The Effect of Intermittent Kangaroo Mother Care on Breastfeeding Practice of Late Preterm Infants in China

CURRENT STATUS: UNDER REVIEW

Bo Zhang
Peking University First Hospital

Zhiying Duan
Peking University First Hospital

Yingxi Zhao
University of Oxford
ORCiD: 0000-0002-4937-4703

Sarah Williams
Save the Children

Stephen Wall
Save the Children

Limin Huang
Hunan Provincial Maternal and Child Health Hospital

Xiaoqin Zhang
Northwest Women & Children Hospital

Wenli Wu
Linyi Maternity and Child Health Hospital

Jieya Yue
Peking University First Hospital

Lin Zhang
Save the Children

Jun Liu
Peking University First Hospital
DOI: 10.21203/rs.2.18645/v1

SUBJECT AREAS  Sexual & Reproductive Medicine

KEYWORDS  Kangaroo mother care, skin-to-skin contact, breastfeeding, late preterm infants
Abstract

Background

China has an extremely low exclusive breastfeeding rate. Kangaroo mother care (KMC) has been shown to increase the exclusive breastfeeding rate of babies born extremely or very preterm. However, there is limited evidence of intermittent KMC’s effect on exclusive breastfeeding in late preterm. Using hospital discharge and follow-up data collected from four postnatal wards, we investigated the association between intermittent KMC and breastfeeding practice for late preterm babies in China.

Methods

Intermittent KMC was recommended to the mothers of all preterm babies admitted between March 2018 and March 2019. Those who agreed to practice KMC were enrolled in the “KMC group”, those who did not in the “no-KMC group”. Basic maternal socio-demographic information was collected, feeding outcome and method were recorded daily whilst in hospital and a follow-up survey of feeding practice was conducted 42 days post-discharge. Calculations for feeding practice were performed separately for both groups. Logistics regression was used to analyze the association between KMC and feeding outcome and method, adjusting for socio-demographic covariates.

Results

Among the 844 participants in the analysis, 627 (74.3%) chose to perform KMC. More mothers who provided KMC were exclusively breastmilk feeding their newborn in the 24 hours before discharge (54.6%) and at follow-up (57.3%), compared with mothers who did not provide KMC (34.6% at discharge and 33.2% at follow-up).
Mothers in the KMC group were more likely to be breastfeeding (method) than mothers in the no-KMC group (65.3% vs. 52.1% at discharge, and 83.1% vs. 67.3% at follow up). Logistic regression indicated that compared with the no-KMC group, mothers who provided KMC were twice as likely to be providing their newborns with exclusive breastmilk feeding at discharge (OR=2.15 (1.53-3.02)), use breast feeding method at discharge (OR=1.61 (1.15-2.25)), provide exclusive breastmilk feeding at follow-up (OR=2.55 (1.81-3.61)), and use breast feeding method at follow-up (OR=2.09 (1.44-3.02)).

Conclusions
Intermittent KMC was associated with a nearly doubled increase in exclusive breastmilk feeding (outcome) and breast feeding (method) at both discharge and 42 days after discharge for late preterm babies. Intermittent KMC has the potential to increase exclusive breastfeeding rates amongst late preterm infants.

Background
Kangaroo mother care (KMC) is a cost-effective intervention recommended by WHO for the care of stable preterm newborns (1). Infants are cared for skin-to-skin on the chest of their mother or another caregiver and receive exclusive breastfeeding (ideally) or breastmilk feeding. Compared to conventional care it has been shown to reduce mortality, the incidence of severe infection and hypothermia and improve health outcomes including exclusive breastfeeding. KMC has been found to increase the likelihood of exclusive breastfeeding at hospital discharge by 50% and at 1 to 4 month follow-up by 39% (2).

