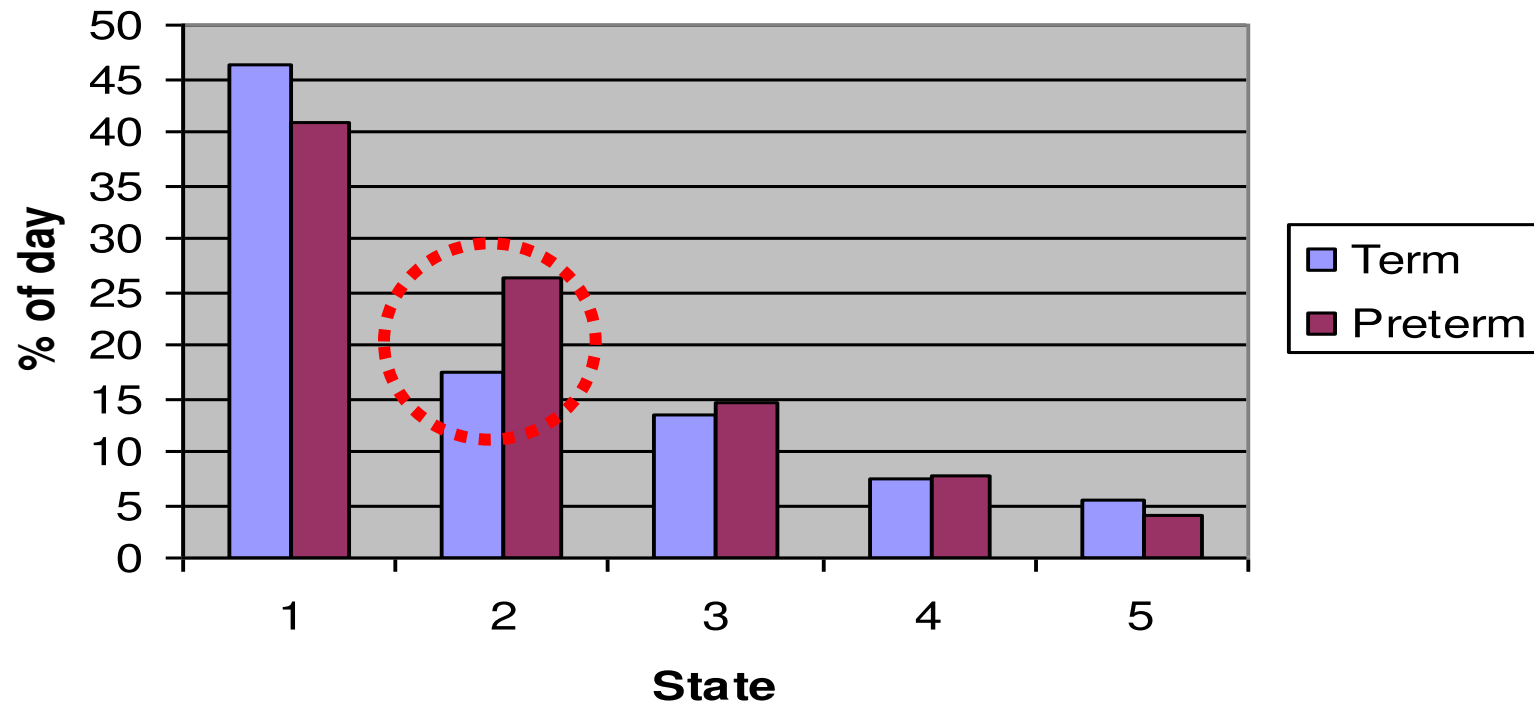
NEOCON 2005

- 37 neonates assessed on multiple occasions
- 97 participant days
- Mean birth weight - 1.67 (± 0.49) kg
- Mean gestational age - 34.4 (± 2.86) wks



REM Sleep

Sleep-wake pattern Term Vs Preterm



Preterms spent more time in REM sleep and less time crying

Importance of SLEEP



- The activity occurring during REM sleep (or active sleep) seems to be particularly important to the developing organism
- Deprivation of sleep \Rightarrow neuronal cell death & \downarrow brain mass

Provide a womb like environment

KMC reduces stress

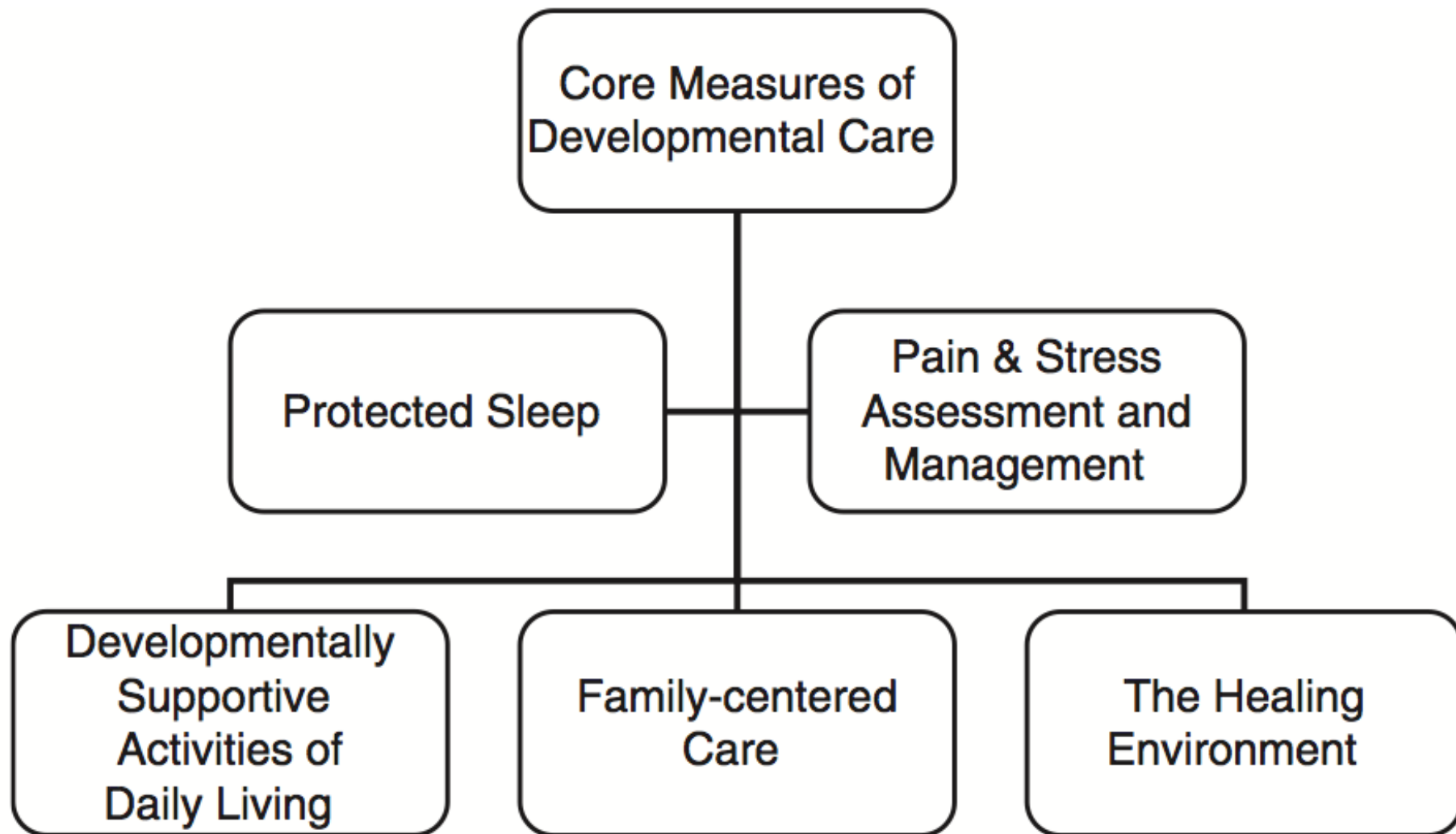
- Collados Gomez et al
 - quasi experimental study in Spain
 - 29-34 weeks - own controls
 - Stress at base line and with KMC
- Physiological stress signals and by behavioral stress response.
 - SpO₂ & HR improved. Breathing was more regular
 - ↓ trunk arching or hyperextension, very open fingers, contraction of the face muscles, apnea, irritability & exaggerated, sustained limb extension.



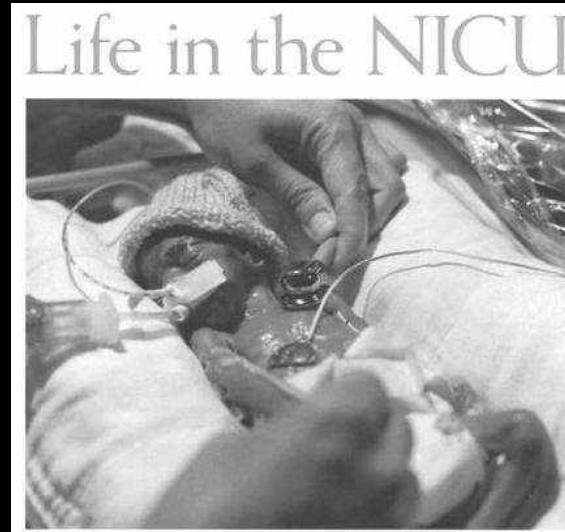
KMC Promotes Sleep



DSC



Protection from pain



A newborn including a preterm **FEELS**, **RESPONDS TO** and **REMEMBERS** pain

Clues from baby - PIPP



Indicator	0	1	2	3
GA	≥36	32-35	28-31	<28
State	AW	QW	AS	QS
HR increase	0-4	5-14	15-24	25
SaO ₂ decrease	0-2.4%	2.5-4.9%	5-7.4%	≥7.5%
Brow bulge	0-9% of time	10-39% of time	40-69% of time	≥70% of time
Eye squeeze				
Nasolabial furrow				

