Kangaroo care in pre-term or low birth weight babies in a postnatal ward

Abstract

Objective: To compare the efficacy of Kangaroo care (skin-to-skin contact with mother) with standard care (next to the mother in a cot) for premature, low birth weight and babies of diabetic mothers in a transitional care ward setting. Method: This was a cohort study undertaken in a transitional care/postnatal ward of a UK district general hospital. The study involved 214 babies (107 in the study group, 107 in the control group) with a gestation 34–36+6 weeks, small for gestational age and babies of diabetic mothers. Babies in the study group had Kangaroo care following birth up to 6 weeks of age. Control group had standard care (in the cot next to the mother). The main outcome measure was the length of hospital stay. The secondary outcome measures were breastfeeding at discharge from hospital and at 6 weeks, admission to neonatal intensive care unit (NICU) and parent satisfaction. Results: There was a significant reduction in mean length of stay (4.33 vs. 5.01 days, P=0.017, 95% CI 3.93–4.73 and 4.58–5.44) in the study group compared to the control. There was also an increase in exclusive breastfeeding rates on discharge from hospital in the study group (72% vs. 55% P=0.01, OR 2.09, 95% CI 1.18–3.69). There were no differences in feeding outcomes at 6 weeks, or in admission to NICU. Conclusions: Kangaroo care is a simple intervention that reduces length of hospital stay and improves breastfeeding rates on discharge from hospital for babies cared for in a transitional care/postnatal ward setting. Parents rate Kangaroo care highly, especially in the first 2 weeks following birth.

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In the early 1980s, paediatricians working in Colombia recognized and researched the medical benefits of Kangaroo mother care, defined as a combination of skin-to-skin contact, exclusive breastfeeding (where possible), early discharge and adequate follow up (Rey and Martinez, 1983). Their research found that this practice was an alternative to the conventional method of care for premature and low birth weight infants in an incubator, separate from their mothers, and that this simple, inexpensive intervention led to a significant drop in mortality rate for premature infants from 70% to 30%.

Approximately 30 years later, a Cochrane review (Conde-Agudelo et al, 2011) compared 16 clinical trials investigating Kangaroo care in developing countries involving mothers and premature or low birth weight babies. It concluded that Kangaroo care reduces the risk of mortality, infection/sepsis, hypothermia and length of hospital stay and that it has also been found to increase some measures of growth, breastfeeding and mother–infant attachment. The World Health Organization (WHO) (2003) has now produced a practical guide on what is needed to introduce and carry out Kangaroo care in settings where resources are limited.

Further studies have also found that skin-to-skin contact (Kangaroo care) alone also has significant benefits for pre-term and term babies, especially in low income countries, including better temperature regulation, shorter hospital stay (Charpak et al, 1997), more contented babies (Ludington-Hoe, 1992; Ludington et al, 1992), fewer infections (Sloan et al, 1994; Charpak et al, 2001), better breastfeeding rates (Bier et al, 1996), improved cognitive (Charpak et al, 2005) and motor development (Ferber and Makhoul, 2004; Dodd, 2005) and trends towards increased maternal attachment and bonding (Moore et al, 2007).

These studies have led to calls for skin-to-skin contact from birth (Kangaroo care) to be more widely implemented in affluent countries as well as impoverished environments (Franck et al, 2002; Ruiz-Pelaez et al, 2004; DiMenna, 2006). Many neonatal intensive care units (NICUs) in the UK are now implementing some form of Kangaroo care contact for mothers and babies, although a note of caution is advised in light of the findings of a recent meta-analysis (Mori et al, 2010) which found that Kangaroo care is effective at increasing body temperature, but is also associated with a decrease in oxygen saturation. The authors therefore recommend monitoring of oxygen saturation and respiration for unstabilized low birth weight infants babies at risk of apnoea of prematurity until more is known about this subject.

During the last decade, most maternity hospitals in the UK have designated an area on the postnatal ward for mothers with babies who are premature or low birth weight (below the second centile for gestational age) and do not require neonatal intensive care, to stay together with help and support from midwives and ancillary staff. To date there has been no research investigating whether the 'routine' adoption of Kangaroo care for these babies cared for in this setting, who are otherwise well, can improve outcomes, especially in relation to length of stay, feeding and parent satisfaction. This is therefore the purpose of this study.

