Guidelines for kangaroo care in district hospitals and primary healthcare maternity sections in the Free State

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Abstract

Background

Kangaroo care was introduced in Bogotá, Colombia in 1979 by Dr Edgar Ray and Dr Hector Martinez due to the shortage of resources and the large number of premature babies that needed special care. Kangaroo care implies direct skin-to-skin contact between the mother and her premature/newborn baby. The advantages of kangaroo care are well known and have been published widely. In the National District Hospital in Bloemfontein, South Africa, stable babies are admitted from 1.2 kg and above and the babies are discharged at around 1.8 kg, when they are able to drink adequately. Babies above 1.2 kg are given kangaroo care by their mothers in the day, but sleep in an incubator at night. Babies with a weight of between 1.5 kg and 1.6 kg are started with around-the-clock kangaroo care. The aim of this study was to determine predictors for good and poor outcomes in kangaroo mother care practiced at the primary healthcare level. This information was then used to compile a protocol for kangaroo care in hospitals and maternity sections at the primary care level. The aim of the protocol is to provide specific inclusion and exclusion criteria for kangaroo care, to indicate all the absolute and relative needs for such a unit, to provide guidelines for managing babies with insufficient weight gain, and to provide guidance for follow-up.

Methods

In this cohort study, the patient files of premature babies that received kangaroo care in the National District Hospital were evaluated in order to establish indicators for good and poor outcomes. Patient files were selected consecutively from the last entry in the admissions register from May 2005 backwards until June 2003. Data was collected on a standard data-collection form. Reasons for not gaining weight and the need for special investigations were investigated and noted. Poor weight gain was regarded as weight gain of less than 17 g/kg/day.

Results

A total of 200 files were audited. In 62% of the cases (95% CI 55.1%; 68.4%), the babies gained weight satisfactorily, while weight gain was unsatisfactory in 38% of the cases. The mean admission weight of the babies was 1 545 g (range 1 100 g to 2 100 g) and the mean discharge weight was 1 800 g (range 1 700 g to 2 100 g). The chance of weight gain was reduced if one of the following occurred: anaemia, low body temperature, inappropriate amount and route of milk administered, sepsis, transport, procedures and other medical conditions. The reinsertion of nasogastric tubes (53%), improved temperature control with improved kangaroo care technique (79%), the correction of anaemia with blood transfusion (12%) and the correction of the volume of milk (5%) were the major corrective steps taken to address the problem. In 29% of the cases, extra energy in the form of FM 85 was added to the breast milk. The type of milk that the babies received, namely breast milk (n=113), premature milk formula (n=40) and a combination of breast milk and formula milk (n=46), did not significantly influence weight gain. Gender, birth weight and gestational age at birth also did not have a significant influence on weight gain. If the problem was properly addressed, the babies started gaining weight within an average of four days.

Conclusion

It is possible to render safe kangaroo care to all stable premature babies in a primary healthcare setting, provided that the set guidelines are adhered to.

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Introduction

Kangaroo care was introduced in Bogotá, Colombia in 1979 by Dr Edgar Ray and Dr Hector Martinez due to the shortage of resources and the large number of premature babies that needed special care.[1] Kangaroo care implies direct skin-to-skin contact between the mother and her premature/newborn baby. The advantages of kangaroo care are well known and have been published widely.[2,3,4] These advantages for the baby include a more stable body temperature,[5] blood pressure, respiratory rate and pulse rate, prolonged breastfeeding, as well as a lower incidence of severe infections later in life.[4] Kangaroo care also has a positive impact on perceptual-cognitive and motor development in infants.[6] Weight gain proved to be up to 30% faster in kangaroo-cared babies compared to babies nursed in an incubator. The advantages for the mother include better bonding and less stress, which benefit her milk production.[7] Mothers who practice kangaroo care also continue longer with breastfeeding.[8] Kangaroo care relieves some of the burden on the nursing personnel, as the mothers take some responsibility for their babies.[7] The mothers can report any physical changes in their babies due to the continuity of care rendered by them. Kangaroo care is cheaper than conventional care for the hospital regarding running cost and salaries.[9] Guidelines are available on how to implement kangaroo care in big training hospitals, although these are not appropriate for small hospitals with limited resources.[10]

In the National District Hospital in Bloemfontein, premature babies are admitted from the secondary (Pelonomi) and tertiary (Universitas) hospitals for weight gain as soon as they no longer need specialist care. Stable babies with weights of 1.2 kg upwards are admitted and discharged at around 1.8 kg, when they are able to feed adequately. Babies above 1.2 kg are given daytime kangaroo care by their mothers and sleep in an incubator at night. Babies with a weight between 1.5 kg and 1.6 kg are started with around-the-clock kangaroo care.