< 6 no/minimal pain, > 12- mod/severe pain

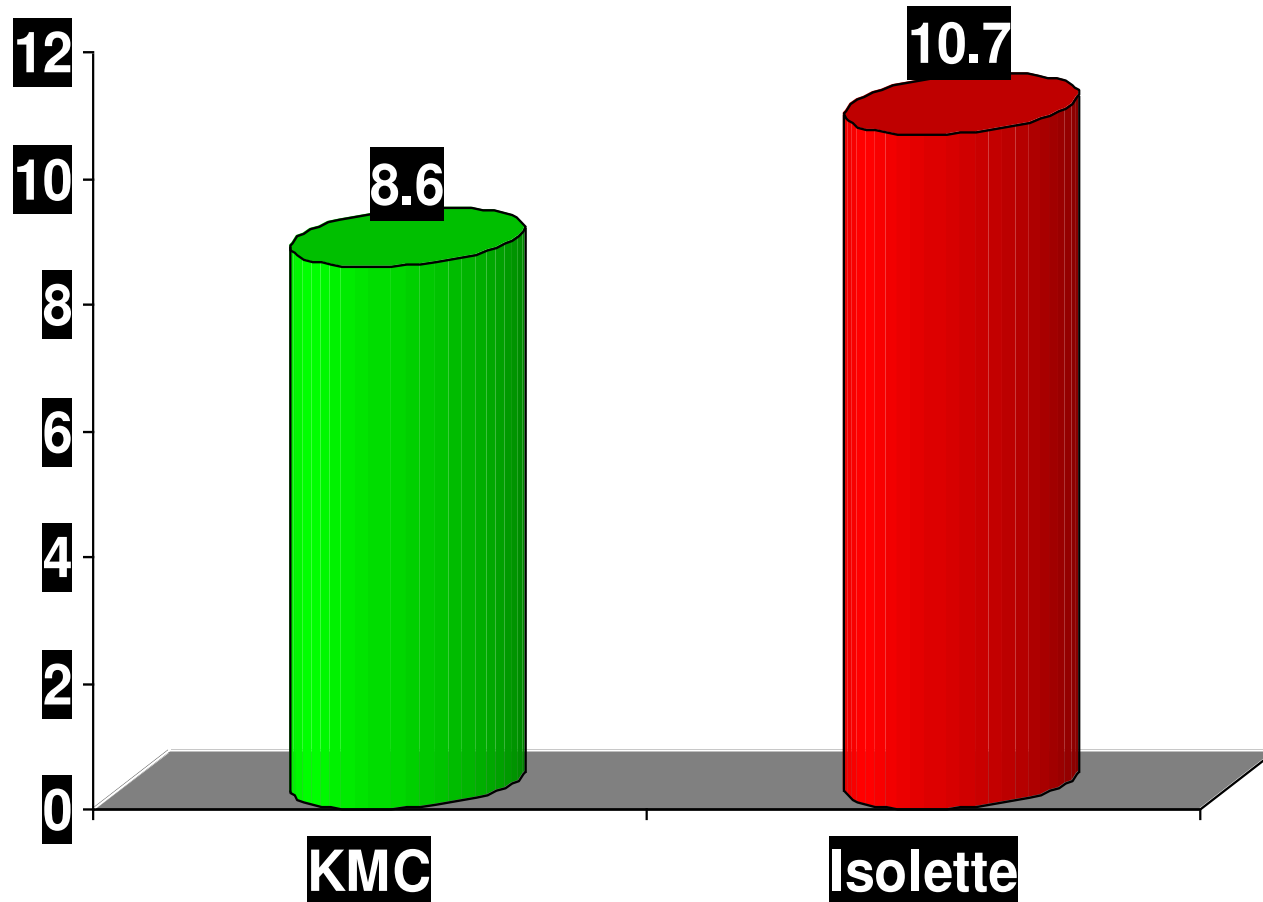
Pain & KMC study SJMCH 2005

NEOCON 2005, Int KMC 2008

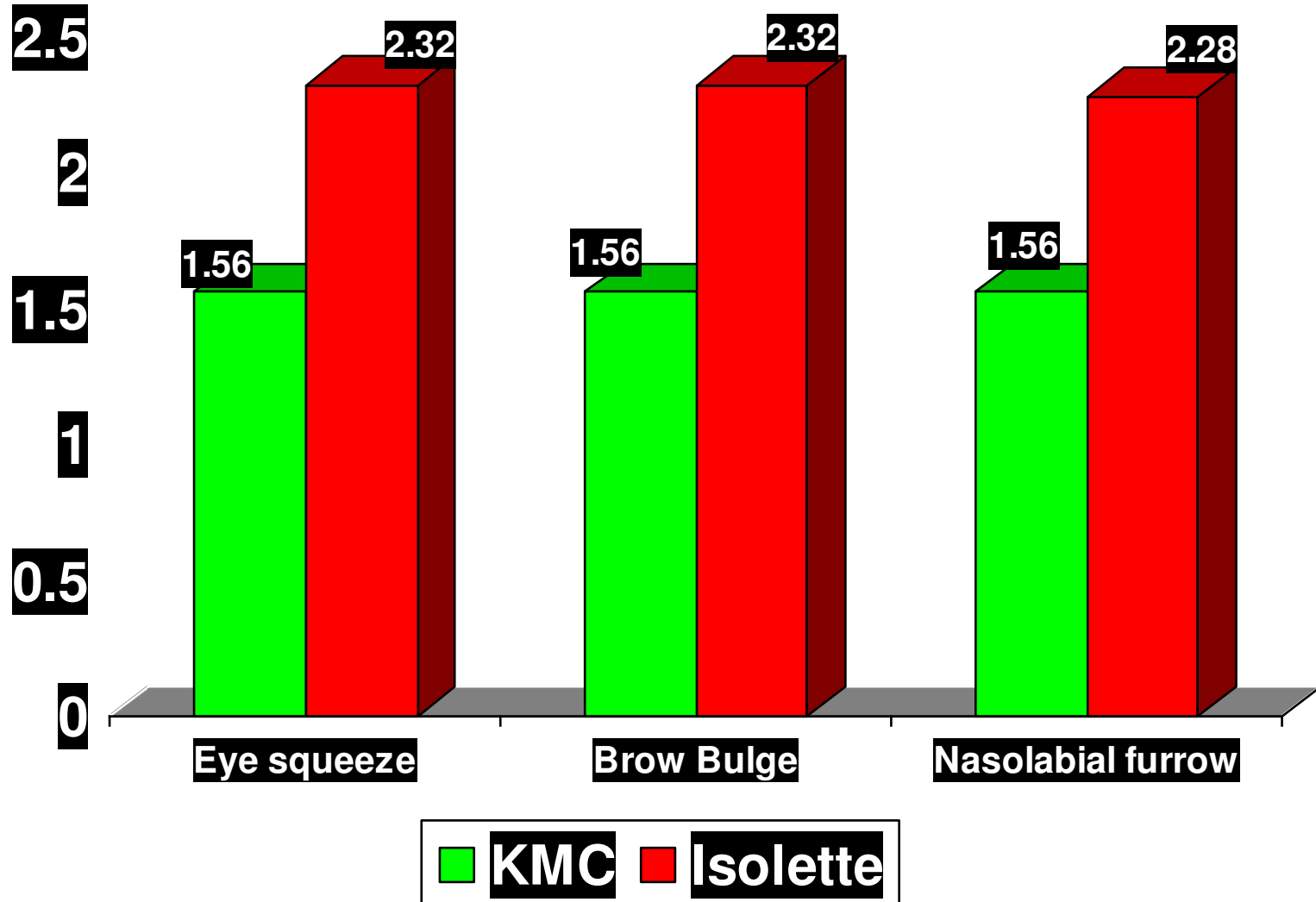


- 20 preterm neonates
- Heel prick in KMC & in isolette
- Cross over study
- Video recording
- PIPP score

