

Neurobehavioural approach to breastfeeding premature infants

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WHAT IS BREASTFEEDING ?

BREASTFEEDING =
A place dependent,
brain-based behaviour
of the newborn.

Is breastfeeding IMPORTANT ?

BREASTFEEDING =

Is more than eating:
primary purpose is
BRAIN-WIRING !!

BRAIN GROWTH

(Rojas et al)

"Somatic growth or preterm infants SSV vs traditional holding ..."

J Dev & Behav Ped 2003; 24(3):163-168

<1500g, same caloric intake,

< 2 hours per day of SSC vs TH

→ Increased head circumference

BRAIN GROWTH

(Rojas et al)

"Somatic growth or preterm infants SSV vs traditional holding ..."

J Dev & Behav Ped 2003; 24(3):163-168

<1500g, same caloric intake,

< 2 hours per day of SSC vs TH

→ Breastfeeding rate 83% vs 33%

BRAIN FUNCTION

(Ohgi et al)

NBAS, Bayley, ITQ

"Comparison of KC and SC ... behavioural organisation and development at 1 year ..."

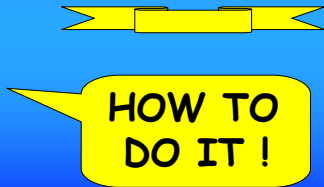
J of Perinatology 2002; 22:374-379

< 2 hours per day of SSC vs SC

→ at 12 m mental and psychomotor development significantly higher in KC

BREASTFEEDING

with an emphasis on premature babies



Overview

Implementation framework
 Skin-to-skin technique
 KangaCarrier
 Self-attachment
 State Organisation
 Breastfeeding steps (Persson)
 Breastfeeding anatomy
 Feeding frequency
 Maternal neurobehaviour

SEPARATING

MOTHERS
 FROM
 BABIES
 IS
 BAD
 NEWS

Newborns
 should never
 be separated !!

K M C FRAMEWORK

CARE VARIABLE



INITIATION	Birth	<90'	<7h	<7d	>7d
CONTINUUM	>20h	>12h	>4h	>1h	<1h
FOOD	BM	EBM	IV	Mix	Cow
METHOD	Breast	Cup	line	NGT	Bottle
Resp' Support	Vent'	CPAP		O ₂	No

K M C FRAMEWORK

CARE VARIABLE



INITIATION	The <u>EARLIER</u> the BETTER
CONTINUUM	The <u>MORE</u> the BETTER
FOOD	MUST BE <u>MOTHER'S MILK</u>
METHOD	<u>BREAST</u> - FEEDING !!!
Resp' Support	<u>ADD</u> available technology

SELF ATTACHMENT.

The newborn should NOT be separated at birth, specially if premature !!

“The newborn may appear helpless, but displays an impressive and purposeful motor activity which, **without maternal assistance**, brings the baby to the nipple.

(Michelson et al 1996)

STATE ORGANISATION.

The ability to appropriately control the level of sleep and arousal.

<p>Simplified scale - HARD CRYING CRYING FUSSING ACTIVE AWAKE QUIET AWAKE ALERT INACTIVE DROWSY ACTIVE SLEEP IRREGULAR SLEEP QUIET SLEEP DEEP SLEEP</p>	<p>L to R shunting, IVH risk Stressful, wastes calories, ... build up to stress This is feeding zone! Time to connect - stimulation ... transition zone ... transition zone ... activity consumes calories</p> <p>Good sleep - digestion zone Apnoea zone !!</p>
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<p>Simplified scale - HARD CRYING CRYING FUSSING ACTIVE AWAKE QUIET AWAKE ALERT INACTIVE DROWSY ACTIVE SLEEP IRREGULAR SLEEP QUIET SLEEP DEEP SLEEP</p>	
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KMC babies oscillate slowly in safe zones

<p>Simplified scale - HARD CRYING CRYING FUSSING ACTIVE AWAKE QUIET AWAKE ALERT INACTIVE DROWSY ACTIVE SLEEP IRREGULAR SLEEP QUIET SLEEP DEEP SLEEP</p>	<p>Separated babies oscillate erratically to danger zones</p>
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BREASTFEEDING IS NOT JUST EATING!