The breastfeeding rate in China is low, for both term and preterm newborns. According to a survey of over 10,000 mothers in 2018, the rate of exclusive
breastfeeding for infants under 6 months of age was 29.2%, and only 11.3% of mothers breastfed their children within an hour of birth (3). While the survey did not disaggregate breastfeeding rate based on gestational age or birth weight, a more recent observational study with a smaller sample size indicated an exclusive breastfeeding rate of 22.5% at 6 months in infants born preterm (4), lower than their full-term counterparts. Barriers to exclusive breastfeeding of preterm infants in China include low levels of breastfeeding self-efficacy and symptoms of postpartum depression amongst mothers. Additionally limited knowledge among health care providers regarding breastfeeding preterm infants and the specific benefits of breastmilk for these newborns hindered their ability to support new mothers (4,5). There is empirical evidence of the benefit of breast milk for preterm infants including improved cardiovascular function in adulthood (6).

While there is evidence to demonstrate that KMC increases the exclusive breastfeeding rate amongst preterm infants, most of this evidence was generated from outside the Western Pacific region (2,7,8) and there have been no studies conducted in China. The majority of these studies are set in neonatal units with extremely preterm or very preterm newborns. The effect of intermittent KMC on the breastfeeding outcome of late preterm newborns cared for on postnatal wards, characterized by rooming in of mother and baby and limited length of hospital stay needs investigating.

In this study, we aim to determine the effect of intermittent KMC exposure for late preterm newborns in a postnatal ward setting on exclusive breastfeeding at hospital discharge and follow-up. This analysis is part of a larger project to investigate the implementation of KMC in China as part of a national-level pilot.
Methods

Study design and population

This study is part of a larger piece of implementation research on the practice of KMC in the neonatal and postnatal wards of eight hospitals in China. In 2017 standardized guidelines for KMC were developed along with procedural and training material, data capture tools were designed, piloted and finalized. Training on KMC, study protocol and tools was provided to medical and nursing staffs working on the neonatal units and postnatal wards. Data collection took place from March 2018 to March 2019. During this time two meetings were held with staffs from the participating wards in order to ensure that data was consistently and reliably collected in all sites.

This current analysis is based on the data collected from the four participating postnatal wards all located in level-III hospitals in different provinces of Southeast and Northwest China. The approximate number of births per month in each hospital ranged from 500 to 1,000 including both full-term and preterm neonates. All preterm newborns are assessed by a pediatrician at birth, late preterm infants with stable vital signs are admitted to postnatal ward with their mothers. The postnatal wards practice rooming in, and non-separation of mothers and babies. The majority of rooms on postnatal wards have space for two beds, however some are single bedded and some have multiple beds, curtains are provided for privacy. The length of hospitalization is determined by the mode of delivery and the condition of the patients, ranging from one to four days. Most women and babies who experience vaginal birth are discharged after one day.

KMC was recommended to the mothers and families of preterm babies on the
postnatal wards. Exclusive breastfeeding was also recommended regardless as to whether mothers chose to provide KMC. The study was explained to mothers and families and written consent for participation was sought. In total 1,007 mother and baby pairs were enrolled in the study. Preterm twins were recorded as two separate pairs in the analysis. Those who chose to provide KMC were termed the “KMC group” (N = 752) and those who chose not to provide KMC were called the “no-KMC group” (n = 255). The specific KMC provision flow diagram is shown in Fig. 1.

Basic maternal socio-demographic information was collected using a structured survey along with obstetric history including maternal parity, presence of obstetric complications and mode of delivery. The newborns birthweight and gestational age were recorded. During hospital stay feeding outcome and method were recorded daily, and each episode of KMC provision was recorded and its length noted. At hospital discharge feeding practice (outcome and method) for the preceding 24 hours was recorded. A follow-up survey was conducted by phone for all participants 42 days after hospital discharge. The survey included questions about feeding practice (outcome and method) provision of KMC after discharge, the incidence of serious disease in mother or newborn and the current weight of the infant.