Method

Study design and setting

A cohort study was set up to test whether there was any difference in length of stay or other outcomes for 'transitional care' babies who have Kangaroo care, compared with the same group of babies who have usual care. The study took place at Pembury Hospital, Maidstone and Tunbridge Wells NHS Trust from 25 November 2009 to 13 August 2010. Approval for the study was obtained from the local Research and Development Department and East Kent Local Research Ethics Committee.

Sample size and participants

Women were informed during their pregnancy about the study by their midwife. Participants were eligible to be included in the study if they met one or more of the following criteria:

- Gestation 34–36+6 weeks
- Small for dates < 2nd centile for gestational age
- Babies of diabetic mothers.

A total of 179 women were eligible for the study; however, 48 were not asked to participate and 24 declined entry. Two women discontinued the intervention and withdrew from the study once they had started the intervention, although their data was included in data analysis on an 'intention to treat' basis (*Figure 1*).

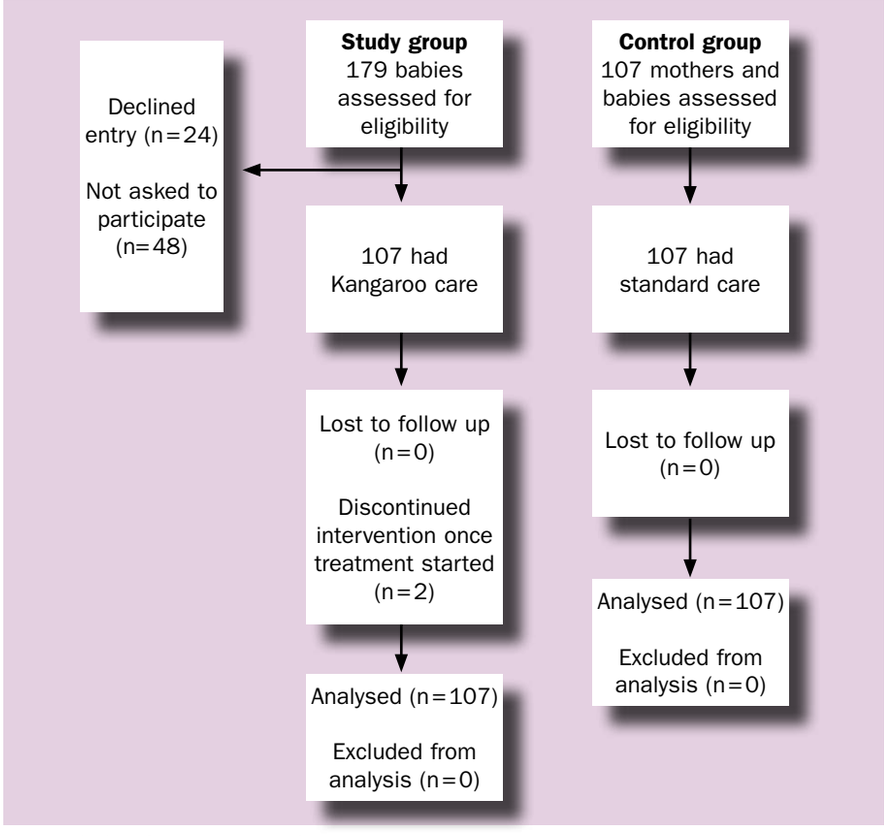


Figure 1. CONSORT diagram for Kangaroo study.

The study sample size was calculated using a joint statistical and pragmatic assessment, based on the number of women that could be recruited within an acceptable timescale and size of effect that could be measured. Sample size calculations were based on the mean length of stay for babies born in a 6-month period during 2009, which was 5 days. Calculations suggested that a sample size of 214 (107 babies in each arm of the study) would be sufficient to show a true mean difference of 1 day in length of stay with a power of 80% at 95% level of significance.

Control group

The control group were 107 babies identified from the register of births that met the study criteria and were born consecutively during a similar period in the preceding year (25 November 2008–25 June 2009). The control group received 'standard care' for 'transitional care' babies as per trust guidelines. This includes up to an hour of skin-to-skin contact at birth, after which parents hold or feed their baby when they want to or put it in a cot beside their bed. Staff ensure the baby feeds at least every 3 hours and also perform regular observations and blood glucose recordings.

