ASPECTS OF ADAPTED NEW BORN CARE IN RURAL HOSPITALS

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Rijswijk, The Netherlands, Oktober 2005

CONTENTS

1. THE NEWLY BORN IN THE TROPICS

General aspects

The average birth weight of children in the tropics is around 3000 gram. (Van Eijk, 1986)
This average birth weight in the Netherlands is 3500-3750 gram. (Reerink, 1989)

Premature

The World health organisation (WHO) still uses the definition of the Finish Paediatrician YLPO from around 1900: A birth weight of < 2500 gram is considered as premature.
However, real premature are those born with a gestation of age < 37 weeks. In the tropics this is most of time unknown.
So, a birth weight < 2500 gram is considered as a Low Birth Weight (LBW). This can be the case because of a real premature birth (< 37 weeks) or because of a weight *'small for the gestation of age'* (SGA), a symptom of an intrauterine growth retardation.
The number of premature birth in the Netherlands and other European countries is 5-7 % of the total birth. But in the tropics the number of premature birth is much higher: Cameroon 13, Cambodia 18, Afghanistan 18, bangladesh 30 (Van Eijk, 1986; Save the Children, 2001a)

Birthweight

The average birth weight in the tropics is around 3000 gram. In our opinion this should be considered as *small for gestation of Age(SGA).* This thought is in line with the advice of Traditional Birth Attendants (TBA) to eat less during the last months of pregnancy to avoid a difficult labour because of a heavy child. (Lefeber & Voorhoeve, 1998)
To see birth weights in the tropics as SGA is also in line with the findings about the average **head circumference of newly born = 35 cm.** (Han-Yo IE1989) This is just conform the WHO reference. It is the expression of the fact that 'nature' safes the important cerebrum in a period of a shortage of food.
The Chest circumference in a newly born and during the first six months is approximately two centimetre less than the head circumference. If the head circumference is more than two centimetre above the chest circumference we should consider a hydrocephalus.

The Mid Upper Arm Circumference (MUAC) in newly born. (Benzler,Sauerborn,1989)

Just as in older children this should be measured at the left arm.
Newly born with a birth weight around 3000 gram have a MUAC of 10 cm.
A MUAC of 9 cm in newly born is an expression of a LBW baby.
Measuring of MUAC in newly born is indicated in all circumstances that weighing is not possible.

Birth weight and child mortality

Child mortality increases with a decrease of birth weight.
This is the reason why all LBW children, either premature or SGA are at risk and need special attention. (Van der Mei, 2005)
Van Eijk (1986) reported an increase of birth weight after 4 or more antenatal visits.
There is also *a link between maternal malnutrition and child mortality*. (Save the Children 2001b) Alisjabana (1993) saw in Jokjakarta region, Indonesia an increased risk for a LBW by a maternal malnutrition measured with a MUAC < 22 cm during antenatal clinics (ANC). This method was even better than the more complex weight/height measurement. So, a MUAC < 22 cm was an indication to advice for a hospital birth. As a result of this study MUAC measurement should be a routine at ANC for the early detection of LBW.
Low Birth Weight should be prevented with all possible methods. (Save the Children, 2001b)

The mortality around the period of birth is expressed as
Peri-natal Mortality = the number of stillbirth + the first week mortality of the total births.

Figures about the first week mortality are never complete in rural circumstances where the mother stays only 1-2 days after delivery in a hospital or health centre. In that case, that is fast everywhere in the tropics, stillbirth is the most accurate part of peri-natal mortality. (Voorhoeve1989) (See Fig.1.1)