Ethical approval for the study was obtained from Peking University First Hospital Biomedical Research Ethics Committee. All participants gave written consent.

Measures and variables

The main outcome variables analyzed were the feeding outcome and the feeding method of preterm infants 24 hours before discharge and 42 days after discharge. Feeding outcome refer to the make-up of the infant’s feeds, classified as “exclusive breastmilk feeding”, “exclusive formula feeding” or “mixed feeding” (when a baby receives both breast and formula milk), while feeding method refers to the way in
which newborns receive their milk, this was classified as either “breastfeeding” (breastfeeding, or breastfeeding and other fed) or “other” which only included babies fed via bottle, tube, syringe or cup and no breastfeeding.

The independent variable in the analysis was KMC vs. no-KMC. We also included other socio-demographic indicators as exposure variables in the study, including maternal age, education attainment (high school, college, university and above), occupation (government employee, technician, worker, etc.), parity (primipara or multipara), pregnancy-related complications (yes, or no), infant’s birth weight (≥ 2500 g, or < 2500 g) and gestational week (36 weeks, or less than 36 weeks).

Additionally, for the KMC groups, we documented the total KMC session numbers and duration of each KMC session during hospital stay.

Statistical analysis

Selected socio-demographic and delivery-related variables were considered separately for the KMC and no-KMC groups. The average KMC frequency and KMC duration were distinguished for the KMC group only. To compare the difference in feeding outcome and feeding method between KMC and no-KMC groups, the unadjusted percentage of breastfeeding outcome and method at discharge and 42 days after discharge was calculated.

Logistics regression was used to analyze the association between KMC and feeding outcome and method. All models were commonly adjusted for covariates including age, education, occupation, parity, pregnancy-related complications, mode of delivery, birthweight and gestational age. Odds ratio for feeding outcome at discharge and at follow-up, and feeding method, were reported within KMC and no-KMC groups. All statistical analyses were performed using Stata V14, and SAS V.9.3, and test results were reported to be significant at 0.05 level.
Results

Table 1 presents the general characteristics of the study population separated by their allocation to the KMC group or the no-KMC group. The analysis excludes those who could not be successfully followed-up (N = 153), 116 were from the KMC group and 37 from the no-KMC group. The follow-up rates were similar in both groups (KMC group 84.6% vs. no-KMC 85.5%). A total of 844 participants were included in the final analysis, of these 627 (74.3%) chose to provide KMC on the postnatal ward. Mothers in the KMC and no-KMC groups were found to be similar in terms of age, educational attainment and parity. Compared with KMC group (56.3%), there were more mothers with pregnancy-related complications in the no-KMC group (72.8%). Similarly, there were more mothers that delivered through C-section in the no-KMC group (69.6%) than in the KMC group (60.5%). 12.8% of mothers in the KMC group delivered before completing 36 weeks gestation, significantly higher than the no-KMC group (3.2%). KMC was provided an average of 3.5 times before hospital discharge and the average duration each time was 65.8 minutes.
|                                | Kangaroo mother care (N=627) | No Kangaroo mother care (N=217) | p value |
|--------------------------------|------------------------------|---------------------------------|---------|
| Age                            |                              |                                 | 0.213   |
| < 30                           | 212 (33.81%)                 | 87 (40.09%)                     |         |
| 30-34                          | 234 (37.32%)                 | 77 (35.48%)                     |         |
| >=35                           | 181 (28.87%)                 | 53 (24.42%)                     |         |
| Education attainment           |                              |                                 | 0.514   |
| High school                    | 205 (32.70%)                 | 67 (30.88%)                     |         |
| College                        | 152 (24.24%)                 | 47 (21.66%)                     |         |
| University & above             | 270 (43.06%)                 | 103 (47.47%)                    |         |
| Parity                         |                              |                                 | 0.804   |
| Primipara                      | 387 (61.72%)                 | 136 (62.67%)                    |         |
| Multipara                      | 240 (38.28%)                 | 81 (37.33%)                     |         |
| Pregnancy-related complications|                              |                                 | <0.001* |
| No                             | 274 (43.70%)                 | 59 (27.19%)                     |         |
| Yes                            | 353 (56.30%)                 | 158 (72.81%)                    |         |
| Delivery mode                  |                              |                                 | 0.016*  |
| Vaginal delivery               | 248 (39.55%)                 | 66 (30.41%)                     |         |
| C-section                      | 379 (60.45%)                 | 151 (69.59%)                    |         |
| Birth weight                   |                              |                                 | 0.133   |
| Normal (>=2500)                | 545 (86.92%)                 | 197 (90.78%)                    |         |
| Low weight (<2500)             | 82 (13.08%)                  | 20 (9.22%)                      |         |
| Gestational week               |                              |                                 | <0.001* |
| 36 weeks                       | 547 (87.24%)                 | 210 (96.77%)                    |         |
| Less than 36                   | 80 (12.76%)                  | 7 (3.23%)                       |         |
| Average KMC frequency before discharge (mean ± SD) | 3.47 (1.74) | - | - |
| Average KMC duration before discharge (minutes, mean ± SD) | 65.75 (58.27) | - | - |