Study group

Kangaroo care was introduced to the transitional care ward at Pembury hospital prior to the start of the study by giving staff a simple training session that explained the potential advantages of Kangaroo care and taught them how to use the baby wraps safely to facilitate skin-to-skin contact. With the exception of two midwives who remained on the ward, staff continued to be rotated to other areas within the maternity unit as normal practice.

The same trust guidelines were followed as for the study group as for the control group. Those willing and eligible to participate in the study were asked to give written consent on admission to the transitional care ward where premature and low birth weight babies are cared for next to their mothers. Each participant received a simple 'wrap-around' style baby sling to help facilitate skin-to-skin contact (Kangaroo care) which was demonstrated by the midwife. Participants were encouraged to perform as much Kangaroo care (skin-to-skin) as possible during the 24-hour period for as long as they were in hospital (rather than putting the baby in the cot). No time constraints for the length of each episode of Kangaroo care were given but participants were given a simple timeline diary for use in hospital so that they could record the length of time that they had the baby skin-to-skin. On discharge from

hospital, the mother took the baby wrap home and was encouraged to continue to perform as much Kangaroo care during the first 6 weeks; however, she was not asked to record how much time the baby spent skin-to-skin once she left hospital.

The primary outcome measure was length of stay. Secondary outcome measures were breast-feeding rates (exclusive and mixed) on discharge from hospital and at 6 weeks postnatal, transfer to NICU and patient satisfaction ratings.

Data collection

Data were collected from the participants' hospital records on discharge from midwifery care. Feeding data at 6 weeks were collected from the primary care trust (PCT). At discharge from hospital, participants were asked to evaluate their experience of Kangaroo care using a Likert scale of 1–5 (Trochim, 2006), a commonly-used psychometric scale for survey research, in which 1=strongly disliked, 5=really loved it. They were also asked to complete the same evaluation on discharge for midwifery care, usually at 10 days, and at 6 weeks. Partners were also invited to do this. At the same time participants were also given the opportunity to comment about Kangaroo care.

Table 1. Maternal and baby demographic details

Category		Study group n=107 (%)	Control group n=107 (%)	P value
Age (mean)		31.46 (SD=5.52)	31.43 (SD=6.45)	P=0.97
Parity	Nulliparous	56 (52)	62 (58)	P=0.41
	Multiparous	51 (48)	45 (42)	
Ethnicity	White British	86 (80)	88 (82)	P=0.16
	Other White	7 (7)	13 (12)	
	Asian	11 (10)	5 (5)	
	Other mixed background	3 (3)	1 (1)	
Smoking	Non-smoker	98 (92)	89 (83)	P=0.06
	Smoker	9 (8)	18 (17)	
Type of delivery	Total vaginal deliveries	61 (57)	61 (57)	P=0.20
	Normal	51 (48)	49 (46)	
	Instrumental	10 (9)	12 (11)	
	Total caesarean sections	46 (43)	46 (43)	
	Emergency caesarean section	26 (24)	16 (15)	
	Elective caesarean section	20 (19)	30 (28)	
Feeding intention at birth	Breast	97 (91)	96 (90)	P=0.80
	Bottle	10 (9)	11 (10)	P=0.98

Data analysis

Data was entered onto a Microsoft Excel spreadsheet and the experimental hypothesis was tested using statistical procedures available in SPSS (PASW) for Windows, version 18. All tests were two-tailed with a significance level of $P<0.05$ being accepted as statistically significant. The study and control group were compared for factors that could potentially affect the length of stay, including mother's age, parity, ethnic group, smoking, delivery type, gestational age, Apgar score, birth weight, sex and feeding type (*Table 1*).

Parametric and non-parametric tests were applied as follows: age, using one-way analysis of variance (ANOVA), gestation, birth weight and Apgar using the independent samples median test. Non-parametric categorical data was tested using Fisher's exact or Pearson Chi Square tests. Length of stay was analysed primarily by a one tailed Mann-Whitney test. Further analysis was conducted on the comparison of length of stay using a Poisson regression model that accounted for the combined co-variates of gestation, birth weight and Apgar score.