<p>Simplified scale - HARD CRYING CRYING FUSSING ACTIVE AWAKE QUIET AWAKE ALERT INACTIVE DROWSY ACTIVE SLEEP IRREGULAR SLEEP QUIET SLEEP DEEP SLEEP</p>	<p>The whole cycle of feeding and digesting mother's milk is what is the fully the breastfeeding programme</p>
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BREASTFEEDING IS NOT JUST EATING!

The whole cycle of feeding and digesting mother's milk is what is the fully the breastfeeding programme

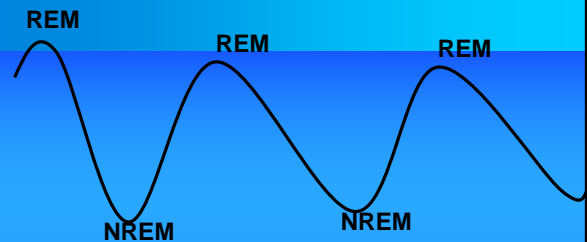


**SKIN-TO-SKIN
CONTACT
SHOULD BE
CONTINUOUS**

KMC AND SLEEP STUDY

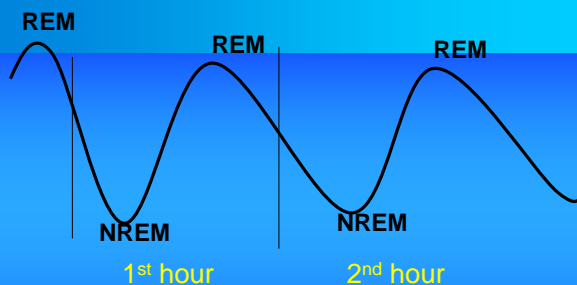
The basic rest-activity cycle for pretermatures and neonates (44-52 weeks post conceptional age) is 60-90 minutes long
Ludington 2003

Not so much duration, or density of any sleep stage, or number of sleep stage episodes, but, cycling between quiet sleep and active sleep is what is important

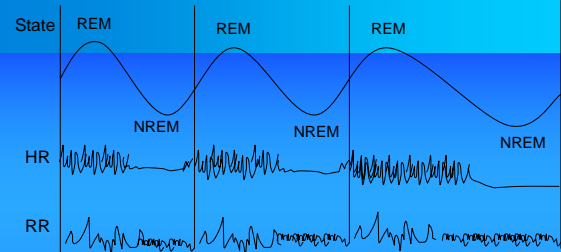


This is a healthy sleep pattern
This is a very good cycling pattern

(thanks to Susan Ludington-Hoe)

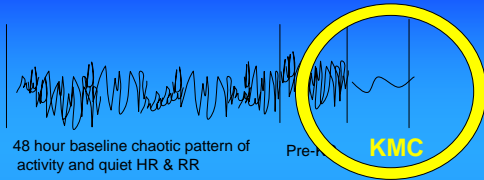


So in every hour, you would like to see an EEG pattern that shows this



REM Sleep is supposed to be somewhat active, so HR increases and RR is irregular

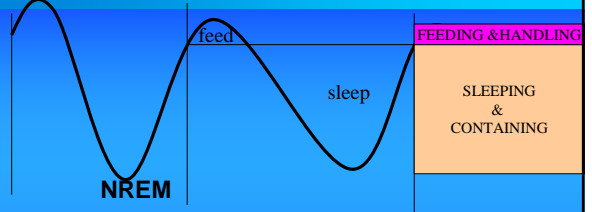
What do we see during KMC?



In KMC:

- Normal cycling
- Non-chaotic pattern

REM



During sleep time - the newborn should NOT BE HANDLED !!