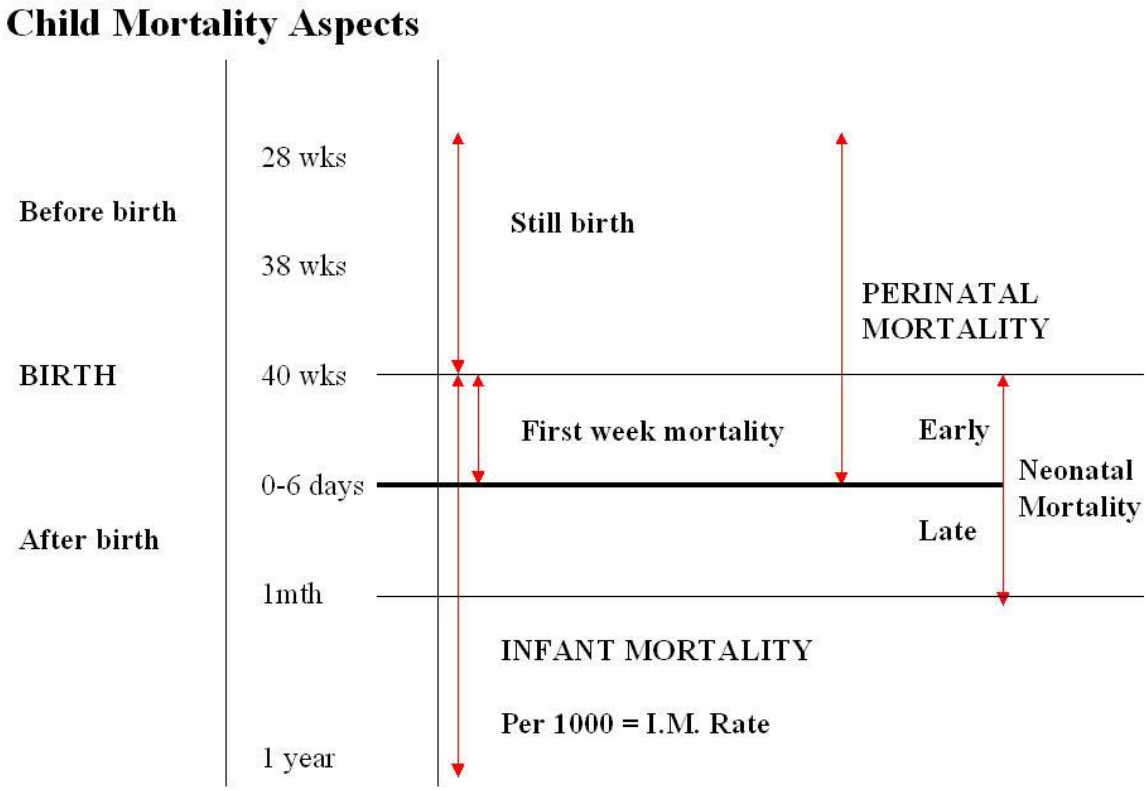

Figure 1.1. Dfferences between perinatal and infant mortality

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2. CLINICAL ASPECTS OF THE NEWLY BORN

Observation of the behaviour of the newly born gives information about risk factors for the future. (Voorhoeve,1974, 2000)

The APGAR score

Immediately after birth the observational score of the American Anaesthesiologist Virginia APGAR is used, fast everywhere. A figure 0= bad or not visible, 1 = poor or 2 = good are given to each of the 5 items: colour of the skin, heart beat, breathing, muscle tonus and irritability of reflexes.(Table 2.1)

Table 2.1
APGAR SCORING CHART

Sign	0	1	2	1min.	5 min.
Heart Rate	Absent	Slow < 100	> 100		
Respiratory effort	Absent	Weak cry Hypoventilation	Good strong cry		
Muscle Tone	Limp	Some flexion of extremities	Well flexed		
Reflex respons					
1. resp.to catheter in nostril	No respons	Grimace	Cough or Sneeze		
2. Tangential foot slap	No response	Grimace	Cry and withdrawl of foot		
Color	Blue, pale	Rosy pink Extremities blue	completely pink		
			Total		

Around 70% of the children are born in a good condition with a score of 8-10. About 24% of children are born in a poor condition with a score of 5-7; mostly they improve after a 5-10 minutes. Only 6% of children are born in a bad condition with a score of 1-4. They need special care and stimulation.

A low APGAR score is seen in premature born and others with a low birth weight and after a difficult long labour. In all those cases there is an increased mortality. (See Chapter 16)

It is sad that: "the lower the birth weight, the lower the APGAR score". (Visschedijk J. 1992)

The first cry

The contact with the cold air after birth stimulates crying of the newly born.

The first cry after birth should be < 4 minutes!

Crying > 4 minutes means a poor condition often an expression of asphyxia or shortage of oxygen during the process of birth.

The New born with an average birth weight

This child looks well nourished. It is usually active and moves arms and legs but not yet symmetric. In prone position the legs are the first week still in flexed position and the head is slightly raised from the pillow.

In supine position are the arms stretched in the direction where the child looks at. This is an expression of the '*Asymmetric Tonic neck Reflex' (ATNR).* This ATNR disappears after the child is six months old. (Bilo e.a.1999)
To survive each new born has reflexes to seek the mother 's nipple, to suck and to swallow the mothers breast milk. (Bilo e.a. 1999)

The new born Small for Gestation Age (SGA)

Such a child looks not well nourished. If you keep the child is stretched you see plaits around the arm-pit and the buttocks. The skin is dry and there is no "vernix caseosa".
The reflexes to survive are present.

The premature born with a gestation < 37 weeks

If born between 35-37 weeks of gestation there is usually a white wax on the skin (*'vernix caseosa'*). It nearly moves arms and legs. And the legs are not flexed as in the appropriate born child.
If born with a gestation of 30-35 there is still no vernix caseosa and the legs may look swollen from oedema. The birth weight is usually < 1500 gram and the reflexes to survive are often not yet present. Such a child needs feeding by a Nasal gastric Tube (NGT).

Body composition and body seize of children

It should be realised that '***a child is no small adult'.***
In young children the head is relatively large1/4 of the total body seize. In adults the head is only 1/8 of the total body seize.
And the extremities are relatively short compared with the trunk
Children easy loose their body warmth and get cold.
In adults 60% of the body is water, but in children 80% is water and this water is mainly extra-cellular and can easily be lost.