The qualitative data (comments from mothers and fathers) was subjected to thematic analysis and organized into themes using simple word repetition, a commonly-used technique in analysing qualitative research (Thorne, 2000).

Results

The data for the 107 women recruited for the study group were compared to 107 controls who met the entry criteria and had given birth consecutively during a similar period in the previous year.

Length of time of skin-to-skin contact

Of the participants, 77 (72%) recorded information regarding the length of time skin-to-skin contact was performed in hospital. This ranged from 2.5 hours to 106 hours. The mean length for total time the baby was recorded as having Kangaroo care in hospital was 24.5 hours and a median of 16 hours. Maternal and baby demographics were tested across the study and control groups (*Tables 1* and *2*). No significant differences were detected.

Length of stay

The median length of stay was reduced in the study group compared to the control group (4 days *vs.* 5 days) ($P=0.04$) (*Table 3*). The comparison

was further investigated using a Poisson regression model with the combination of the predictor (co-variant) variables of gestation, birth weight and Apgar score being held at their mean values. The marginal mean length of stay predicted by the model was also significantly different for the study group when compared to control (*Table 3*).

Fewer babies were admitted to NICU in the study group (5 *vs.* 8), however, this difference was not significant ($P=0.65$).

Feeding

There were no significant differences between the study and control group regarding feeding intention at delivery, however, there were more participants who were exclusively breastfeeding on discharge from hospital in the study group, compared to the control group (*Table 4*). It was not possible to determine if this difference continued at 6 weeks as there was a large amount of missing data at 6 weeks from both groups ($n=20$; $n=28$).

Evaluation of Kangaroo care

On discharge from hospital, 74 (69%) of participants responded to the invitation to evaluate their experience of Kangaroo care by indicating which statement best fitted their experience (*Table 4*). Of the 74 who responded, 72 (97%) really loved or liked doing Kangaroo care, especially during the days that they were in hospital. There were fewer respondents ($n=44$) on discharge from community care and at 6 weeks ($n=31$), however, the majority of these (87% and 74%) still responded very favourably to Kangaroo care. Fathers were also invited to rate their experience. Of the 55 fathers that responded, 89% 'loved' or 'liked' Kangaroo care on discharge from hospital. Two fathers gave a very negative response on discharge from community care, however it is unclear what their experience had been.

Qualitative data

Some participants ($n=65$; 61%) responded to the invitation to record individual comments in the Kangaroo diary. Thematic analysis revealed four main themes emerging from this data: bonding; feeding; how settled the baby was; and comments about the baby wrap.

Bonding

The greatest number of comments ($n=34$) related to bonding. All comments were extremely positive about the effects of Kangaroo care in this respect:

> ***'I have enjoyed bonding more closely with my daughter after having problems with my first child'***

Table 2. Baby demographic details

Category		Study group (n=107)	Control group (n=107)	P value
Gestation	Median	38 weeks	36.8 weeks	P=0.10
	Mean (standard deviation)	37.7 weeks	37.4 weeks	
	Range	238–296 days	241–282 days	
Birth weight (g)	Median	2670	2620	P=0.49
	Mean	2892	2829	
	Range	1840–4430	1920–4520	
Apgar score	Median	10	9	P=0.34
	Mean	9.42	9.34	
	Range	5–10	8–10	

Table 3. Length of stay

All subjects	Study group (n=107)	Control group (n=107)	P value
Median	4	5	Mann Whitney (one tailed) P=0.04
Mean length of stay	4.33 days CI 3.93–4.73	5.01 days CI 4.58–5.44	Poisson regression P=0.02
Range (days)	1–10	1–15	