Aim

In order to use kangaroo care safely, specific criteria should be set. The aim of this study was to evaluate predictors for good and poor outcomes if kangaroo mother care (KMC) is practiced at a district hospital. This information was then used to compile a protocol for kangaroo care in hospitals and maternity sections at the primary care level. The aim of the protocol is to provide specific inclusion and exclusion criteria for kangaroo care, to indicate all the absolute and relative needs for such a unit, to provide guidelines for managing babies with insufficient weight gain and to provide guidance for follow-up.

The use of kangaroo care units will decrease the duration of hospital stay of premature babies, promote and sustain breastfeeding, if indicated, empower mothers to look after premature babies and save on costly equipment, such as incubators.

Methods

In this cohort study, the patient files of premature babies that received kangaroo care in the National District Hospital were evaluated in order to establish indicators for good and poor outcomes. Patient files were selected consecutively from the last entry in the admissions register from May 2005 backwards until 200 patient files were included in the review. This covered a period of two years. Cases were excluded if there was not enough/appropriate data available in the patient file or if the mother had to leave the hospital and could not continue with kangaroo care. Twelve cases were excluded. The data was collected on a standard data-collection form. Reasons for not gaining weight and the need for special investigations were investigated and noted.

An analysis of the data was done by the Department of Biostatistics of the University of the Free State (UFS). Children gaining weight satisfactorily were compared to those not gaining weight satisfactorily in terms of maternal, child and treatment factors. Poor weight gain was regarded as weight gain of less than 17 g/kg/day.[11] Chi-squared tests (categorical variables) and Mann Whitney tests (numerical variables) were performed, and 95% confidence intervals were calculated for differences in means and medians (numerical variables) and percentages (categorical variables) between the two groups.

Approval for this study was obtained from the Ethics Committee of the Faculty of Health Sciences (UFS), as well as from the CEO of National District Hospital.

The first five cases were included in the pilot study to validate the data form. No changes occurred in the data form after the pilot study. The pilot study was excluded from the main study.

Results

A total of 200 files were audited, of which, coincidentally, 100 were male and 100 were female babies. Of these babies, 164 were from single pregnancies, 15 were the first-born of twins and 21 the second-born of twins. Table I shows the demographic data of the babies and their mothers.

The total number of 188 mothers is due to multiple pregnancies and the fact that both twins were not always admitted. Forty-one per cent of the mothers were primigravidae.

The mean admission weight of the babies for kangaroo care was 1 545 g (range 1 100 g to 2 100 g) and the mean discharge weight was 1 800g (range 1 700 g to 2 100 g). Sixty-two per cent (95% CI 55.1%; 68.4%) of the

Table I: Demographic data of babies and mothers

Demographic data of the babies (n=200)	**Minimum**	**Mean**	**Maximum**
Birth weight (g)	700	1424	2250
Gestational age (weeks)	26	31.6	37
Demographic data of the mothers (n=188)	**Minimum**	**Mean**	**Maximum**
Age (years)	15	26.9	43
Gravidity	1	2	8

Table II: The influence of maternal factors on weight gain

Condition	**Babies who gained weight satisfactorily (%)**	**Chi-square**	**95% CI for difference in %**
PET (n=65) No PET (n=135)	74 % 56%	0.0166	(3.3%;30.0%)
PROM (n=22) No PROM (n=178)	41 % 65 %	0.0307	(-42.6%;-2.1%)
Unbooked (n=68) Booked (n=132)	50 % 68 %	0.0121	(-31.9%;-3.9%)
Infection in pregnancy (n=14) No infection in pregnancy (n=186)	57 % 62 %	0.6978	(-30.7%:17.4%)
Multiple pregnancy (n=31) Single pregnancy (n=169)	52 % 64%	0.1949	(-30.4%;5.7%)
HIV positive (n=43) HIV negative or not tested (n=157)	51 % 65 %	0.0984	(-29.8%;2.4%)