Note: Values are n (%) unless otherwise specified

**Table 1. Basic characteristics of the study population by kangaroo mother care group**

Figure 2 compares feeding outcome and method at discharge and at follow-up in the two groups. For feeding outcome, more mothers in the KMC group practiced exclusive breastmilk feeding at discharge (54.6%) and at follow-up (57.3%), compared with mothers in the no-KMC group (34.6% at discharge and 33.2% at follow-up,). The majority of mothers in the no-KMC group chose mixed-feeding at discharge (63.1%) and at follow-up (62.7%). In both groups very few mothers chose formula-feeding only. As for feeding method, both groups experienced an increase in breastfeeding rate at follow-up, while compared with mothers in the no-KMC group, mothers in the KMC group were more likely to be breastfeeding at discharge (52.1% vs. 65.3% respectively) and at follow-up (67.3% vs. 83.1%). The increase in the KMC group was larger than in the no-KMC group.
Table 2 illustrates the results of the logistics regression, analyzing the association between selected variables and feeding outcome, and feeding method at discharge and follow-up. After adjusting for other co-variates including age, education, occupation, parity, presence of complications, mode of delivery, birth weight and gestational age. Intermittent KMC was significantly associated with an increased likelihood of exclusive breastmilk feeding (outcome) and breastfeeding (method). Compared with mothers in the no-KMC group, mothers in the KMC group were twice as likely to perform exclusive breastmilk feeding at discharge (OR = 2.15 (1.53–3.02)), and breastfeed (method) at discharge (OR = 1.61 (1.15–2.25)), provide exclusive breastmilk feeding at follow-up (OR = 2.55 (1.81–3.61)), and breastfeeding (method) at follow-up (OR = 2.09 (1.44–3.02)). It was observed that education attainment and parity did not significantly influence breastfeeding practice, older mothers (over 30 years of age) were less likely to exclusively breastfeed at follow-up than their younger counterparts. Mothers with complications were less likely to perform breast feeding (method) (OR = 0.69 (0.51–0.94) at discharge, OR = 0.68 (0.47–0.99) at follow-up), though our results indicate that it does not influence breastfeeding outcome.
Table 2. Odds ratio of the association between selected variables and exclusive breastmilk feeding (outcome), breast feed (method) at discharge and at follow-up

Discussion

This study is the largest and one of only a few studies on KMC and breastfeeding in China. Our analysis shows that KMC was associated with a nearly two-fold increase in exclusive breastmilk feeding (outcome) and breast feeding (method) at both discharge and follow-up in late preterm infants. Our results suggest that for late preterm newborns on postnatal wards (with mother), relatively brief exposure to intermittent KMC in facility was associated with increased exclusive breastfeeding at discharge and at follow up.