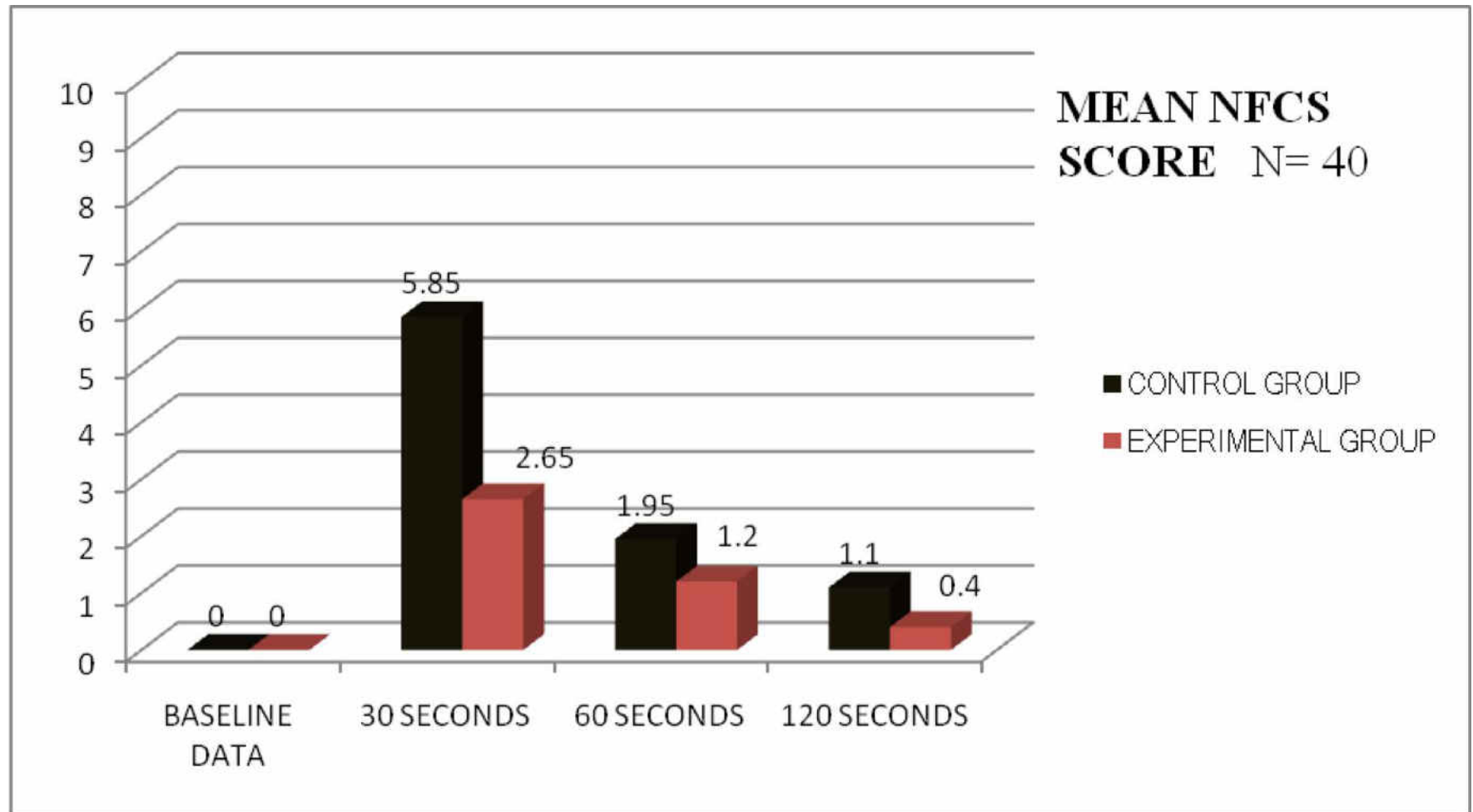
Pain during Heel Lancing



Pain – Behavioural Parameters



KMC position & Pain during Heel Prick – Term babies by NFCS



Skin-to-skin care for procedural pain in neonates (Review)

Johnston C, Campbell-Yeo M, Fernandes A, Inglis D, Streiner D, Zee R



**THE COCHRANE
COLLABORATION®**

This is a reprint of a Cochrane review, prepared and maintained by The Cochrane Collaboration and published in *The Cochrane Library* 2014, Issue 1

<http://www.thecochranelibrary.com>

ROP Pain study SJMCH 2007

NEOCON Pune 2007

Journal of Tropical Pediatrics Advance Access published November 5, 2014

JOURNAL OF TROPICAL PEDIATRICS, 2014

Topical Anesthesia or Oral Dextrose for the Relief of Pain in Screening for Retinopathy of Prematurity: a Randomized Controlled Double-blinded Trial

by Saudamini V. Nesargi,¹ Suneetha Nithyanandam,² Suman Rao,¹ Somashekhar Nimbalkar,¹ and Swarnarekha Bhat³



- RCT 20 preterm neonates
- 2 ROP screening
- ± Topical Proparacaine / 25% D

Olfactory and Gustatory system



- >32 wks detect and respond ■ **Which odour?...**
- Discriminate Breastmilk/mother/amn. fluid
- Memory ■ Avoid V nerve stimulation
- Habituation ■ **Taste Milk**

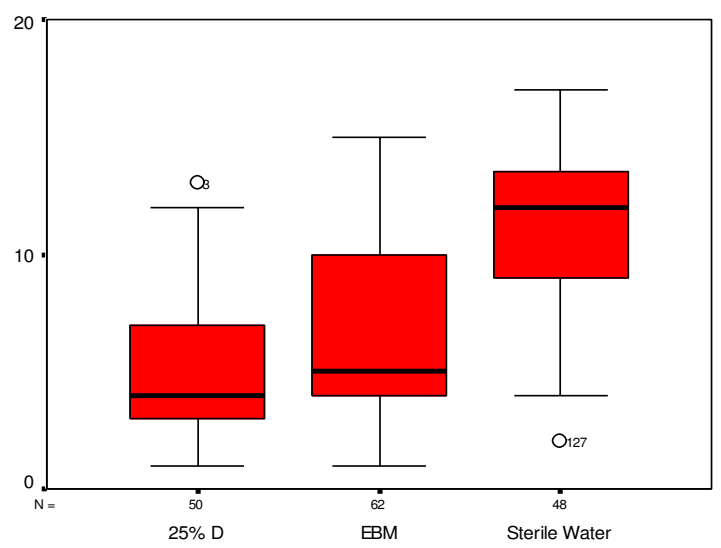
EBM as analgesic study SJMCH 2010

KARNECON Award 2010

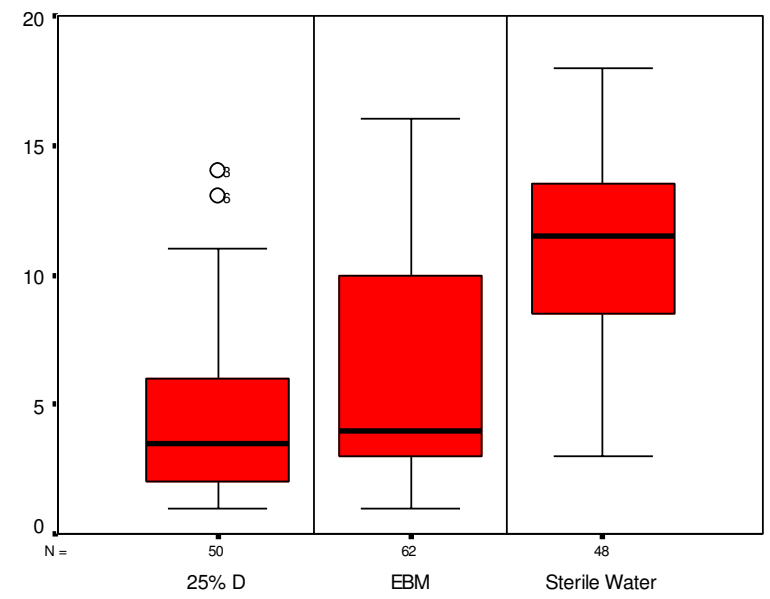
- 210 neonates
- Double blinded RCT
- 25 % Dextrose, EBM, placebo
- Venipuncture
- Video recording
- PIPP score



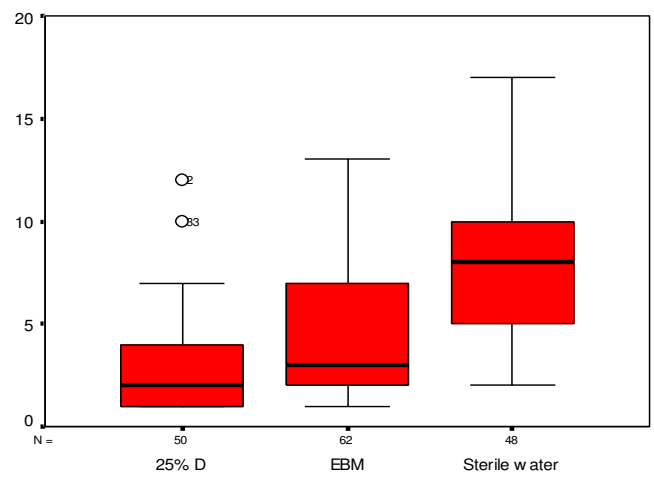
PIPP Score



INTERVENTI



INTERVENTION



INTERVENTION

P 0.000

Indian Pediatrics 2012

RESEARCH PAPER

Expressed Breast Milk vs 25% Dextrose in Procedural Pain in Neonates: *A Double Blind Randomized Controlled Trial*

JAGDISH PRASAD SAHOO, SUMAN RAO, SAUDAMINI NESARGI, THOMAS RANJIT, ASHOK C AND SWARNAREKHA BHAT

From Department of Neonatology, St John's Medical College and Hospital, Bangalore, Karnataka, India.

Correspondence to: Dr Jagdish Prasad Sahoo, Senior Resident, Department of Pediatrics, Kalinga Institute of Medical Sciences, Bhubaneswar, Orissa, India. dr_jagdish_sahoo@yahoo.co.in

Received: December 09, 2011; Initial review: January 06, 2012; Accepted: June 23, 2012.