Table III: The influence of parameters routinely monitored in premature babies on weight gain

Parameter	Reference value	*Satisfactory* weight gain	Chi-square	95% CI for difference in %
Anaemia (n=27) No anaemia (n=172)	Hematocrit < 35%	3.7% 70.9%	<0.0001	(-74.2%;-51.0%)
Low body temperature (n=20) Normal body temperature (n=179)	< 36.5 °C	5% 68.2%	<0.0001	(-70.7%;-43.2%)
Appropriate *volume* of milk (n=157) Inappropriate volume of milk (n=42)	180 ml/kg/day	73.9% 16.7%	<0.0001	(50.3%;71.2%)
Appropriate route for milk according to weight (n=188) Inappropriate route for milk according to weight (n=11)	<1.6 kg Nasogastric tube only	65.4% 0%	<0.0001	(38.6%;71.9%)
Procedures and transport (n= 29) No procedures or transport (n=170)	Procedure lasting >10 minutes or transport to another facility	6.9% 71.2%	<0.0001	(-72.3%;-47.6%)
Sepsis (n=12) No sepsis (n=187)	Any clinical or laboratory signs of sepsis	0% 65.8%	<0.0001	(-72.2%;-40.5%)
Other: Yes (n=37) No (n=162)	E.g. chromosome abnormalities, cardiac lesions	16.2% 72.2%	<0.0001	(-66.7%;-39.4%)

babies gained weight satisfactorily and 38% gained weight unsatisfactorily.

Maternal problems experienced during pregnancy, leading to spontaneous preterm deliveries, were i) pregnancy-induced hypertension (PET) in 33%, ii) pre-labour rupture of membranes (PROM) in 11%, iii) HIV infection in 21%, iv) multiple pregnancies in 11% and v) never having attended an antenatal clinic before the baby was born and being considered as unbooked in 35% of cases.

Table II shows the association between maternal factors and weight gain. PET predicted satisfactory weight gain. PROM and unbooked pregnancies predicted poor weight gain. Infections in pregnancy and multiple pregnancies had no statistical influence on weight gain. The HIV status of the mother had no influence on weight gain, but more than 50% of the mothers were not tested.

Table III shows the association between the parameters routinely monitored in premature babies and weight gain.

From Table III it is clear that the chance of weight gain was reduced if one of the following occurred in a premature baby: anaemia, low body temperature, inappropriate volume and route of milk, sepsis, transport, procedures and other medical conditions.

If the reasons for poor weight gain were addressed, it took an average of four days (range two to 20 days) for the babies to gain weight satisfactorily and these babies stayed in the hospital an average of four days longer than the babies with good weight gain (95% CI one to nine days) The reinsertion of nasogastric tubes (53%), improved temperature control with improved kangaroo care technique (79%), the correction of anaemia with blood transfusion (12%) and the correction of the volume of milk (5%) were the major steps taken to address the problem of poor weight gain. In 29% of cases, extra energy in the form of FM 85 (a breast milk fortifier) was added to the breast milk.

The type of milk that the babies received, namely breast milk (n=113), premature milk formula (n=40) and a combination of breast milk and formula milk (n=46), did not significantly influence weight gain. Gender, birth weight and gestational age at birth were not found to have a significant influence on weight gain.

Discussion

The weight for gestational age of the babies demonstrated that the majority of the babies were not only premature, but also suffered from intrauterine growth retardation (IUGR).The age and gravidity of the mothers were similar to those of the patient population of the area. A maternal age of less than 18 years and more than 40 years is quoted in the literature as a risk factor for prematurity.[12] In this study, 8% of the mothers were younger than 18 and only 1% were older than 40.

Regarding maternal complications of pregnancy, the incidence of pregnancy-induced hypertension (PET) was 38% in our study, compared to 4.2 to 6 % in the general population.[12] PET is therefore a definite risk factor for prematurity. Babies of mothers with PET gained weight faster than those without PET, presumably because of the stress and growth retardation they experienced during the pregnancy.

