

## Evaluating Maternal Discharge Readiness in Kangaroo Mother Care

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**Objective:** To develop and apply a tool for measuring hospital discharge readiness of mothers practicing continuous kangaroo mother care (KMC) in a tertiary setting. **Methods:** A 22-item questionnaire was adapted from an existing tool. After a pilot ( $n=20$ ), the survey was administered to 200 mothers in the KMC unit, Kalafong Hospital, South Africa from 2017-2018. Two items which asked participants how confident and ready they felt overall were used to categorize women as 'ready' or 'less ready' for discharge. **Results:** Most women ( $n=168$ , 88.0%) were categorized as ready for discharge. The mean (SD) score for all 22 questions was 9.4 (0.7). Women categorized as 'less ready' scored lower overall (mean difference: 1.3) and within all four questionnaire categories compared to women who were discharge ready ( $P<0.05$ ). **Conclusions:** Although most women in this study reported high levels of discharge readiness, further research is needed to see if results are comparable across settings.

**Keywords:** Hospital discharge, Outcome, Premature neonates, South Africa.

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Kangaroo mother care (KMC) is one of the ten key interventions recommended by the World Health Organization [1] to improve the survival and health outcomes of premature neonates [2]. The majority of low birthweight (LBW) infants are born in low- and middle-income countries (LMICs) [3], where KMC has been shown to reduce the risk of mortality by 40% compared to conventional neonatal care [4].

There is a growing recognition of the importance of maternal self-reported discharge readiness [5], as research from high-income settings has identified that inadequate maternal discharge readiness is associated with increased health service utilization [6,7], low confidence in providing infant care, and greater difficulty with stress, recovery, self-care and coping in the early postnatal period [8,9]. However, there is little evidence from LMICs of self-reported hospital discharge readiness in women after giving birth, especially in the context of KMC. This study aims to address this gap by piloting and implementing a tool for evaluating self-reported maternal discharge readiness among women practicing continuous KMC in a tertiary hospital setting in South Africa.

### METHODS

Kalafong Hospital is a public teaching hospital with approximately 6000 deliveries per year. It serves women of

predominantly low socioeconomic backgrounds, many of whom live in informal settlements. The KMC unit is one of the most well-established in the region, accommodating up to 20 mother baby dyads at any time.

Most LBW and premature babies receive intermittent KMC in the high-care neonatal unit before being transferred to the KMC unit for continuous KMC. A multidisciplinary team of medical and nursing staff, dieticians, and occupational and speech-language therapists provide extensive discharge preparation to mothers on feeding, KMC techniques, infant care, hygiene, medications, and follow-up arrangements. Evaluating correct feeding techniques for preterm babies and touching and handling are very important before making a decision on discharge from hospital. Most babies receiving continuous KMC tend to be discharged from hospital earlier [10], at a lower weight, and still on top-up expressed breast milk fed by cup.

The questionnaire used in the current study was adapted from the Parent Discharge Readiness Survey [11]. Face validity of the adapted questionnaire was evaluated by local health professionals and researchers, and a focus group discussion with five study-eligible women. It was then piloted with a sample of 20 women who met the study inclusion criteria. Average inter-item correlation was 0.16 (acceptable level 0.2-0.4) [12] and principal components

analysis (PCA) identified ten components with an Eigen value >1. As questions were clinically informed, with the intent of gathering information to improve clinical practice, no questions were removed. Cronbach's alpha of the questionnaire was 0.81 and was not improved if questions were removed to increase internal consistency.

The study population comprised all eligible women staying in the KMC unit between 1 November, 2017 and 30 April, 2018. Recruitment was conducted using convenience sampling. Of 212 women who were approached, 200 (94.3%) agreed to participate. Reasons for non-participation included: depression, previous bad experience with research, or disinterest.

The included women were aged 18 years or older who spoke any of the Sotho or Nguni languages, Afrikaans, or English, staying in the KMC ward for at least three days with an infant born prior to 37 weeks (preterm) or under 2500g at birth (LBW). Women with major social issues (e.g., alcohol or drug addiction), those exclusively formula feeding (as breastfeeding is a core component of continuous KMC), and mothers of infants admitted for palliative care were excluded.

Two trained research assistants administered the questionnaire on the day of hospital discharge through face-to-face interview of approximately 30 minutes duration, in the woman's preferred language. They recorded responses in English. Hospital records provided maternal and neonatal clinical information and socio-demographic data, which were complemented by data collected upon recruitment. In the case of multiple births, information from the twin with the poorest clinical indicators was used (e.g., lowest birth weight) and the twin pair considered one entity relating to the mother, as the condition of the poorer twin is the main criterion for discharge planning according to hospital protocol.