Preterm infants are at a higher risk for late breastfeeding onset and early
breastfeeding cessation when compared to infants born at term (9), due to a series of barriers including but not limited to a lack of adequate breast milk, an immature uncoordinated sucking pattern and increased likelihood of maternal symptoms of depression due to preterm delivery (4,10,11). This also applies to late preterm infants (12,13). Inadequate milk intake contributes to slow weight gain and protracted jaundice in late preterm infants, making routine formula supplementation and early termination of breastfeeding more likely (14).

Our study is consistent with previous evidence from published literature that frequent skin-to-skin contact between mother and baby is crucial to the successful transition to direct breastfeeding in preterm infants (7,11) and initiation of exclusive breastfeeding in healthy full-term babies (15). Early skin-to-skin contact, within the first hour of birth, if possible, facilitates maternal milk production (16,17). While continued skin-to-skin contact on a daily basis accelerate neurophysiological development of the preterm infant (18), which contributes to establishment of effective suckling behavior. KMC on postnatal wards minimizes mother-infant separation time and likely increase breastfeeding (4,19).

It is noteworthy that KMC may play a role in alleviating stress related to preterm birth, encouraging mothers to care for their late preterm infants and breastfeed. Parents of late preterm infants are likely to exhibit a lack of confidence and some may exhibit distress during feeding or symptoms of depression (20–22). A previous study on breastfeeding outcomes for preterm infants in China suggests that mothers of preterm newborns experienced low self-efficacy for breastfeeding and are more likely to have symptoms of depression, contributing to unsuccessful establishment of breastfeeding (4). It is likely that KMC encouraged mothers to relieve their stress and boost their confidence, and in the process nurses and health professionals
could provide breastfeeding support, which may increase mothers’ probability to initiate breastfeeding for late preterm infants.

Our analyses indicate that intermittent KMC on postnatal wards may have an impact on exclusive breastfeeding, not only at discharge, but up to 42 days after discharge. Given the extremely low exclusive breastfeeding rate (29.2%) at six months in China (3), our study has strong public health implications. KMC is recommended for newborns under 2000 g, however use of intermittent KMC for late preterm infants on postnatal wards could be encouraged by health professionals in order to improve breastfeeding outcomes. Further studies should be conducted as to whether regular skin to skin contact between mothers and their full-term newborns could be applied with the intention of improving breastfeeding outcome in China.

Despite being the largest study on KMC and breastfeeding in China, there are several limitations to be considered. The study was not a randomized controlled trial, as KMC is known to be beneficial for preterm newborns it was deemed unethical to randomize mothers and babies to a group where they would not be encouraged to practice KMC. It is possible that those who opted to provide KMC may have been more likely to breastfeed their babies than those who chose not to provide KMC; however, we found no significant difference in socio-demographic characteristics (including age and educational attainment) between the two groups. Moreover, the exclusive breastfeeding rate for mothers who did not provide KMC (33.2% at 42 days follow-up) is similar to the national exclusive breastfeeding rate at six months (29.2%); therefore, we believed that the finding that KMC was associated with an increase in breastfeeding is valid.

Secondly, we also noted difference in the KMC vs. no-KMC ratio across four study hospitals especially where in one hospital almost all of the participating mothers
chose to provide KMC to their babies. We also did an additional analysis excluding this hospital and the results were similar (see supplementary appendix).

Nonetheless, we believe that the four hospitals enrolled are all tertiary hospitals with minimal difference in service delivery capacity, and it would be appropriate and useful to compare breastfeeding pattern between mothers in different hospitals, thus we included all of them in our analysis.