ROP Pain study SJMCH 2012



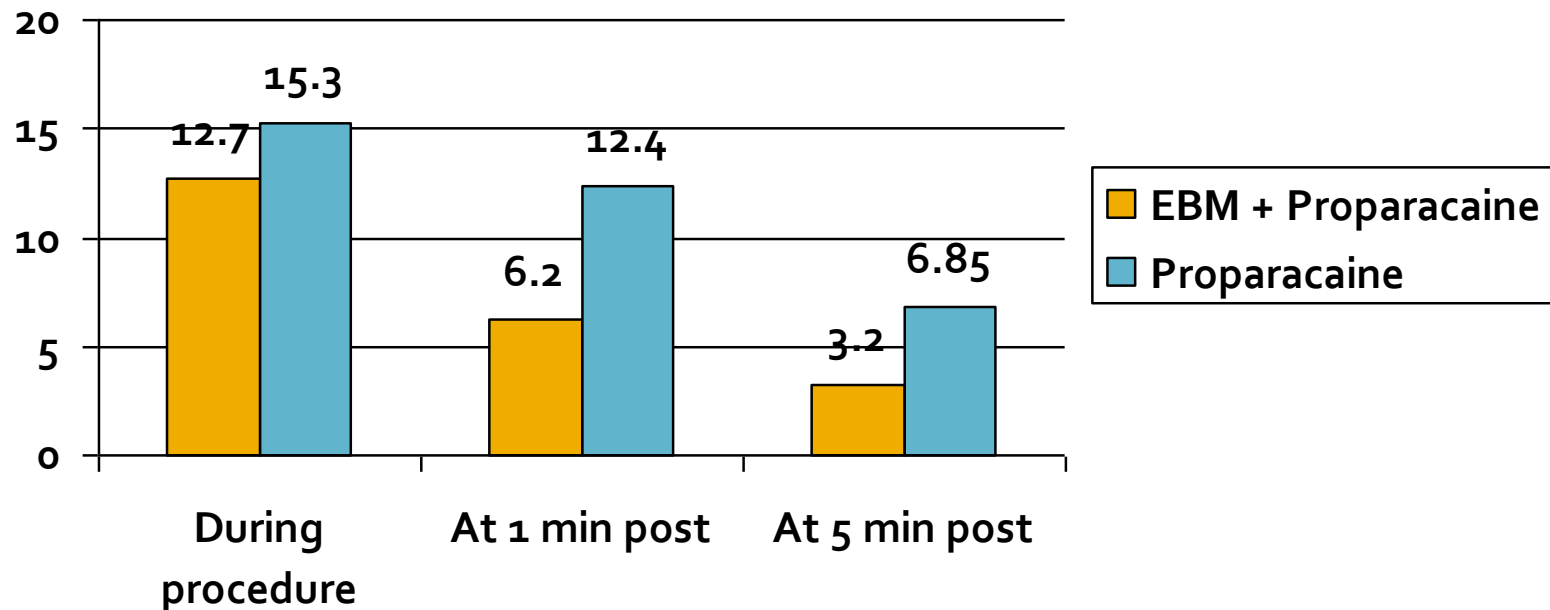
2012

- RCT 12 preterm neonates
- 2 ROP screening
- Topical Proparacaine control
- **Proparacaine + EBM**
intervention

ORIGINAL PAPER

Efficacy of Expressed Breast Milk in Reducing Pain During ROP Screening—a Randomized Controlled Trial

by Sr Lalitha Rosali,¹ Saudamini Nesargi,² Shiny Mathew,³ Usha Vasu,⁴ Suman PN Rao,² and Swarnarekha Bhat²

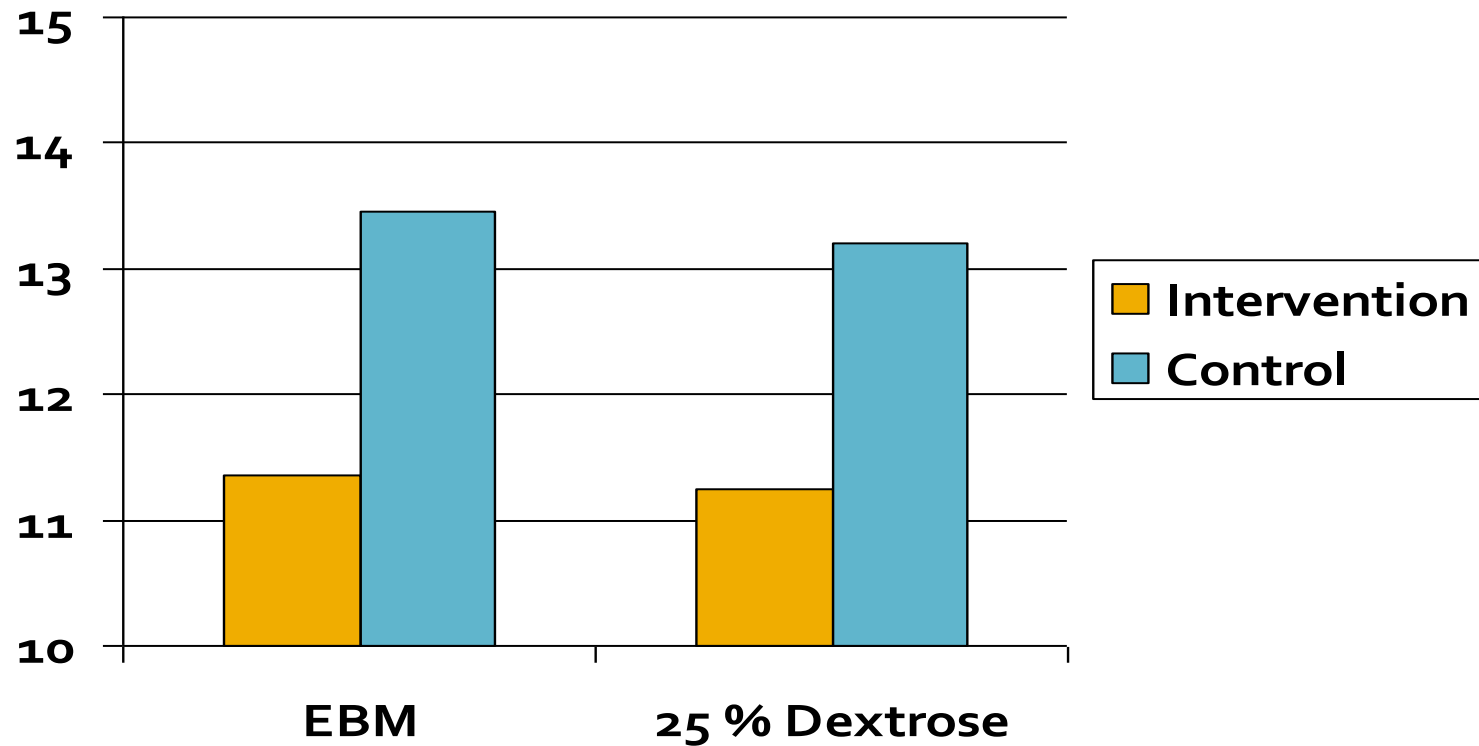


EBM is beneficial in reducing severe pain of ROP screening

CPAP- nasopharyngeal suction

EBM Vs 25 % Dextrose

NEOCON Hyderabad 2013



Sucrose OR EBM?

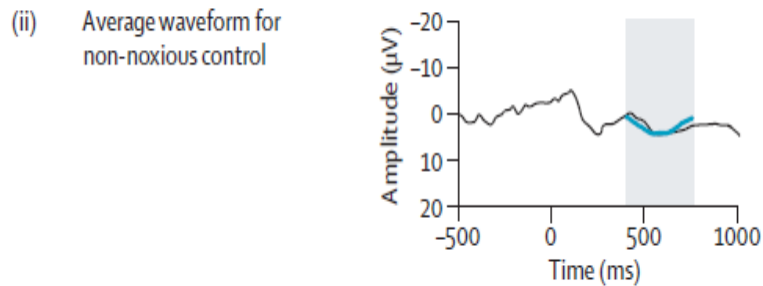
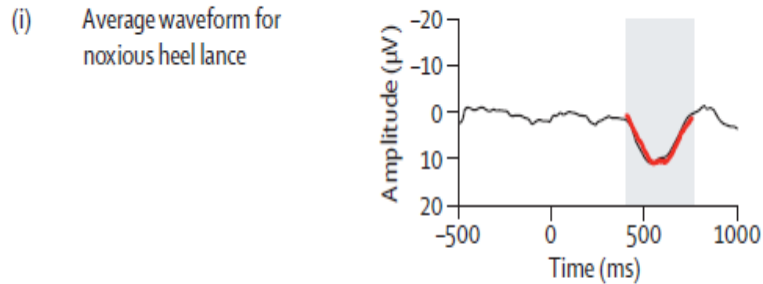


Baby
SUCROSE
24%

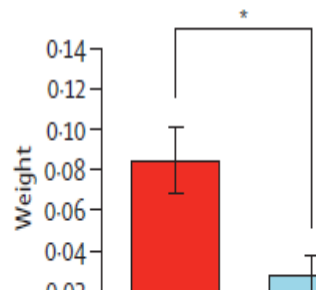


Sucrose true analgesic?

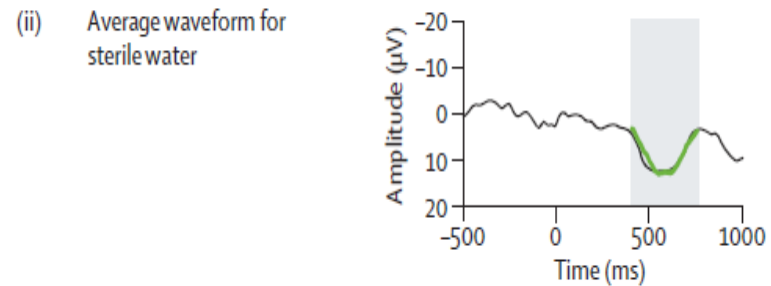
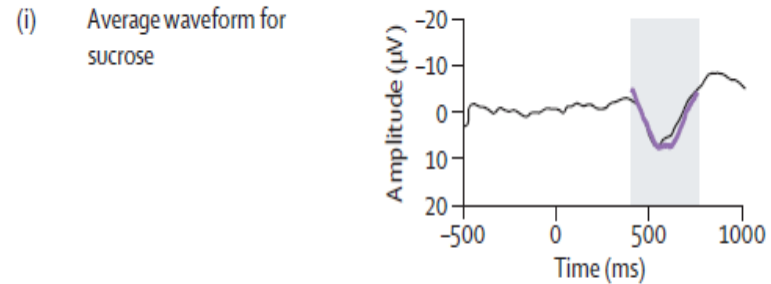
A Characterisation of the nociceptive-specific brain activity



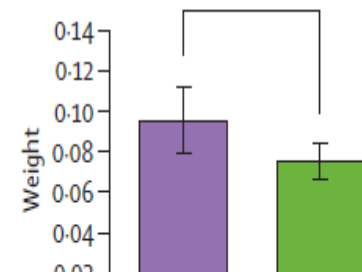
- (iii)
- Noxious heel lance
 - Non-noxious control