The first urine and stool

In general can be sad that the newly born child pass the first urine and stool within 24 hours. More in detail this is given by the research from Ogala e.a.(1986) from Zaire, Nigeria. (Table 2.2)

Table 2.2
TIME OF PASSING THE FIRST URINE AND STOOL IN NEWLY BORN N=1000 (in percents),Ogala,1986

Time in hours	Urine	Stool
0 - 6	42	56
7 - 12	76	81
13 - 24	95	96
25 - 48	99.8	99.8

The eventually pass of a stool (meconium) before delivery should be considered.
If a stool has not passed < 24 hours or ultimo < 48 hours a serious condition should be considered. Inspection of the anus can learn about a perhaps closed anus (anal atresia).
If this is not found other forms of intestine obstructions e.g. the disease of Hirschprung should be kept in mind. All those cases need paediatric surgery in an academic hospital.
Not passing urine is even more serious. Are the kidneys present? And how is their function?

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3. ADAPTED NEW BORN CARE IN RURAL HOSPITALS

In adapted new born care he following aspects are of great importance:

1. Keep the baby warm

Young children and certainly, LBW infants easily loos their warmth. So, keep them warm!

a. With the **KANGOEROE method**: care of the LBW child on the mother's chest, or in Europe also on the fathers chest. In this way, the LBW infant is not only kept warm, but the skin-to- skin contact also stimulates the respiration and certainly in premature babies there are less episodes of stop breathing or apneu.
Certainly in rural hospitals this is a kind of "high neonatal care" as the mortality of premature babies is reduced. (See table 3.1 Gardeyn, RJde, 1989, Nijenhuis e.a.1993)

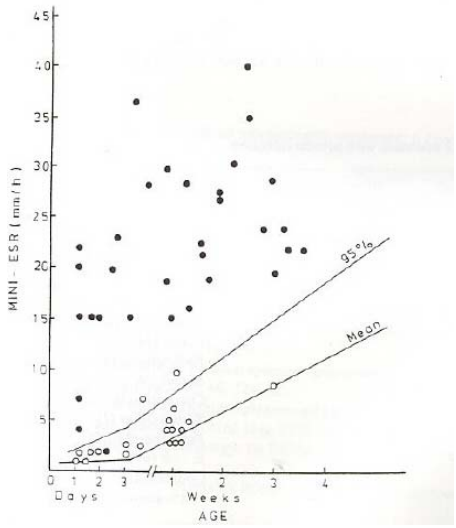
Table 3.1
MORTALITY OF PREMATURE BABIES ACCORDING TO WEIGHT
with and without Kangoeroe method (Gardeyn,1989)

Weight	Kangoeroe		Controls	
	N	%	N	%
< 1000	3	100	3	100
1000- 1499	14	57	14	85
1500- 1999	33	24	33	30
Total	50	38	50	50

b. In the **Adapted incubator of Van Hemel**. (See Chapter 4)

2. Check the temperature with theThermo SPOT indicator *) or an adapted but expensive glass/mercury thermometer.
Preferable three hourly, certainly if there is no growth of the baby.

- The normal temperature of a newly born is 36.5 - 37.5 Grade Celsius.
  A temperature < 35.5 C. is under temperature!
- Either by a too cold surrounding. Here, there is a need for an incubator!
- Or it is a sign of infection! Check the White blood cells (leukocytes):
  > 10.000 /mm3 is a sign of an infection and an indication for antibiotic treatment.
  Check also the mini-Erythrocyte sedimentation Rate (mini-ESR): herewith, infected patients are in 97% correct identified if > 15 mm. (Okolo e.a. 1988) (Fig.3.1.)
- A temperature > 38.5 = 'fever' either a sign that the surrounding is too hot, or more often a sign of a shortage of fluids! ('*Fever of thirst'*), or an infection.
  Check if the napkins are wet at least 6 times a day!



Figuur 3.1 Mini ESR in 32 neonates with proven infection (●) and in uninfected controls (○)