CI=Confidence interval

Table 4. Feeding outcomes on discharge from hospital and at 6 weeks

Feeding outcomes		Study group	Control group	Odds ratio (95% CI)
Feeding outcomes on discharge from hospital (study group n=107; control group n=107)	Breast-feeding	77 (72%)	59 (55%)	P=0.015 OR 2.09 (1.18 to 3.69)
	Breast and artificial (mixed)	15 (14%)	32 (30%)	P=0.01 OR 0.33 (0.19 to 0.76)
	Artificial	15 (14%)	16 (15%)	P=1 OR 0.93 (0.43 to1.99)
Feeding outcomes at 6 weeks post-delivery (study group n=87; control group n=79)	Breast-feeding	42 (48%)	29 (37%)	P=0.13 OR 1.61 (0.86 to 2.99)
	Breast and artificial (mixed)	12 (13.8%)	13 (16.5%)	P=0.63 OR 0.81 (0.35 to1.90)
	Artificial	33 (38%)	37 (47%)	P=0.25 OR 0.69 (0.37 to1.29)

CI=Confidence interval

Table 5. Patient satisfaction scores

	Hospital	Community discharge	6 weeks
Mother's scores	**n = 74**	**n = 44**	**n = 31**
I loved Kangaroo care and found it made an enormous difference to helping me care for my baby	41 (56%)	17 (39%)	10 (32%)
I quite liked Kangaroo care and found it quite helpful in helping me care for my baby	31 (41%)	21 (48%)	13 (42%)
Neutral feelings (neither liked or disliked)	2 (3%)	3 (6.5%)	3 (10%)
I did not particularly like doing Kangaroo care and did not really find it helpful in caring for my baby	0	3 (6.5%)	5 (16%)
I strongly disliked doing Kangaroo care. It was very unhelpful and I would never recommend it to anyone else	0	0	0
Father's scores	**n = 55**	**n = 35**	**n = 18**
I loved Kangaroo care and found it made an enormous difference to helping me care for my baby	28 (51%)	13 (37%)	7 (39%)
I quite liked Kangaroo care and found it quite helpful in helping me care for my baby	21 (38%)	14 (40%)	8 (44%)
Neutral feelings (neither liked or disliked)	5 (9%)	5 (14%)	2 (11%)
I did not particularly like doing Kangaroo care and did not really find it helpful in caring for my baby	1 (2%)	1 (3%)	1 (6%)
I strongly disliked doing Kangaroo care. It was very unhelpful and I would never recommend it	0	2 (6%)	0

'I really enjoyed the closeness'

'Amazing experience for fathers to be so close to their baby'

'Great for my husband to have skin-to-skin with our son. He really enjoyed being able to bond.'

Feeding

All comments relating to feeding ($n = 19$) were very positive about the benefits of Kangaroo care:

'It helped my baby get stronger quicker'

'After some initial feeding problems, my little girl fed brilliantly after her first time in the baby wrap'

'It made an amazing difference to feeding'.

Settling

The majority of comments related to how settled the baby was. Of 25 comments, 21 were positive:

'I have such a quiet, happy baby and think this is related to Kangaroo care'

'Definitely the calmest baby on the ward!'

I was worried that the wrap would make the baby more clingy—but it was the opposite! He was more settled with Kangaroo care'.

There were 4 negative comments:

'Feel Kangaroo care has made it more difficult for baby to settle'

'Liked Kangaroo care but baby will only settle on Mum'

'After Kangaroo care my baby was not happy to go in the cot'

'Baby more unsettled after Kangaroo care'.

Baby wrap

There were mixed comments about the wrap, with only 23 favourable responses out of 43:

'Brilliant to have hands free and have my baby skin to skin'

'Helped me feel confident'

'Very comfortable and really helps to do Kangaroo care'

There were 20 negative comments, relating to difficulties in using the baby wrap:

'Hard to use when you are alone'

'Fiddly to put on'

'Too bulky to wear in bed after a caesarean section.'

There were also several comments that it was hot to wear, especially during the summer.

'Weather too hot to wear the wrap, so did skin-to-skin without'.


ISTOCKPHOTO

This study confirms that there are significant benefits for introducing Kangaroo care for babies on a transitional care/postnatal ward.

Discussion

A cohort design was used for this study, comparing the babies in the study group with those in the control group who were born during the previous year. This design was chosen because a randomized controlled trial would not have been feasible on an open ward where mothers allocated to control would have been likely to observe skin-to-skin contact and decide to do it themselves. Guidelines for caring for transitional care babies did not alter during the study period. In addition, the study and control group periods began at the same time of year to prevent seasonal differences potentially affecting results. There were more smokers in the control group than in the study group (17% *vs.* 8%). Although this did not reach statistical significance, it is unclear whether it was of clinical significance.