B Effect of treatment on nociceptive-specific brain activity



- (iii)
- Sucrose
 - Sterile water



Sucrose & Neurodevelopment

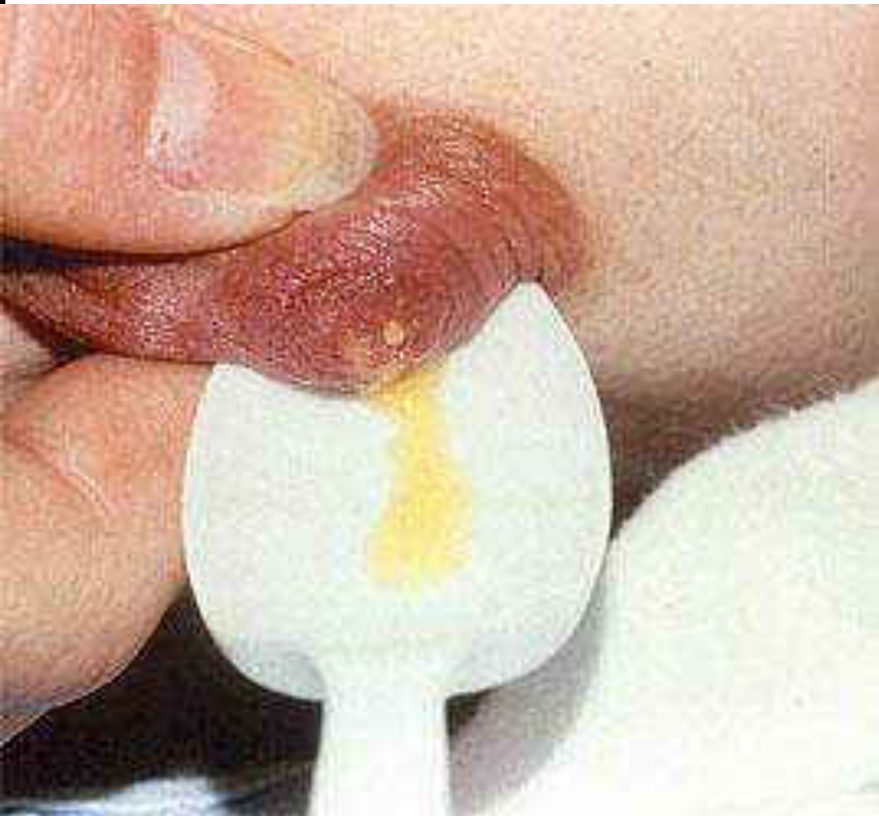
- > 10 doses / day in preterm
- Oxidative stress
- Poorer motor development
- Attention



Johnston et al. routine sucrose analgesia in the first week of life in preterms < 31 weeks. Pediatrics 2002; 110:523-28

Stevens Bet al. Consistent management of repeated procedural pain with sucrose in preterm neonates: is it effective and safe for repeated use over time? Clin J Pain 2005;21(6):543–548.

EBM or Sucrose



But do we still hurt our newborns?!





PAINFUL PROCEDURES IN NICU (separate sheet for each day)

Name: **SABEERA** DOB: **28/4/11** Hospital no. baby: **293641** Day of life: **0** Date: **28/4/11**
 Birth weight: **2300** g Gestation: **33** wks AGA/SGA/LGA time of admission: **5:30**
 CRIB score: _____

CPAP/Ventilated/IV Fluid / antibiotics /

Procedure	AM												PM											
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Diaper change																								
Heel stick																								
Arterial Blood Gas																								
Venipuncture																								
IM injection																								
IV injection																								
NGT insertion																								
NGT removal																								
IV cannula insertion																								
IV cannula removal																								
X-ray																								
Removal of micropore tegaderm																								
Weight check/Bed Making																								
Changing central line dressing																								
Oral suctioning																								
Nasal prong removal																								
ET intubation																								
ET suctioning																								
Rectal stimulation/enema																								
MISCELLANEOUS Handling by healthcare workers, physicians, oil massage, etc																								

30/08/2011 13:10

B/O

PAINFUL PROCEDURES IN NICU (separate sheet for each day)

Name SABEERA DOB 28/4/11 Hospital no. baby: 283641 Day of life 0 Date 28/

Birth weight: 2.300g

Gestation 33 wks

AGA/SGA/LGA

time of ad

CRIB score

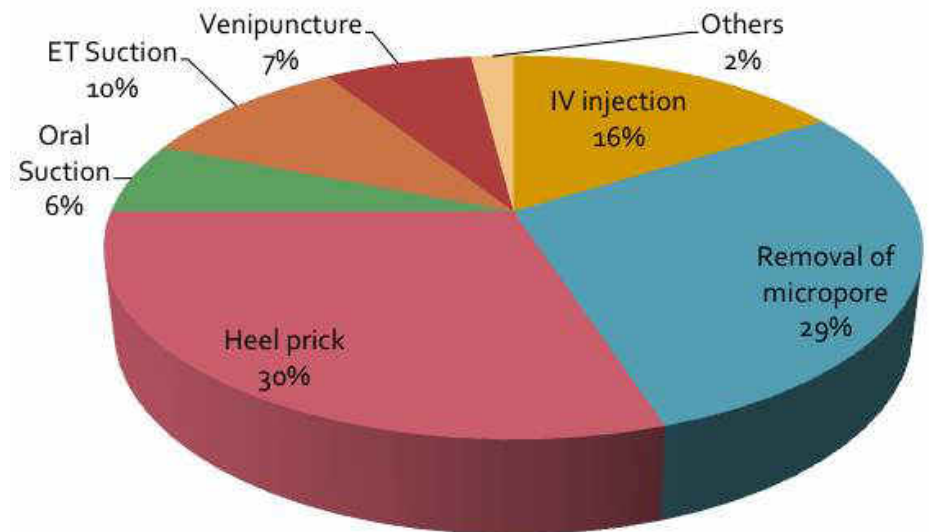
CPAP/Ventilated /IV Fluid / antibiotics /

Procedure	AM												PM					
	1	2	3	4	5	6	7	8	9	10	11	12	1	2	3	4	5	6
Diaper change						✓			✓			✓			✓			
Heelstick					✓				✓				✓					✓
Arterial Blood Gas				✓														✓
Venipuncture									✓			✓	✓					
IM injection																		
IV injection						✓					✓		✓					
NGT insertion									✓									
NGT removal																		
IVcannula insertion												✓						
IV cannula removal																		
X-ray												✓						
Removal of micropore/tegaderm				✓				✓			✓			✓				✓
Weight check/ Bed Making							✓											
Changing central line dressing												✓		✓				✓
Oral suctioning				✓			✓				✓			✓				✓

30/08/2011 13:04

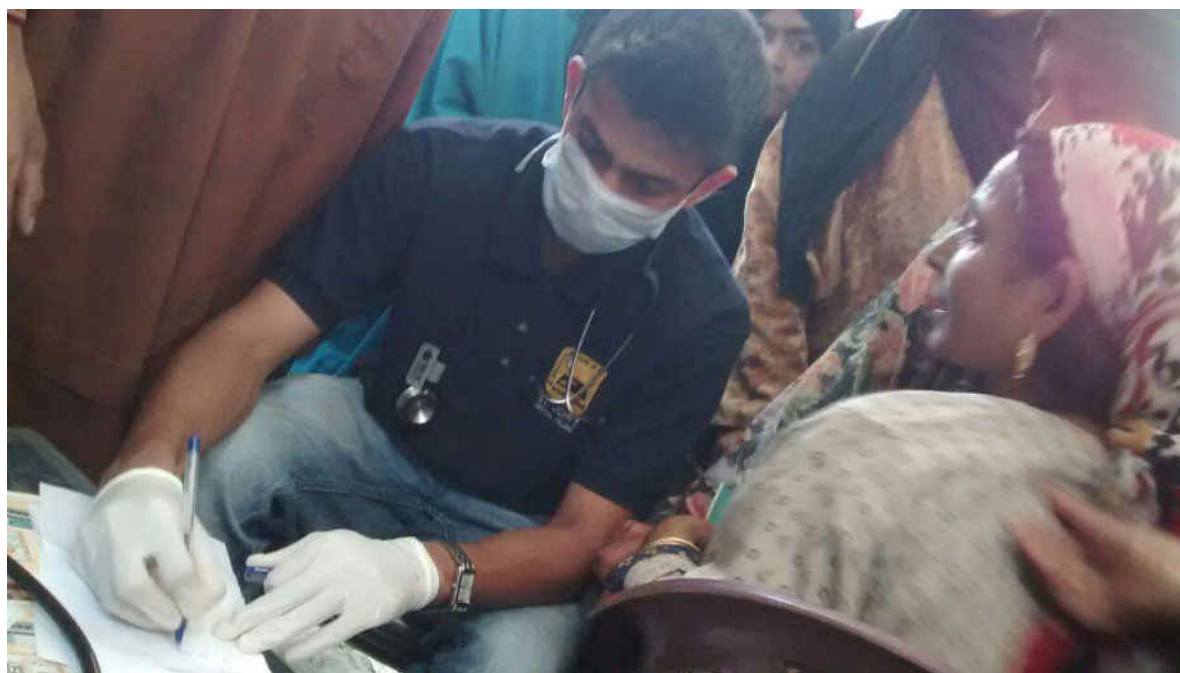
Results

- No. of painful procedures per baby
 - 68.54 ± 63.7
- No. of painful procedures per baby/d
 - 9.13 ± 5.3