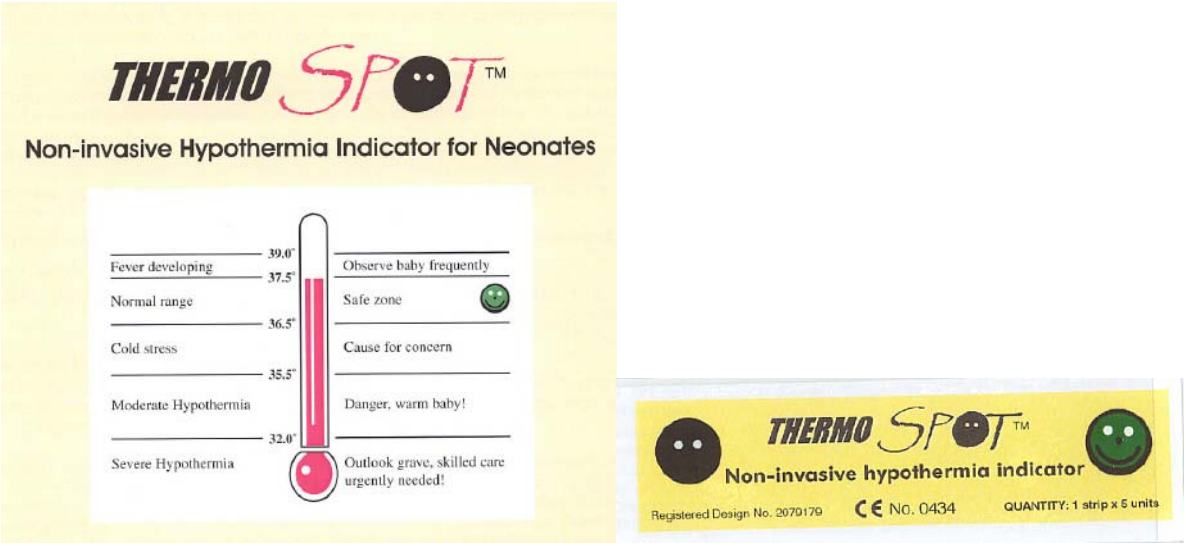


Figure 3.2 Thermospot

*) The Thermo Spot is a black spot with two white dots. The spot is like a smíling face if the theperature is in the safe zone between 16.5 and 37.5 C. The spot darkened if the temperature is < 35.5. The spots can be placed in the axilla or over the liver. (JDB Zeal, 2005; Morley D, Blumenthal I. 2000)

3. **All children at risk should receive antibiotics. (Steidel 2004)**
   That is with a sign of infection and if there is no growth despite of sufficient food. An Antibiotic of choice is Ampicilline 25-50 mg three times daily (TDS).
4. **Feedings "on demand", at least three hourly**
   Three hourly feedings are according the periods of sleep of the baby. Each young child weeks up spontaneous after three hours to suck at the mother's breast. (Bilo et al,1999) **Breastfeeding "on demand"** that is usual possible in all babies with a weight > 1500 grams.
   In LBW infants < 1500 gram if sucking on the breast is not yet possible it is recommended to give feeding by a naso-gastric tube (NGT)

Experiences in many rural hospitals in the tropics has learned that all newly born baby's, even with a birth weight of 1000 gram or less, should start with oral feedings. As the very small

ones (<1500 gram) are not yet able to suck at the mother breast, we must start with feedings by a Nasal-gastric Tube (NGT). There is ***no need to start Intra venous feeding of newly born babies in rural hospitals***! This is even dangerous and should be avoided.
Research has learned that early oral infant feeding keeps the gut in a better condition. (Van Goudoever e.a.2002) Herewith, the dangerous situation of neonatal enteric necrosis (NEC) should be avoided. This is indeed a rather rare condition in the tropics that we never have seen there.
And ***all newly born children should get three hourly feedings, eight times a day.*** One hourly feedings is not reliable in rural circumstances. A scheme for infant feeding based on practice in rural circumstances is given in Table 18.2. A general advice is to increase the amount of feeding as fast as possible, however be careful and observe a distance of the stomach and avoid vomiting.
The total amount of food per 24 hours should not excite the 200ml/Kg bodyweight. (Table 3.2 and 3.3)

Table 3.2
SCHEME OF INFANT FEEDING: "8 feedings - 3 hourly"

Day	Amount of feeding	Kind of feeding
1	4 x 5 ml + 4 x 10 ml	glucose water 5%
2	8 x 10 ml	glucose water 5% + EBM
3	8 x 15 ml	glucose water 5% + EBM
4	8 x 20 ml	EBM *
5	8 x 25 ml	EBM

*) EBM = Expressed Breast Milk

Table 3.3
TOTAL AMOUNT OF FOOD PER BODY WEIGHT
For premature babies

Body weight	Total amount
1000 gram	8 x 25 ml
1200 gram	8 x 30 ml
1400 gram	8 x 35 ml
1600 gram	8 x 40 ml
1800 gram	8 x 45 ml
2000 gram	8 x 50 ml

5. **Daily weighing is essential to check the growth!**
6. **Adapted neonatal care can best be given by simple trained "mothercraft nurses".**

This are selected ward attendants with a training of one year in the aspects of care for the newly born. (van der Mei, 2005) Adapted neonatal care should not be given by qualified nurses, certainly not by extra trained for neonatology.

Summary - Adapted Guidelines for pre-matures
The Premature ward

1. All children less than 2000 grams are admitted with their mothers and registered as 'pre-matures',
2. All pre-mature children get primary the *Kangaroo-method* of skin-to-skin on chest or abdomen of the mother *alternated with the van Hemel incubator* to give the mother some rest.
3. **General measures in premature ward:**

a. all windows to be kept closed
b. all wash hands before handling each child
c. check of each child - the temperature, rectally at least 6 hourly!
d. the body weight, first week daily then 3 x weekly and carefully, exactly till two figures behind KG (f.e. 1.62 kg) or preferrable in grams.
e. Register temperature and body weight on special chart for each child
f. weekly health education to the mothers
g. if any problem arises: warn Medical Officer

On admission:

4. Explain Kangaroo-method to the mothers,
5. Take body weight and temperature carefully and register it exactly.
6. All premature children get Vitamine K 1 mg i.m.
7. Naso gastric tube (NG) on indication and decision by Medical Officer (by preferable in children < 1500 gr., but always < 1000 gr.)