Benefits of Kangaroo care

This study confirms that there are significant benefits for introducing Kangaroo care for babies on a transitional care/postnatal ward, who are premature, small for gestational age or at risk of developing hypoglycaemia. Length of hospital stay was significantly reduced, there was an increase in breastfeeding rates on discharge from hospital and there were no increases in admissions to NICU. Participants reported that Kangaroo care was very helpful for establishing feeding, facilitating bonding and developing confidence in caring for their newborn infant, especially during their stay in hospital and up to 2 weeks following the birth.

There were many positive comments from mothers and fathers who performed Kangaroo care, especially during the days immediately following the birth of their baby. Comments showed how much they found Kangaroo care helped with establishing breastfeeding, bonding with their newborn infant and having greater confidence in their ability to care for their premature or small infant.

Although a number of participants reported that Kangaroo care continued to be helpful at 6 weeks, enthusiasm was overall less effusive than at discharge from hospital or discharge from midwifery care and the use of the baby wrap seemed to be more of a lifestyle choice that suited some, but not all.

Limitations

There were three main limitations to this study which were lack of certainty regarding the amount of time participants performed Kangaroo care, lack of clarity of the definition of Kangaroo care for participants when they were asked to score and comment on their experience, and missing data for feeding outcomes at 6 weeks.

The transitional care/postnatal ward

The transitional care/postnatal ward was a busy environment and it was therefore not possible for staff to ensure that participants completed the Kangaroo diary, or to help them if they were not able to do this themselves. This meant that only 77 (70%) participants recorded data in the Kangaroo diary and it is not possible to know how accurately this was performed. Although this was recognized as a potential problem in the design of the study, it was felt that recording the data might in itself encourage participants to perform more Kangaroo care and therefore the diary was included as part of the study.

Definitions

Some participants were unclear about the definition of Kangaroo care and thought this only applied to when the baby was in the wrap. This was evident in discrepancies which saw a low score being given for the experience of Kangaroo care, but positive comments about how much they had enjoyed doing skin-to-skin contact. In hindsight it would have been better to ensure that comments about the baby wrap were clearly separated from comments about Kangaroo care (skin-to-skin contact).

Missing 6-week data

Finally, 26% of data for feeding outcomes at 6 weeks was missing from the study group and 19% from the control group. Data were collected and made available to the research team by the local PCT. Lack of accurate feeding data at 6 weeks is a problem that occurs in many PCTs throughout the UK and

is currently being targeted by the Department of Health as a priority (Department of Health, 2009). There were no realistic alternatives for collecting this data, especially in the control group.

It is possible that the effects of Kangaroo care, especially in relation to breastfeeding outcomes, would have been more pronounced if staff on the ward had remained static, as there were a number of occasions when women were not recruited or encouraged to do much Kangaroo care, due to staff inexperience. Despite this, the study demonstrates significant advantages for introducing Kangaroo care to a busy postnatal ward environment and shows that this can be achieved with minimal expense and training.

Conclusions

It has become standard practice in the Western world to separate newborn babies from their mothers for long periods of time by placing them in a cot. However, this study shows that this may not be best practice for stable premature and low birth weight babies, as well as those at risk of developing hypoglycaemia, cared for on the transitional care/postnatal ward. These findings show that Kangaroo care is associated with a shorter hospital stay and more exclusive breastfeeding on discharge from hospital. It is an intervention that is easy to introduce to the clinical area that is inexpensive and is highly rated by parents. It is recommended that more research should be carried out into the effects of Kangaroo care for all babies (especially those born at term), however, the authors feel it should be adopted now as routine care for premature and low birth weight babies who are cared for on the transitional care/postnatal care wards in UK hospitals. **BJM**

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Key points

- This is the first UK study to investigate Kangaroo care for stable low birth weight babies and babies at risk of hypoglycaemia cared for in a transitional care/postnatal ward setting
- Kangaroo care has significant benefits for these babies including shorter hospital stay and increased breastfeeding on discharge
- Kangaroo care is a simple intervention that parents find very helpful when caring for a premature or small for gestational age infant

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