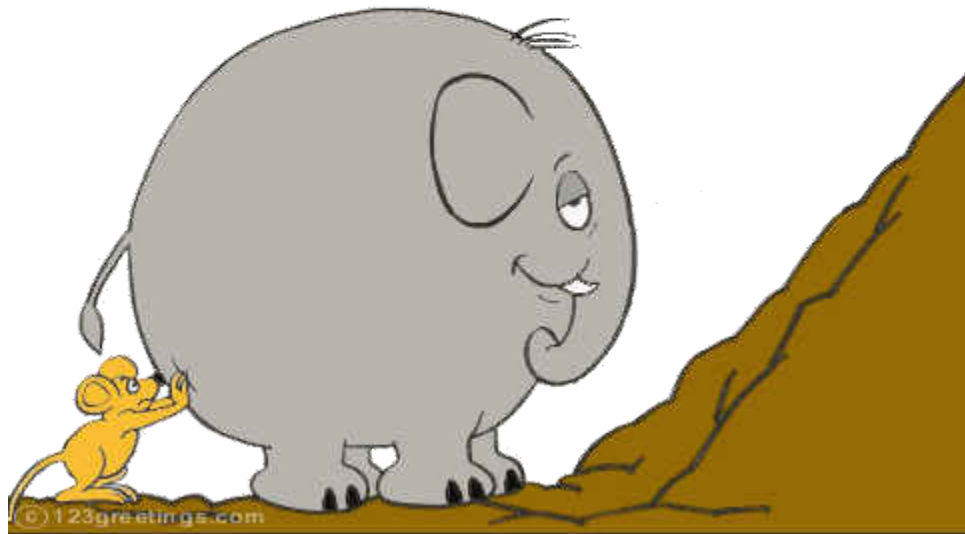
PAIN—Perception and Assessment of Painful Procedures in the NICU

by Carl Denis Britto,¹ Suman Rao PN,¹ Saudamini Nesargi,¹ Sitara Nair,² Shashidhar Rao,¹ Theradian Thilagavathy,¹ Armugam Ramesh,³ and Swarnarekha Bhat¹



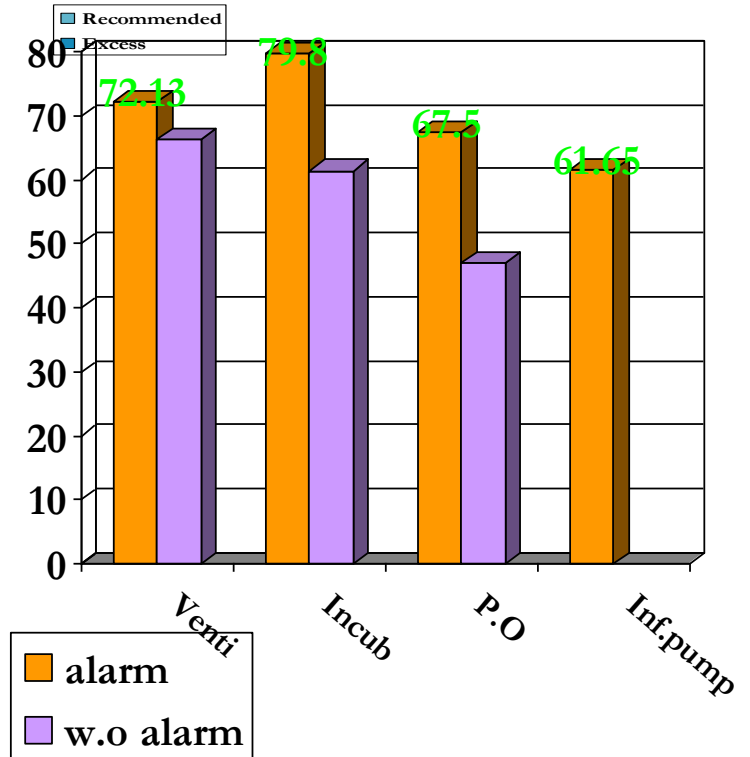
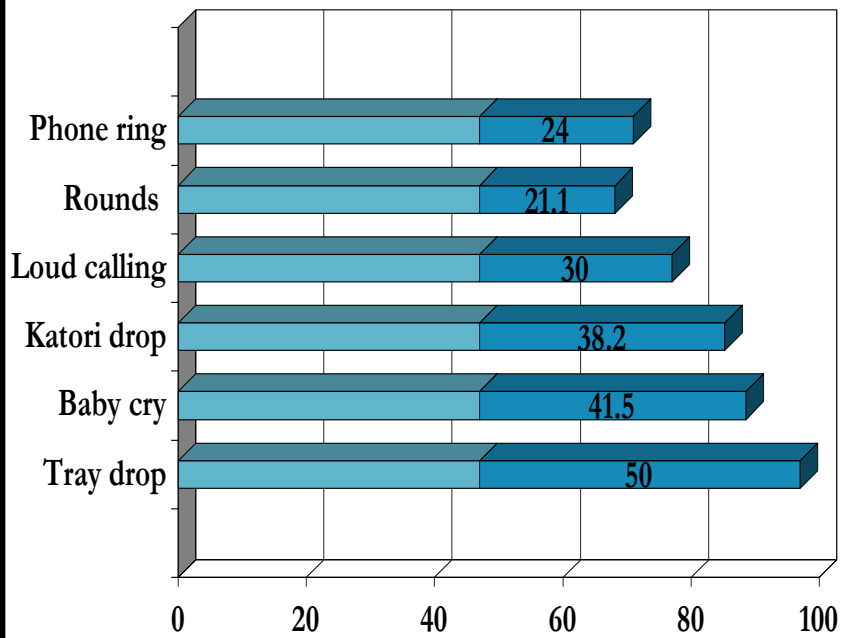
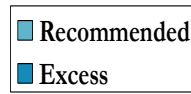
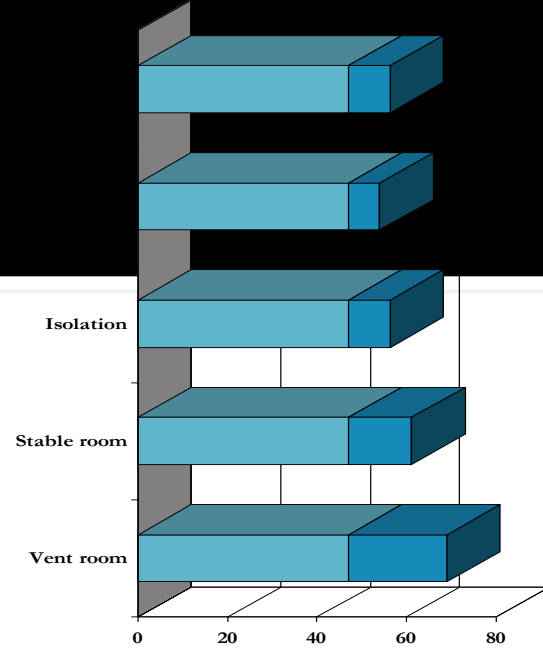
Tactile system / Pain management

It's an uphill task !





Noise is HARMFUL !



Spectral Analysis of Noise in the Neonatal Intensive Care Unit

M.D.Livera, B. Priya, A. Ramesh, P.N. Suman Rao, V. Srilakshmi, M. Nagapoomima, A.G. Ramakrishnan¹, M. Dominic and Swarnarekha

St John's Medical College Hospital, Bangalore, ¹Medical intelligence and language engineering laboratory, Department of Electrical engineering, Indian Institute of Science, Bangalore, India



Silence Please



Thank you for helping me sleep

Enviornmental modifications

- Rubber shoes for furniture
- Plastic files for patient records
- Closed doors between rooms
- Minimum Telephone and alarm volumes
- FM radio switched off



Karneocon Bangalore 2007

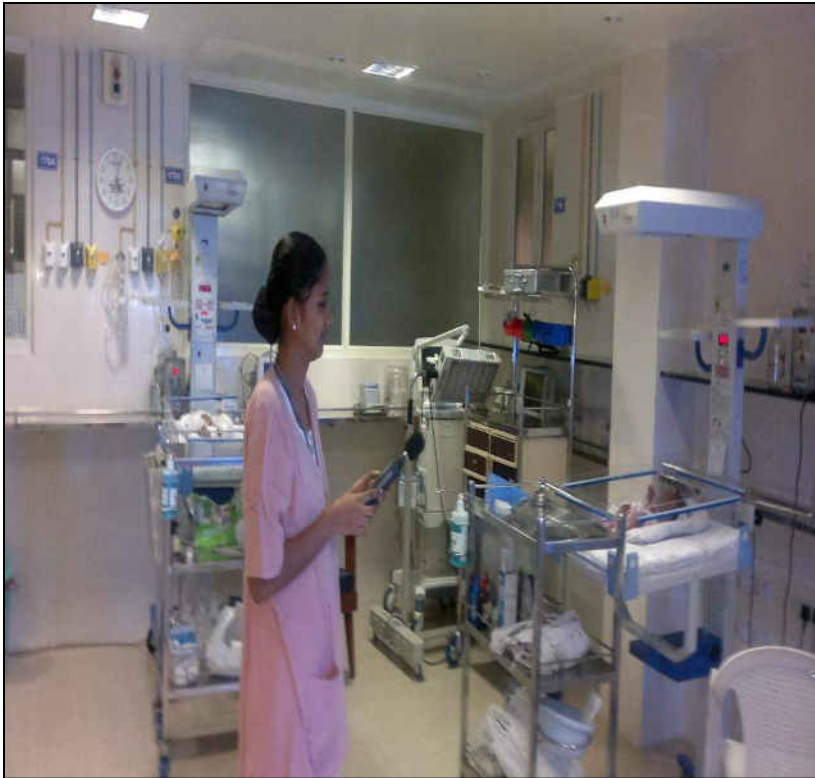
Original Article

Efficacy of a Low Cost Protocol in Reducing Noise Levels in the Neonatal Intensive Care Unit

A. Ramesh, P.N. Suman Rao,¹ G. Sandeep,¹ M. Nagapoornima,³ V. Srilakshmi, M. Dominic² and Swarnarekha

Departments of Otolaryngology, ¹Pediatrics, ²Community Medicine, ³Audiology and Speech Pathology, St John's Medical College Hospital, Bangalore, India