Feeding schedule (See table 3.2 and table 3.3)

- Children > 1500 gram preferable breastfeeding 'on demand'.
  NB. Remember that in most communities mothers are just allowed to give breastfeeding after the child got first a 'symbolic' food of usually something of the local staple food or something delicious like honey, a drop of palm wine among the Yoruba's in Nigeria
- All children < 1500 grams get 8 feedings, 3 hourly:
- First feeding: one hour after birth: 5 ml glucose 5%
- Day 1: 4 x 5 ml + 4 x 10 ml glucose 5 %
- Day 2: 8 x 15 ml glucose 5 % + available EBM
- Daily increase with 8 x 5 ml; maximum = 200 ml/Kg
- [1000 gram = 8 x 25 ml; 1200 gr. = 8 x 30 ml; 1400 gr. = 8 x 35 ml; 1600 gr. = 8 x 40 ml.]
- From day 2 onwards: if possible 1/2 glucose 5% and 1/2 EBM
- Born AM: day of birth = day 1, next day = day 2.
- Born PM: day of birth = day 1, next day = also day 1.
- New feedings: start each day at same time f.e. at 3 PM.
- Daily registration of each feeding at the special (feeding) chart of the child!
- Start breastfeeding certainly with 1500 gram.

NB. ***Give all feedings always slowly, never fast and at once***
If vomiting or a swollen abdomen: stop feeding at once!
And no more increase of food!

If a swollen abdomen: (with visible intestines and or vomiting)
certainly after some loose stools**:** (= pseudo-ileus):

- give KCl 10 % 5 ml tds

Chloroquine profylaxis for all pre-matures

- start on day 2 with 10 mg chloroquine,
- further: every Sunday 10 mg. (110 mg chloroquine = 1/4 tablet of 50 mg base)

If Fever:

- Start with blood-slide to lab.
- Cheque fluid intake and diuresis. ("*Fever of Thirst*")
- Antibiotic of choice is Ampicilline 25-50 mg tds

If Malaria (during chloroquine profylaxis):

- Quinine 10 mg/Kg tds
  No Fansidar or Metakelfin in pre-matures!

If pussy eyes:

- Swab immediately to lab.

- Start tetracycline eye ointment QID. (don't wait for lab result or doctor)

No Antibiotic profylaxis: Treatment should just decided by doctor.

If Diarroea:

- With each feeding 5 ml ORS extra to be given by the mother with a spoon.

If jaundice: (Yellow eyes: sclerae!

- Put mother and child near the window.
- **Or: give photo-therapy** by TL-tube on the van Hemel incubator.
  (With protection of eyes and head with aluminium folie)

Other measurements:

- **Immunisations**
  Start with DTP at a body weight of 1800-1900 gram
  give before discharge: BCG and Oral Polio(OPV).
- **Haemoglobine:**
  Cheque HB weekly or at least before discharge.
  If HB < 8 gr. %: give blood-transfusion, preferable **intra-peritoneal**
  It is easier and much safer to give blood from the mother if she is HIV negative, than there is no blood-grouping or cross-matching necessary!
  Give 20 ml/Kg, Add first 0.5 ml sodium citrate.
- **Discharge:**
  When at least 2000 grams
  And the child is healthy and fully sucking from the breast.
- **After Discharge:**
  To come back after two weeks at doctors office to cheque Body weight, HB and development. Further monthly at MCH clinic of hospital or locally
- **After Caesarian Section and normal body weight:**
  Give children to the mother as quick as possible. This is essential for breast feeding (after the 'symbolic' feeding!) and the Kangaroo- method.

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4. AN ADAPTED INCUBATOR FOR RURAL HOSPITALS IN DEVELOPING COUNTRIES - THE VAN HEMEL TYPE OF INCUBATOR

Introduction

Until recently, there was just little attention for the care of newly born babies in developing countries. People are used to the fact that a low birth baby would easily dye.
Presumable, as a result of the great number of health workers from the western 'world' who went to those countries, there is now more attention for new born care in the developing countries. But the great attention for neonatology in paediatric literature of the western world has certainly also contributed to the recent development of newborn care in developing countries.
However, the introduction of the western methods of newborn care, specially the technologic advanced incubator was often a failure. They are not only too expensive (> 10.000 Euro) for the low budget countries, but also technological too advanced to handle in a simple way. Beside that, in case of a technical problem, there are no spare parts available and there are no technicians who can handle those advanced incubators. So, those incubators are often used in a wrong way. (Fig.4.1)

Figure 4.1 Imperfect use of industrialised incubator in rural tropical hospital.

The adapted incubator

As early as 1968, the first author working in Uganda at that time developed an adapted incubator with *simplicity and transparency as an objective for heating, humidity and isolation.* The incubator is in fact a wooden box with at the front- and topside transparent "perspex" to have a good view on the child. (Fig.4.2)

Figure 4.2 Van Hemel adapted baby-incubator

To keep the baby warm, special during the cool nights, *heating* is realised with three ordinary electrical bulbs of 75 Watt each. They produce 95% heat and only 5% light and they can best be obtained locally because the connection of the bulbs is different in the English spoken and the French speaking countries. The heating is based on *the chimney principle* air passed the warm bulbs and afterwards a humidified rack with water and in it a long wet strip of cotton (fig.4.3).