KMC and neurobehavioural state organisation

State organisation is the ability to appropriately control the level of sleep or arousal.

Compared to incubator babies, KMC babies have

less deep sleep	(which is when apnoea occurs)
more quiet sleep	(which is when growth occurs)
less active sleep	(which wastes calories)
more alert periods	(which promotes bonding)
much less crying	(which is harmful)

BREASTFEEDING THE PREMATURE

The **ABILITY** to breastfeed is **INNATE**.
The physical **CAPACITY** to breastfeed may however be **insufficient in prematures**.

Full term babies need no help
Premature babies will need help.

Kerstin Hedberg-Nyqvist
described

“The development of
preterm infants’
breastfeeding behaviour”

Nyqvist KH, Sjöden PO, Ewald U.
Early Human Development 55 (1999): 247-264.

BREASTFEEDING THE PREMATURE

Premature babies will need help.

BERLITH PERSSON
has provided that help ...

PERSSON'S WHEEL !

Breastfeeding & Suckling

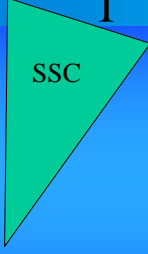
From 16 or 20 weeks gestation, the fetus is swallowing.

From 26 or 28 weeks gestation the fetus can SUCKLE

From 36 weeks gestation the fetus is able to SUCK

SUCKING and SUCKLING
sound same, but **VERY** different

Step 1 SKIN-TO-SKIN



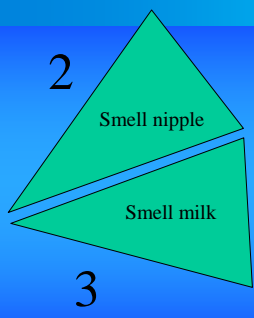
Continuous skin contact

The newborn must be in the right environment for the behaviours that it is capable of to be expressed. It requires protection from stress and provision of warmth.

KMC provides the “maternal nest”

Ideally this should be done on prematures **AT BIRTH**. However it can be done later, even with nasogastric tube providing expressed breast milk in the meantime

Step 2 and 3 Olfactory

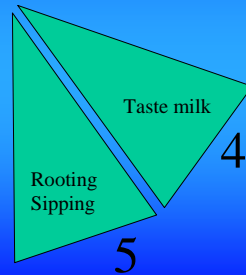


The first steps in sequence require smell of the nipple which may take longer in the premature, and then the smelling of milk.

Babies can identify smells and tastes from their time in the uterus in the mother’s milk!

Step 4 Taste

This is re-inforcing the smell. Fullterm seems to skip this!




Step 5 Rooting

These are mouth movements the normal sequence described in the full-terms.


Here the premature requires help, with position and “sipping” = feeling milk in mouth

Step 6 First suckling.



Key step, builds on steps 1 to 5. Must be awake and alert. Alert period is maximal at birth, and lasts 45 - 90 minutes. If missed then, will require feeding, and several hours delay.


Step 6 First suckling.



Note difference suckling vs sucking!
“ ... myographically distinct”

For late premature lactation, allow suckling to develop in successive alert periods, while feeding by tube.

Step 7 Latching & swallowing



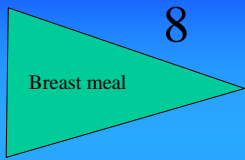
Premature is too physically weak to crawl to nipple, but if held to nipple will at this stage latch on.

Once latched, suckling follows.

Suckling squirts a controlled dose of milk to the back of throat, which is safely swallowed without any interference of breathing

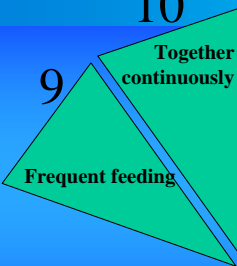
This is INNATE.

Step 8 First breast milk meal.