A third limitation is that, those who were not successfully followed-up were excluded from the analysis, which may lead to selection bias. However, the loss to follow-up rate was similar between in the KMC and the no-KMC group (15.4% vs. 14.5%). Within the KMC group, those lost to follow-up reported a higher exclusive breastfeeding rate at discharge than those who were successfully followed-up (60.0% vs. 54.6%), while within the no-KMC group those who were lost reported a lower rate than those who were followed-up (23.5% vs. 34.6%). This suggests that the results of our analysis may underestimate the association between intermittent KMC and improved breastfeeding outcomes as the actual impact may be greater.

Lastly, the major outcome variables of breastfeeding were only collected at hospital discharge and at 42 days follow-up. The study would have benefited from a longer-term outcome variable, e.g. exclusive breastfeeding at 6-months of age, in order to provide a more robust clinical and public health recommendation.

**Conclusion**

In this observational study, we found that KMC was associated with a nearly two-fold increase in exclusive breastmilk feeding (outcome) and breast feeding (method) at both discharge and at 42 days follow-up in late preterm infants. We believe this demonstrates the benefit of even “low-dose” intermittent Kangaroo mother care in
late preterm infants. Additionally, considering the extremely low exclusive breastfeeding rate in China, KMC promotion for late preterm newborns on postnatal wards may be an effective and a feasible strategy to increase breastfeeding in China.

Declarations

**Ethics approval and consent to participate:** Ethical approval was obtained by Peking University First Hospital Biomedical Research Ethics Committee. All participants gave written consent.

**Consent for publication:** Not applicable

**Availability of data and materials:** The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

**Competing interests:** The authors declare that they have no competing interests.

**Funding:** Save the Children International

**Authors’ contributions:** B. Zhang, J. Yue and Y. Zhao conceived of the analysis. B. Zhang, L. Huang, X. Zhang, W. Wu and G. Zhao led the data collection process. B. Zhang and Y. Zhao produced the estimates, created figures and tables and wrote the first draft of the manuscript. S. Wall, S. Williams, J. Yue, J. Liu and G. Zhao provided critical feedback on the first draft of the manuscript. L. Zhang managed the production process. All authors read and approved the final manuscript.

**Acknowledgements:** We thank Greta Wetzel and Ying Cao for their assistance for the manuscript production and all the participants for their participation.

**References**

1. World Health Organization. WHO recommendations on interventions to improve
preterm birth outcomes [Internet]. 2015 [cited 2019 Dec 4]. Available from: https://www.who.int/reproductivehealth/publications/maternal_perinatal_health/preterm-birth-guideline/en/

2. Boundy EO, Dastjerdi R, Spiegelman D, Fawzi WW, Missmer SA, Lieberman E, et al. Kangaroo Mother Care and Neonatal Outcomes: A Meta-analysis. Pediatrics. 2016 Jan 1;137(1):e20152238.

3. Rate of breastfeeding in China lower than 30 percent: survey - Chinaldail.com.cn [Internet]. [cited 2019 Aug 16]. Available from: https://www.chinadaily.com.cn/a/201902/26/WS5c74f24ca3106c65c34eb82a.html

4. Wang Y, Briere C-E, Xu W, Cong X. Factors Affecting Breastfeeding Outcomes at Six Months in Preterm Infants. J Hum Lact. 2019 Feb 1;35(1):80-9.

5. Yang Y, Li R, Wang J, Huang Q, Lu H. Knowledge of healthcare providers regarding breastfeeding preterm infants in mainland China. BMC Pediatr [Internet]. 2018 Jul 31 [cited 2019 Aug 16];18. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6069978/

6. Lewandowski AJ, Lamata P, Francis JM, Piechnik SK, Ferreira VM, Boardman H, et al. Breast Milk Consumption in Preterm Neonates and Cardiac Shape in Adulthood. Pediatrics [Internet]. 2016 Jul [cited 2019 Nov 7];138(1). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6198929/

7. Conde‐Agudelo A, Belizán JM, Diaz‐Rossello J. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. Cochrane Database Syst Rev [Internet]. 2011 [cited 2019 Aug 16];(3). Available from: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD002771.pub2/full

8. Lawn JE, Mwansa-Kambafwile J, Horta BL, Barros FC, Cousens S. ‘Kangaroo mother care’ to prevent neonatal deaths due to preterm birth complications.
9. Giannì ML, Bezze E, Sannino P, Stori E, Plevani L, Roggero P, et al. Facilitators and barriers of breastfeeding late preterm infants according to mothers’ experiences. BMC Pediatr. 2016 Nov 8;16(1):179.