Continuous measurement of noise



Central area measurement



**Continuous measurement
-Sound station**

RESEARCH PAPER

Maintaining Reduced Noise Levels in a Resource-Constrained Neonatal Intensive Care Unit by Operant Conditioning

*A RAMESH

*From the Dep
College and E*

NA REKHA

hn's Medical

Adherence to Noise Reduction Protocol



International Journal of
Qualitative Studies
on Health and Well-being

COACTION

EMPIRICAL STUDY

Sustaining a “culture of silence” in the neonatal intensive care unit during nonemergency situations: A grounded theory on ensuring adherence to behavioral modification to reduce noise levels

S. SWATHI, Resident¹, A. RAMESH, Associate Professor¹, M. NAGAPOORNIMA, Lecturer¹, LAVINA M. FERNANDES, Lecturer², C. JISINA, Lecturer¹, P. N. SUMAN RAO, Associate Professor³, & A. SWARNAREKHA, Professor³

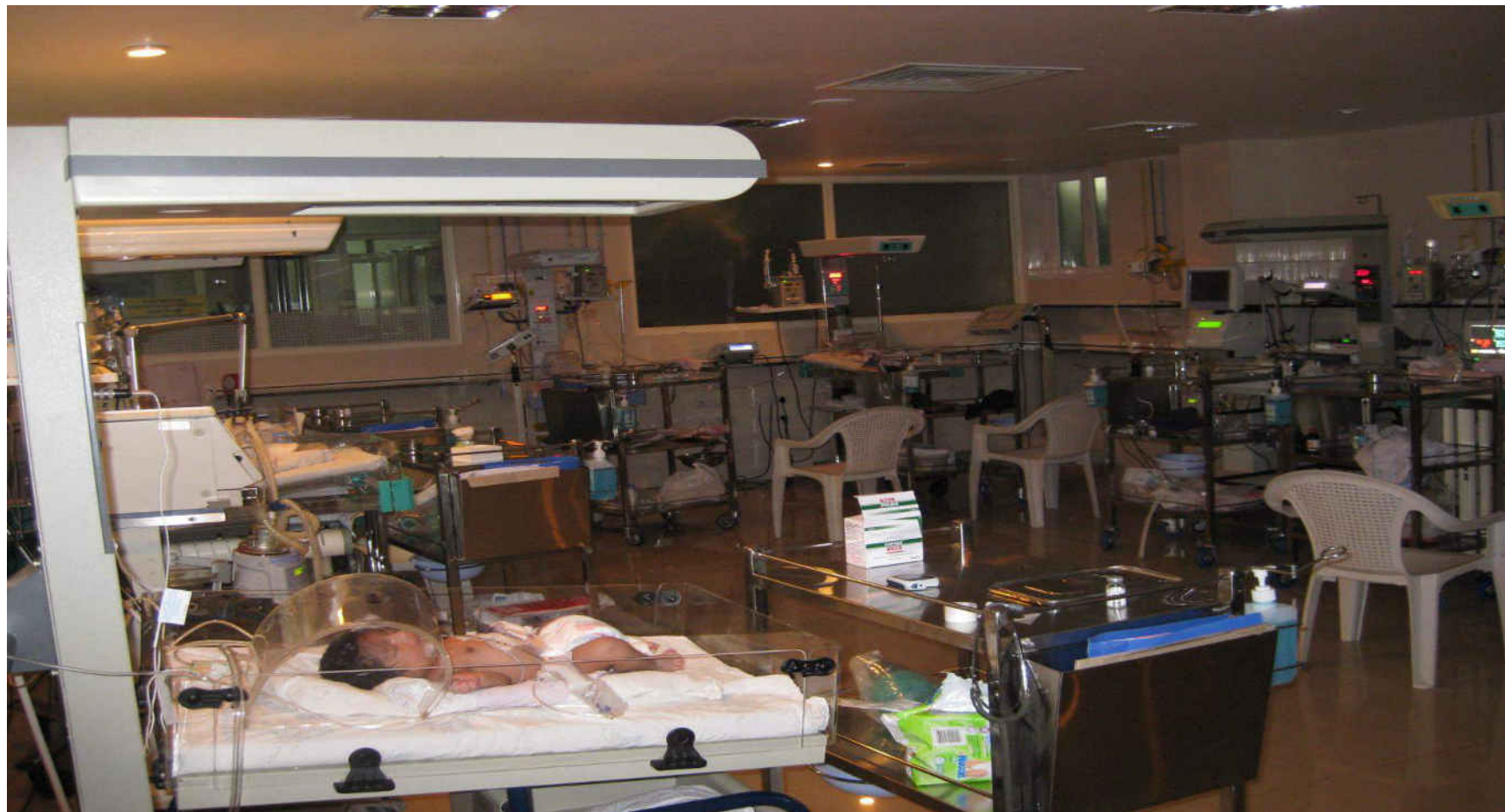
¹Department of Otolaryngology Head & Neck Surgery, Bangalore, India, ²CMR Institute of Management Studies, Bangalore, India, and ³Department of Neonatology, St John's Medical College Hospital, Bangalore, India

Light can be harmful

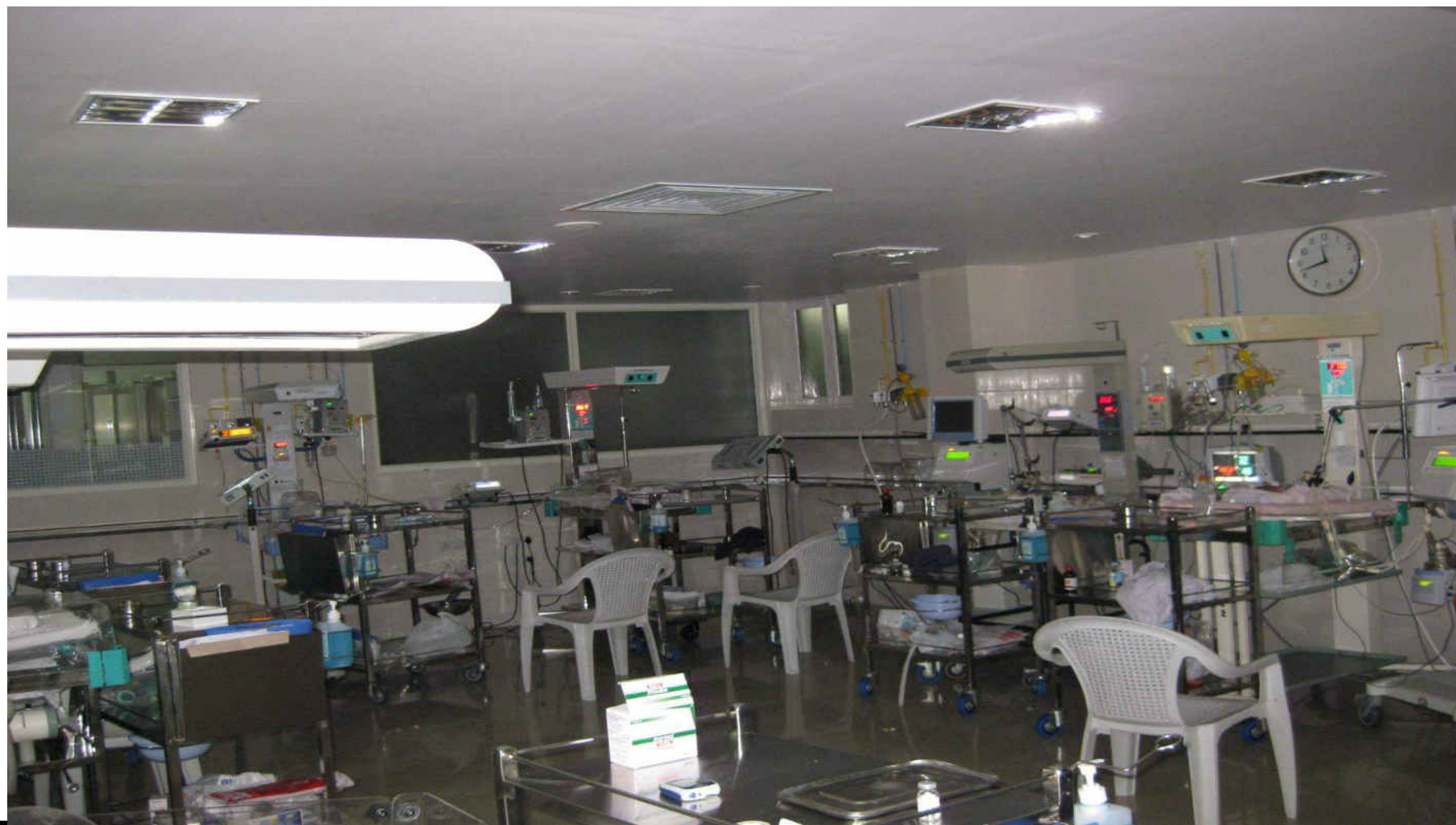


- Reduce the total light exposure
- Shade neonate's eyes
- Use flexible point light source for procedures
- Use of dimmer light
- Cycled light: create day and night environment

Dimmer light at night



Natural light at Day



What is the Evidence ???