Steps 1 to 7 and on take place rapidly in the fullterm. They can occur in the first alert period after birth in a premature if allowed to, but may require a longer period of defined steps in successive alert periods. For late prem lactation, step 8 is the first time milk is swallowed Enough to feed the baby.

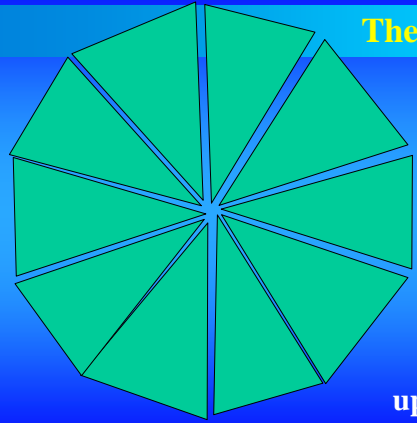
Step 9 Frequent feeding



In utero, baby is feeding Continuously. Demand feeding is NOT SUITABLE f or prematures. Feeds should be at most 2 hours apart.

Step 10 Together continuously

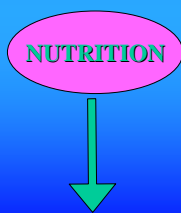
The wheel



is not round

Turns slow at first but then picks up speed!

BREASTFEEDING A PREMATURE



STEP 1 SSC
 STEP 2 ALLOW TIME
 STEP 3 State organisation; alert awake
 STEP 4 SMELL
 STEP 5 TASTE
 STEP 6 LATCH
 STEP 7 SUCKLE

Breast-feeding of Premature babies.

A fullterm baby NEEDS NO HELP to breastfeed (Does perhaps need help not to be hindered!)

A premature baby DOES NEED HELP !!

The constant sequence is however constant, but some minor changes will help:

Place the baby on mother's chest, not abdomen
 Allow longer for each step
 Recognise the steps, and assist where needed

Gut hormones.

(Uvnas-Moberg 1989)

20 different hormones
work in the gut –
regulated by the vagal nerve.

Each has a specific function.

Gut hormones.

"Bad guy" - SOMATOSTATIN:
inhibits gastrointestinal secretion
inhibits motility ,
reduces blood flow to gut
and absorption,
causes gastric retention,
vomiting, constipation.

SOMATOSTATIN:

inhibits the good hormones,
contributes to
slow weight gain.

At high levels also
inhibits release of
growth hormone.

It takes 30 to 60 minutes
to lower somatostatin
and other stress hormones

Babies need to have had a good sleep first.
They will only have a good sleep if given
continuous skin-to-skin contact.
Baby should be allowed to get to a state
of AWAKE and ALERT by itself.
ALLOW TIME → ...

Position baby for eye to eye contact,
and close the nipple for SMELLING ...

"Feeding cues" are any movements that make
up the global behaviour of breastfeeding.

Ziggy

... is able to
eat and purr
(and breathe) at
the same time !

Emma's cat :
"Zig-Zag Thomas"

Larynx meets uvula,
separate
airway & foodway

THE NEWBORN

also has a larynx that meets the uvula, designed to separate the respiratory tract from the gastrointestinal tract, enabling the newborn to feed and breathe simultaneously.

Apes (and all mammals) have a high larynx separates airway from "foodway"

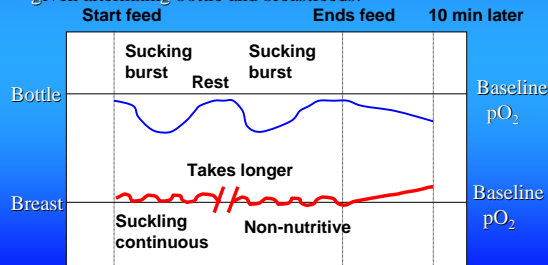
Human newborn ALSO !!

Only at 18 months does larynx start migrating, and ability to make more sounds develop → speech

From "Origins Reconsidered" Richard Leakey.