Figure 4.3 Huminified rack with water in Van Hemel adapted baby-incubator

Herewith, a *high humidity* (> 80-90%) can be realised. This is essential for a newly born baby, beside the physical warm environment. By the *chimney principle of air ventilation* there is in the incubator no fan, no noise and no re-circulation of air (Fig.4.4).

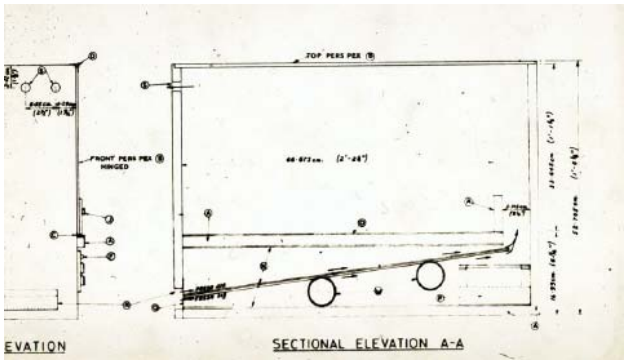

Figure 4.4 Chimney principle of air circulation in the Van Hemel adapted baby-incubator

A *thermostat* situated at an air outlet regulates the temperature control. This is the most vulnerable part of the incubator. Nurses must be informed how to use the thermostat. At the

inner back site of the incubator a *thermometer* is fixed to read the temperature and beside the thermometer a *hygrometer* shows the humidity within
Tests by a bacteriologist learned that the van Hemel incubator has less bacterial growth than the conventional industrial ones because there is no re-circulation of the air. So, the baby is well isolated in the van Hemel incubator. For routine nursing care, there are arm inlets at the front side with "sleeves". The nurse or the mother, after cleansing their hands, can through the "sleeves" handle the baby as much as they wants. Herewith, the mother-child contact is realised. Nurses say spontaneously: "they like the simplicity and the ease of regulating the temperature of the babies"

The Availability

The adapted van Hemel baby incubator is available as a *construction kit* and should be *assembled locally*. Here for a *photo booklet of visualised Assembly instructions* are send with. The kit is produced as a non-profit volunteer product at the cost of 280 Euro.
Maintenance is simple done by a local technician because the incubator is assembled locally by the local technician.

Evaluation

Around the year 2004, we have now about 36 years of experiences with the technological adapted incubators. Even though this adapted incubator is never promoted, in the year 2004 over 1000 of them are distributed to 80 countries. (Fig. 4.5)

Figure 4.5 Van Hemel incubators in use in Kabul Hospital Afghanistan (2003)

In Uganda and Kenya are 130 of them situated. During a survey (by van Hemel) in April 2002 to those countries we saw that after 28 years they still can continue their operations. We just advice new thermostats after 15 years as we saw too many spider webs between the electrical contacts.
Local imitations of this incubator are found and they have our full approval. The thermostat is modified industrial one which we make available to others for US$ 40.

Paediatric experiences

- Both for mothers and nurses in developing countries it is a strange experience that a baby should be undressed, naked go into the incubator. We had to explain that inside the incubator is the right temperature of 36-37 grade and that baby clothes should cause overheating of the baby! This should be avoided of course! And that an undressed baby gives a better observation.
  A baby incubator is specially used for babies with a low birth weight < 2500 gr. or a very low birth weight < 1500 gr. All children with a birth weight < 2500 gram are usually described as 'premature'. This is according to the old definition of the late Finish paediatrician YLPO around the year 1900. But a number of the children with a low birth weight are not just premature, but they are certainly also "small for their gestational age" (SGA). The number of 'premature' birth in developing countries is at least the double of

that in the western world. There 5-7% of the babies are premature born and in developing countries this are 15-20% or even more, depending of the season.(Van Eijk, 1986, Bantje,1982)

- In the first years that our adapted incubator was in use in Entebbe, Uganda, the growth of the small premature babies (< 2270 gr) was measured carefully and compared with figures of premature born babies (<2500gr) from a hospital in Amsterdam. Child growth in Uganda and in Amsterdam was rather similar. It should be considered that the babies in Uganda just received Expressed Breast Milk (EBM) and the children in Amsterdam usually get artificial prepared powdered milk.

The adapted incubator in the Netherlands

The adapted incubator that was first constructed in Entebbe, Uganda is later and farther developed and constructed in the OLVG Hospital, Amsterdam. Here, the already mentioned bacteriological tests are performed

During the years 1968-1974 the van Hemel incubator was used at the newly built Rijnoord Hospital in the village Alphen aan den Rijn (Rijn & Gouwe1973). In the beginning the nurses preferred the technical advanced incubators and they had some problems to accept the simple ones. But soon they were used to them and they realised the advantage, special for simple technical assistance by the own hospital technician. And the last were very enthusiast that they could provide this technical help them self in stead asking for a technician from the factory of the technical advanced incubators.