Level I evidence..... Meta-analysis

- ↓↓ length of hospital stay
- ↓↓ hospital costs
- ↑↑ weight gain
- ↓↓ time to full enteral feeding
- ↑↑ neurodevelopmental scores at 9–12 mo

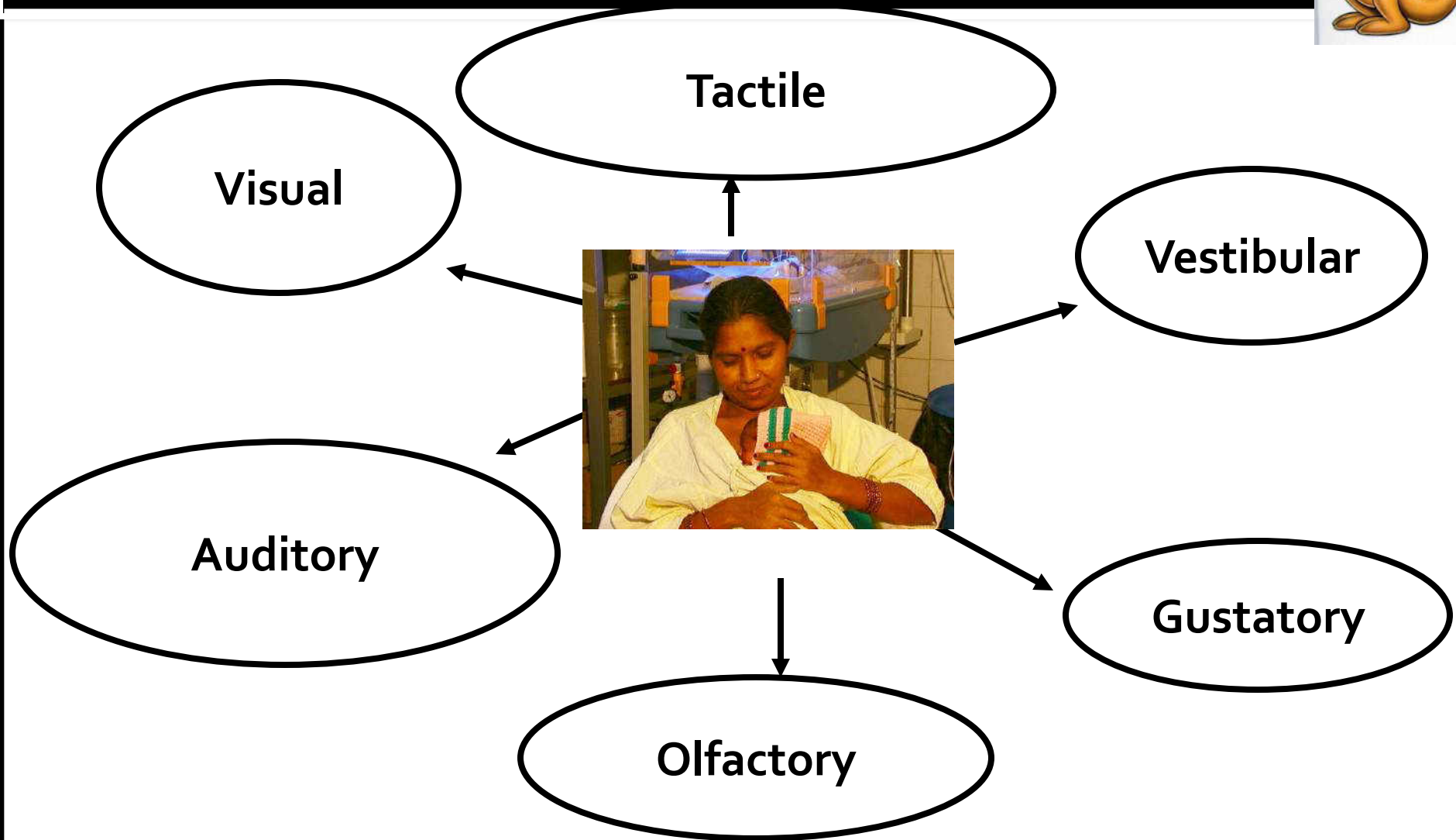
Jacobs et al. 2002
Symington & Pinelli 2002
Symington & Pinelli 2006

Kangaroo Mother Care

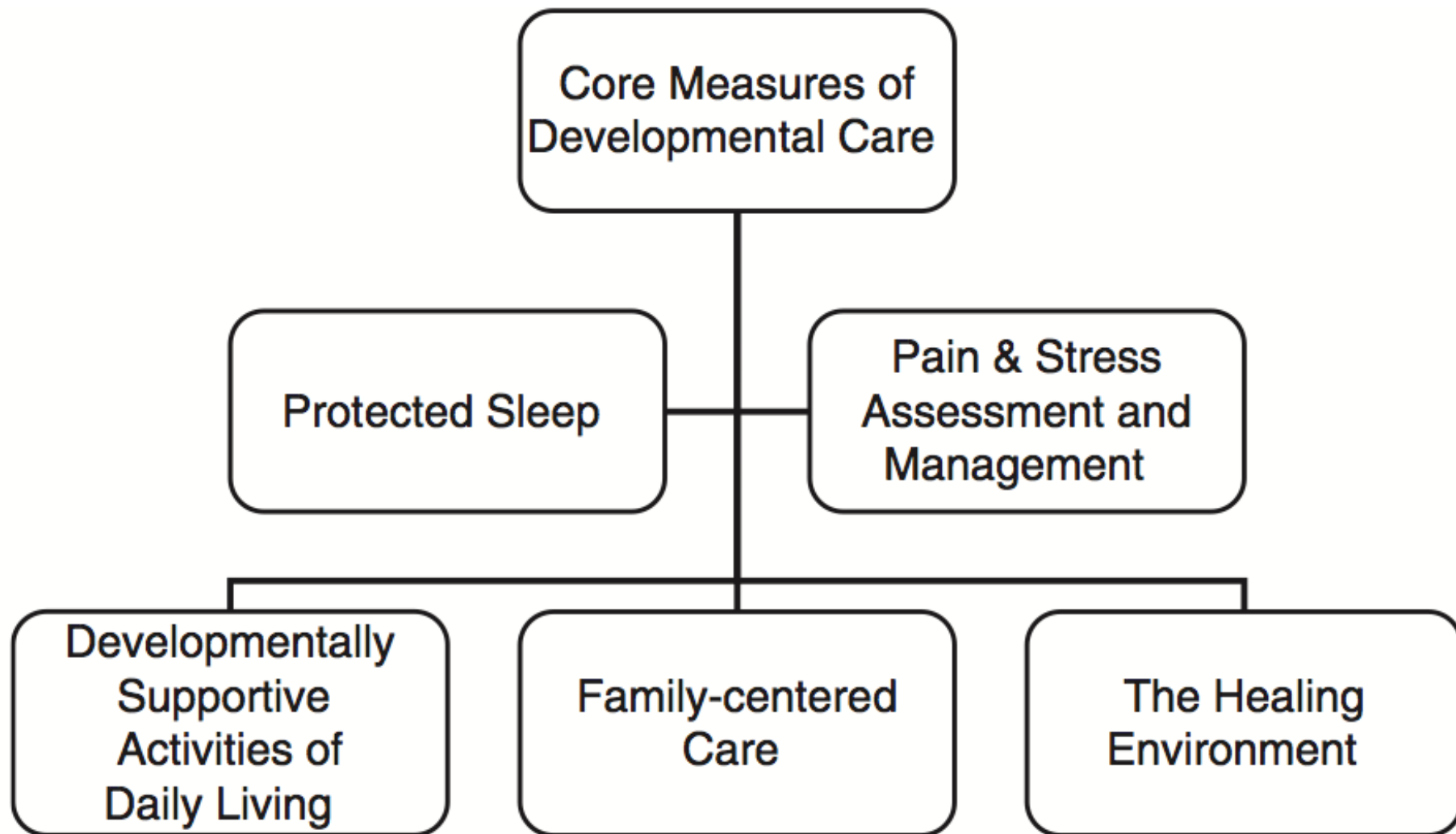


Baby's Right, Mothers Delight

KMC – Best Developmentally supportive care !!!



KMC & DSC



KMC & DSC - Evidence

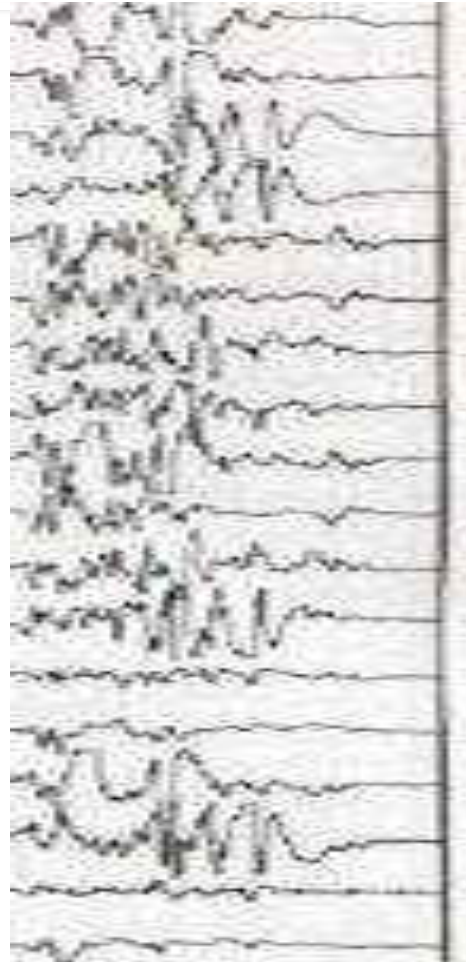
3 mo.....1 year....14 years....life long????

KMC Neurophysiological evidence

Preterms (No KMC)
At term

KMC preterms
At term

Term infants



KMC=Term

Kaffashi et al. An analysis of KMC using neonatal EEG complexity. Clin Neurophysiol 2013 Feb.

KMC – Positive influence till adolescence

Transcranial Magnetic Stimulation (TMS) outcomes:

- KMC = term infants
- KMC better than controls

Schneider , Charpak et al. Cerebral motor functions in very premature at birth adolescents – KMC effects. Acta Paediatrica Oct 2012

KMC for sick newborns - Sweden



KMC for sick newborns- India



KMC - best DSC

HUMANE Neonatal Care

Hu **MA**ne Neonatal Care



Feel with the mother's feelings
See through the mother's eyes



WAKE UP.....It is
OVER

Thank you