10. Meier P, Patel AL, Wright K, Engstrom JL. Management of breastfeeding during and after the maternity hospitalization for late preterm infants. Clin Perinatol. 2013 Dec;40(4):689–705.

11. Lucas RF, Smith RL. When is it safe to initiate breastfeeding for preterm infants? Adv Neonatal Care Off J Natl Assoc Neonatal Nurses. 2015 Apr;15(2):134–41.

12. Wang ML, Dorer DJ, Fleming MP, Catlin EA. Clinical outcomes of near-term infants. Pediatrics. 2004 Aug;114(2):372–6.

13. Engle WA, Tomashek KM, Wallman C, Committee on Fetus and Newborn, American Academy of Pediatrics. “Late-preterm” infants: a population at risk. Pediatrics. 2007 Dec;120(6):1390–401.

14. Meier PP, Furman LM, Degenhardt M. Increased lactation risk for late preterm infants and mothers: evidence and management strategies to protect breastfeeding. J Midwifery Womens Health. 2007 Dec;52(6):579–87.

15. Moore ER, Bergman N, Anderson GC, Medley N. Early skin-to-skin contact for mothers and their healthy newborn infants. Cochrane Database Syst Rev [Internet]. 2016 [cited 2019 Sep 4];(11). Available from: https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD003519.pub4/full

16. Hurst NM, Valentine CJ, Renfro L, Burns P, Ferlic L. Skin-to-skin holding in the neonatal intensive care unit influences maternal milk volume. J Perinatol Off J Calif Perinat Assoc. 1997 Jun;17(3):213–7.
17. Nyqvist KH. Early attainment of breastfeeding competence in very preterm infants. Acta Paediatr. 2008;97(6):776–81.

18. Maastrup R, Hansen BM, Kronborg H, Bojesen SN, Hallum K, Frandsen A, et al. Breastfeeding Progression in Preterm Infants Is Influenced by Factors in Infants, Mothers and Clinical Practice: The Results of a National Cohort Study with High Breastfeeding Initiation Rates. PLoS ONE [Internet]. 2014 Sep 24 [cited 2019 Aug 20];9(9). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4177123/

19. Elander G, Lindberg T. Short Mother-Infant Separation during First Week of Life Influences the Duration of Breastfeeding. Acta Paediatr. 1984;73(2):237–40.

20. Premji SS, Pana G, Currie G, Dosani A, Reilly S, Young M, et al. Mother’s level of confidence in caring for her late preterm infant: A mixed methods study. J Clin Nurs. 2018 Mar;27(5–6):e1120–33.

21. Premji SS, Currie G, Reilly S, Dosani A, Oliver LM, Lodha AK, et al. A qualitative study: Mothers of late preterm infants relate their experiences of community-based care. PLoS ONE [Internet]. 2017 Mar 23 [cited 2019 Aug 22];12(3). Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5363959/

22. Dosani A, Hemraj J, Premji SS, Currie G, Reilly SM, Lodha AK, et al. Breastfeeding the late preterm infant: experiences of mothers and perceptions of public health nurses. Int Breastfeed J. 2017 May 8;12(1):23.

Figures
Figure 1

Operational process for Kangaroo mother care on postnatal wards
Figure 2

Feeding outcome (a) and methods (b) at discharge and at follow-up

Supplementary Files

This is a list of supplementary files associated with the primary manuscript. Click to download.

Supplementary appendix.docx