Photo therapy

At that time it was recognised that the jaundice of some newly born babies disappeared by sunlight, especial the UV part of that light. To practise it in a hospital situation special UV lamps were produced by the industry. At that time for about f 800,-. Because the jaundice also disappeared by ordinary light we suggested the use of an ordinary TL lamp. And with one of the hospital technicians (J. van Gorp) we developed a wooden photo therapy box with just two TL lamps that fitted on the van Hemel incubator. The cost was just f 70,- . The distance between the TL lamps and the child should not be less than 45cm. Both the van Hemel incubator and Voorhoeve's photo - therapy box were presented at the special MEDIA '73 exhibition "to doctors by doctors". How photo - therapy reduced jaundice in 3-4 days is presented in Fig. 4.6. and Fig.4.7.

Figure 4.6 and Figure 4.7 Phototherapybox up Van Hemel adapted baby-incubator
Used in 2004 (left) and in 1973 (right)

To make photo -therapy safe even in rural circumstances the following instructions are given:
The distance between baby and the TL-tubes should be at least 45 cm.
Cover eyes and the head of the baby, for example with aluminium foil.
Each baby should be exposed no longer than 3-4 hours a day.
The baby should be given extra fluid intake.

In general it will take 3-4 days for blood bilirubine to normalise.

The incubator versus the "Kangoeroe" method

In the eighties of the 20th century we learned from Bogota in Columbia that premature babies could be kept warm on the mothers breasts. In that way they had even less periods of apneu. So, this method is since than preferred above an incubator and even used in the Academic Hospitals of Amsterdam (AMC).(de Leeuw, 1987) However, it is often difficult for mothers to keep a baby during 24 hours a day as a 'Kangoeroe' baby on their breasts. Certainly during the night it is more comfortable for the mother with her baby in an incubator. In case of jaundice and photo - therapy is necessary this can best be given in the van Hemel 's incubator. But if a baby in the incubator has too many periods of apneu or "stop breathing" it is recommended to introduce the Kangoeroe method for some hours a day as well.

Conclusions and summary

1. It is our experience that the expensive industrial incubators are not at all applicable in rural hospitals in developing countries.
2. The adapted van Hemel incubator is rather appreciated in rural hospitals. After 36 years there are over 1000 distributed around the world in Africa, Asia and Latin America.
3. It is a great advantage that the adapted van Hemel incubator can be assembled and if necessary repaired by the local hospital technicians
4. Together with Voorhoeve's photo therapy box the van Hemel incubator can be used if phototherapy in jaundiced babies is necessary.
5. Even if the Kangoeroe method is accepted by the mothers and in use, the adapted incubator is necessary to release the mother, special during the night.
6. Naso -gastric Tube feeding is also easily possible in the van Hemel incubator.
7. It is our advice to avoid intravenous fluid in rural hospitals.

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Abstract
The technological incubator of the western countries is not suitable and too expensive for developing countries. In 1968 van Hemel as a hospital practitioner in Uganda, constructed an adapted incubator with transparency for heating, humidity and isolation. Ever since, in 36 years, up to 1000 are distributed as a package to Africa, Latin America and South East Asia. The local technician should do the reconstruction of the incubator. The price is now less than 300 Euro.
In 1972, Voorhoeve used the van Hemel incubator in his paediatric department in the Netherlands and constructed a box for Photo- therapy in jaundiced baby's that fitted on top of the van Hemel 's incubator. In 2002 a new version is ready for distribution over the world. Even now the Kangoeroe method is recommended for premature babies, there is a need for an adapted incubator to release the mother at night. A scheme for adapted infant feeding in very Low birth weight infants is also presented.
Keywords: adapted incubator, heating, humidity, photo- therapy, adapted infant feeding

5. FIRST FEEDING PRACTICES IN NEWLY BORN BABIES

Introduction

Personal experiences in the past with first feeding practices in newly born babies are described from West European countries and afterwards from the present experiences in tropical countries.

In the past in Western Europe

As a medical student after World War II and during my paediatric training in the mid-fifty's of the 20th century, *we have learned not to feed a newly born baby before 24 hours after birth.* And in premature born babies we even had to wait for 48 hours. It is remarkable that we never saw any problem of this custom. All babies have survived it.
And before it was allowed to begin with milk feedings, by bottle or by breast, it was obligator to give some water with a teaspoon to detect an obstruction or atresia of the oesophagus.
This were the first feeding practices in the mid-fifty's of the 20th century in West European countries. The following years the first feeding time is gradually reduced from 24 to 12, 8, 6, 3 hours to zero. (Fig.5.1.)