Preterm rupture of membranes occurred in 11% of cases and contributed to unsatisfactory weight gain. Infection is the most common cause of the premature rupture of membranes, and this can explain the poor weight gain.[12]

A patient who had not attended the antenatal clinic before the delivery was considered unbooked. The incidence of unbooked pregnancies (35%) in our study is much higher than that of an audit done at our facility, in which it was found that 80% of pregnant mothers attended antenatal clinics. The argument might be that the mother delivered prematurely before she could attend the clinic. The babies of these unbooked mothers statistically gained weight slower. The causes of this prematurity could not be addressed during the antenatal period. The incidence of multiple pregnancies in the general population varies between 1.5 and 3%.[11] In this study it was 15%, which correlates with the literature, which indicates that the incidence of prematurity is much higher in multiple pregnancies.[12] Babies born to HIV-positive mothers tended to gain weight slower than their unexposed counterparts. However, the majority of the mothers were not tested and no conclusion is possible from this result.

When the reasons for unsatisfactory weight gain were addressed appropriately and timeously, the babies soon gained weight satisfactorily. It therefore is necessary to examine every premature baby at least once a day to identify risk factors for poor weight gain.

Regarding the type of milk that the babies received, the majority were on breast milk. Some of the mothers chose formula feeding after an informed decision had been made regarding their HIV-positive status. Babies of mothers who could not lactate or who were on a drug contraindicated in breastfeeding were also put on formula feeding. Sufficient breast milk was not always available from the beginning, as the babies were born prematurely and some were twins. As a result, 23% of the babies received a combination of breast milk and formula milk until lactation had been established properly.

Conclusion

It is possible to render kangaroo care to all stable premature babies at the primary healthcare level. Risk factors for not gaining weight have been demonstrated, and an attempt has been made to identify ***possible*** ways to address these factors. The attached

guidelines for safe kangaroo care in a primary healthcare institution were developed as a result of this study.

Guidelines for kangaroo mother care in a primary healthcare setting

Technique of kangaroo mother care

The baby should be placed on the mother's naked chest, facing the mother, with direct skin-to-skin contact between the mother and her baby. The baby should wear a nappy, booties and a hat. The head is turned to the side with one ear touching the mother's chest. The mother then covers herself and the baby with her clothes. If it is cold, she covers both of them with a blanket. The baby stays on the mother's chest 24 hours a day, while the mother lies down on a bed or sits in a chair.

Equipment needed

Normal beds for the mothers to sleep on.
A chair for the mother to sit on.
Baby scale to weigh the babies.
Blankets to wrap the baby and mother.
Hats to cover the babies' heads.
Booties for the feet.
Medicine cup for cup feeding.

When to start with kangaroo care

As soon as the baby is stable and does not require oxygen.
As soon as the mother is able to manage her baby/babies. It may be difficult for the mother to handle two babies at a time. therefore one is usually kept in the incubator to give her time to adapt.

Type of feeding

The mother should make an informed decision regarding feeding.
Expressed breast milk (EBM) given exclusively is the preferred choice, but this is not always possible for various reasons.
Premature formula milk.
Pasteurised expressed breast milk if the mother is HIV positive.
A combination of EBM and formula milk until lactation is established.

Volume of milk

Day 1 - 60 ml/kg/day
Day 2 - 80 ml/kg/day
Day 3 - 100 ml/kg/day
Day 4 - 120 ml/kg/day
Day 5 - 140 ml/kg/day
Day 6 - 160 ml/kg/day
Day 7 and onward - 180 ml/kg/day

Route of feeding

Babies should receive all milk through a nasogastric tube until they weigh 1.6 kg. Then start with cup feeding and give breast milk extra. Remove the nasogastric tube as soon as the baby can drink all the milk from the cup. Gradually increase the volume of milk from the breast and decrease the volume from the cup. At a weight of 1.8 kg, the baby should be able to drink adequate milk from the breast, if breastfed, or from the cup, if formula fed.

Daily monitoring

Weigh daily at the same time to monitor a weight gain of at least 17 g/kg/day.
Check that the body temperature is kept between 36.5 and 37.5˚C at all times.
Do a clinical examination to exclude sepsis and anaemia.
The baby should have at least six wet nappies per day.
Control the volume of milk received and the route of milk given according to age and weight.

Steps to be taken if the baby is not gaining weight

Check all the above parameters and address appropriately:

- Low temperature with better kangaroo care technique
- Anaemia with blood transfusion
- Sepsis with septic workout and appropriate intravenous antibiotics
- Incorrect amount of milk with the correct amount of milk

Reinsert the nasogastric tube.
Add extra energy in the form of FM 85 to expressed breast milk.

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