Sensitive Midwife - PREMATURE

Meier 1988
BOTTLE AND BREASTFEEDING IN PREMATURE
Prematures babies weighing 1300g and 34/40 PCA,
given alternating bottle and breastfeeds.



Sensitive Midwife - PREMATURE

SUCKLING uses the largest muscle in the baby's head, making the smallest movement

SUCKLING requires lots of tiny and weak muscles, making maximum effort,

... also causes hypoxia,
... and is **STRESSFUL!**

Bottle feeding requires **SUCKING**,

which requires completely different muscles, and does NOT allow co-ordination between swallowing and breathing. Bottle feeding causes **STRESS** in prematures, and relative post-prandial hypoxaemia.



SUCKLING - in and of itself, apart from nutrition intake - has beneficial effects on both mother and baby.

A normal sleep cycle for a premature is **60 - 90 minutes**

A babies stomach empties in **60 - 90 minutes.**

The volume of a single letdown reflex is

30 - 35 ml

The volume of a week old baby's stomach is

30 - 35 ml.

Peter Hartmann

has measured the volume of milk in a single let down reflex.

Quite regardless of breast-size ... amazingly constant:

a let down of milk is 30 - 35 ml.

One feed every 90 minutes
= 16 feeds/ day

16 feeds of 30 mls each
= 480 mls

480 mls per day for 3 kg baby
= 160 ml/kg/d

= requirement of baby.

FREQUENT FEEDS !!!!

The volume of a week old baby's stomach is

30 - 35 ml.

D7 30ml = pinpong ball
D3 15ml = shooter marble
D1 3-5 ml = small marble

The volume of a week old **PREM's** stomach is ???

10 - 15 ml.

D7 10 ml ? =
D3 5 ml ? =
D1 1-2 ml ? =

Overfilling ????

FREQUENT FEEDS !!!!

In anthropological studies, where infants are carried constantly, and have free access to the breast, they will breastfeed every hour.

Surmise - Cholecystokinin, oxytocin
- Behavioural synchrony.

*In the Muslim faith
context of divorce ...*

**“The mother shall give
suck to their offspring,
for two complete years”**

- Quran Surah II (Baqarah) verse 233

*suckling rights of the infant over ride
father’s rights to child.*

BRAIN GROWTH & BREASTFEEDING

*“suckling rights of the infant over ride
father’s rights to child.”*

NEWBORN’S CHOICE, or FUNDAMENTAL RIGHT:

Exclusive breastfeeding 6 months

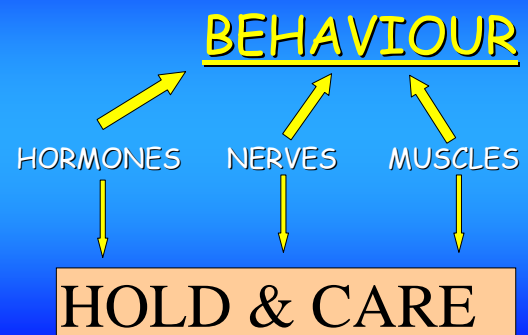
Ongoing breastfeeding 2 years

Personal testimony of a mother
at International KMC Workshop

**“The instinct of a
mother to hold and
care for her baby
is primordial and
primitive, and an
overwhelmingly
powerful feeling.”**

Jane Davis, Bogota, Dec 1998

Mother’s have an innate, inborn



**MOTHER
is the
Only**

**Appropriate
ENVIRONMENT**

**MOTHER’S
MILK is
the only**

**Appropriate
FOOD**

FETAL BRAIN DEVELOPMENT

The first 10 – 14 weeks, fetal brain growth is determined by genes (the DNA)

Thereafter, brain growth is an active process. The neurons extend their axons, and make synapses. Each axon make thousands of synapses, again by “firing”, which is stimulated by sensations.

Brain growth depends on experiences !!
AND ON MOTHER'S MILK.



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