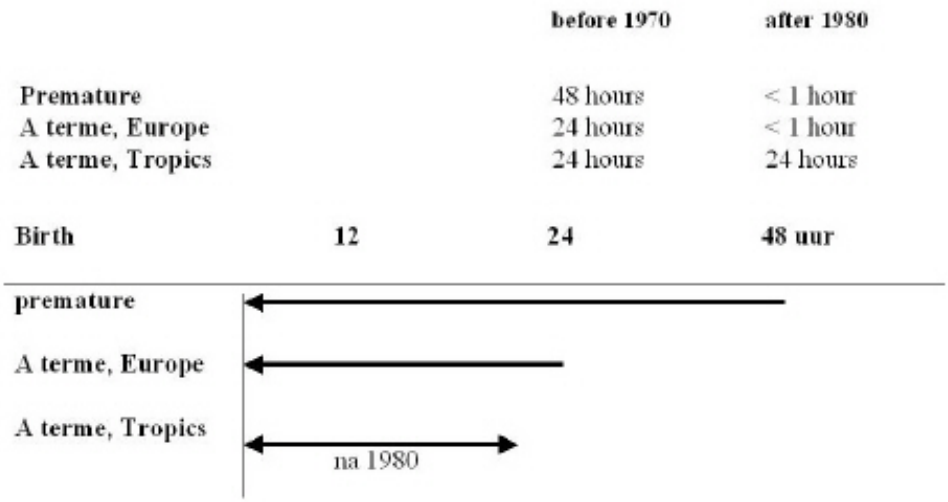

Figure 5.1 Evolution of first feeding times in the 20Th Century

In the early ninety's newly born babies were allowed to take the nipple of the mothers breast immediate after birth, even before the umbilical cord was cut. This is in line with the reflex of all mammals to survive after birth: 1) seek the nipple of the mother's breast, 2) start suckle and 3) swallow. (Bilo RAC et al 1999)

The present first feeding practices in Tropical countries

In tropical countries fast all mothers give breastfeeding to their babies. Not to give breastfeeding is a stigma for the mother. Should she have the HIV/AIDS infection? However, fast no mother starts immediate after birth with the breastfeeding.
In many anthropological papers it is mentioned that mothers does not like the first breast milk or *colostrum*. It should poison the child. Others think that the mothers just imitate the old custom of European mothers.
But, we are informed that mothers are just allowed to start breastfeeding after the newly born child has first tasted some of the local staple food or some local delicious like honey or palm wine. It is usually the father who gives something of the local delicious or staple food.

The *Papoea's* in the Central highlands of New Guinea or Papoea let the newly born taste something of pork or pig's meat if that is available, usually only ones a year after a pig's festival. Otherwise the child should taste something of the sweet potato or yam. In the coastal areas of Papoea the child should taste some sago-porridge or *'papeda'*. (Voorhoeve1965) In Indonesia, Thailand, Vietnam and other countries of South- East Asia the newly born children should taste some rice. Among the *Yoruba* population of Nigeria, West Africa it is the custom that a newly born child should get a few drops of palm wine before the mother can start breastfeeding.
In fact it is incorrect to speak of first feedings as the child taste only the local food. So, we see it as a '***symbolic feeding'*** and practice.(Lefeber & Voorhoeve, 1998,1999)
More examples of those ***symbolic first feeding practices*** are summarised in Table 5.1
Here, we can add the experiences of a gynaecologist who delivered in the Netherlands the wife of an Egyptian man. As the baby was born the Egyptian father came in the delivery room with *dades*. He put one *dade* on the lips of his newly born child. After that the mother was allowed to start breastfeeding (DJ Voorhoeve-den Hartog 1997- personal communication).

Table 5.1. 'Symbolic' first feeding practices for new born babies in tropical countries

	Country	People	First food	"reason"
Africa	Egypte		dades	to learn the taste
	Ghana	Asante	gin; rum; lime juice	to clear the infants throat
	Nigeria	Yoruba	palm wine	to clear the infants throat
	South Africa	Pedi;Zulu	watery porridge	to clear the infants bowel
		Sotho	cow's milk; water	from meconium
	Zambia	Lozi	light beer	
	Mbunda		Mustard oil	to clean the intestine of Meconium
Asia	Bangladesh		Honey; sugar Sugar water	for ritual or medicinal purposes
	India		Honey; water Castor oil; herbs	to clean, purify the body to remove the fluids ingested during birth
	Thailand	Karen	riceto	learn the taste
	Indonesia		honey; coconut/rice water	to learn the taste
	Papoea	Papoea's		
		low land	sago; sago porridge	to learn the taste
		high land	taro; pork fat	to learn the taste
Latin America	Bolivia		wine; cow's milk water with herbes or salt; coffee	
	Jamaica		mint tea; castor oil	to cough up mucus
	Haïti		castor oil	to get meconium out
	Guatemala	Maya's Latinos	tea; boiled wine; anise sugar; onion stalk; Garlic salt; tea of 'chicoria'.	

In Ethiopia the "*symbolic feeding*" is called "*pre-lactal feeding"*. Here the child "food" for even the first one or two days is then some water with the local cereals.(Z.Getahun, 2005)

Discussion

In the majority of the non-western countries 'young' mothers are not allowed to start with breastfeeding of their newly born baby before this child has tasted something of the local staple food or other 'symbolic' or pre-lactal feeding. This should preferable be given by the father. So, it takes sometimes even two days before the newly born get some real food. This is even in line with the old European custom to start feedings after 24 hours. (See Fig.20.1)
In most of the anthropological textbooks and papers is written that the mother doesn't like to give the early breast milk or '*colostrum'* because the other colour and taste. However, this is

what is sad to the western researchers. Presumable mothers don't like to mention the more secret indigenous custom of 'symbolic' feeding with the thoughts behind it that the child should get first this feedings in the hope that it should grow-up in good health and reach the state that it can really consume this feedings.

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