Maternal discharge readiness was treated as a dichotomous variable (ready/less ready). Two questions asking about overall discharge readiness were used to determine overall level of perceived readiness on a 10-point scale (Q18 and Q22). Women scoring  $\leq 8$  on either of these two questions were categorized as 'less ready' while women scoring  $> 8$  on both questions were categorized as discharge 'ready.'

*Statistical analysis:* Crude differences between discharge 'ready' and 'less ready' groups were evaluated with Pearson chi-square and Fisher exact test for categorical variables, and independent samples *t*-test for continuous variables. Crude differences between discharge 'ready' and 'less ready' groups on each item were investigated using independent samples *t*-test. All data were analyzed

using IBM SPSS Statistics version 25 statistical software with level of significance set at  $P < 0.05$ .

## RESULTS

Of the 200 women who agreed to participate, 190 (95%) women were included in the analysis of discharge readiness. Women were excluded if they were transferred to another hospital ( $n=5$ ), discharged prior to completing the questionnaire ( $n=4$ ), or did not complete all questions ( $n=1$ ).

Descriptive characteristics of the study participants are presented in **Table I**. Most women reported they were of South African citizenship (78.5%), were multiparous (68.0%) and with a singleton pregnancy (86.5%). For infants, the mean (SD) gestational age at birth was 32.8 weeks (2.7), and birthweight was 1703g (424g). The mean (SD) gestational age at discharge was 36.1 (1.9) week.

A sensitivity analysis of the outcome measure (ready/less ready for discharge) was undertaken by adjusting the cut-off score applied to Q18 and Q22 from 7 to 9 to assess the proportion of women being classified as ready/less ready. It was determined that a score of  $\leq 8$  (out of 10) on Q18 or Q22 allowed for reasonable discrimination between the two groups, and was also most consistent with the original tool [11]. In contrast, the mean of all 22 items with the cut-off score  $\leq 8$  resulted in 95% of participants categorized as 'ready' and therefore did not provide good discrimination between 'ready' and 'less ready' mothers in our study. The majority of women were categorized as discharge ready ( $n=168$ , 88%). Women who were considered less ready ( $n=22$ , 12%) were more likely to be younger, have a multiple pregnancy, and have an infant who was smaller at both admission to and discharge from the KMC unit ( $P < 0.05$ ).

The 'less ready' group scored lower overall and in each category of questions compared to women who were discharge 'ready' (**Table II**). Mean scores for the 'less ready' group were 1.2 points (12.6%) lower across feeding-related questions, 0.9 points (9.5%) lower across questions related to infant care, 1.3 points (13.8%) lower across infant health and medications questions, and 1.0 point (10.1%) lower across questions related to KMC.

**Web Table I** shows mean scores for each discharge readiness questionnaire item. Women who were 'less ready' scored significantly lower, on average, than women who were discharge 'ready' on all but four individual questions (Q4, Q7, Q9, and Q21;  $P < 0.05$ ). The greatest differences between the 'ready' and 'less ready' groups were seen in four questions: Question 18 'How confident/sure do you feel that you are ready for your baby to come home?' (mean difference: 2.6,  $P < 0.001$ ); Question 22 'Please tell us how ready you feel overall to take your baby home.'

**Table I Descriptive Characteristics of Study Participants**

Characteristic	All (N=200)	Discharge readiness	
		Ready (n=168)	Less ready (n=22)
Maternal			
Age, y <sup>a,b</sup>	28.8(6.0)	29.2 (6.2)	27.0 (4.5)
Country of citizenship			
South Africa	157 (78.5)	130 (77.4)	18 (81.8)
Zimbabwe	32 (16.0)	30 (17.9)	1 (4.5)
Malawi	6 (3.0)	3 (1.8)	3 (13.6)
Lesotho	2 (1.0)	2 (1.2)	0
DRC	1 (0.5)	1 (0.6)	0
Other	2 (1.0)	2 (1.2)	0
Rural home	20 (10.0)	16 (9.5)	3 (13.6)
Married or co-habiting	106 (53.0)	92 (54.8)	10 (45.5)
Maternal income <sup>a,c</sup> (n=102)	3104 (2691)	3057 (2738)	3740 (2543)
Paternal income <sup>a,c</sup> (n=97)	6401 (6516)	6645 (6814)	5398 (5020)
Primipara	64 (32.0)	51 (30.4)	10 (45.5)
Mode of delivery (n=195)			
Vaginal birth	91 (45.5)	76 (45.2)	12 (54.5)
Caesarean birth	104 (52.0)	87 (51.8)	10 (45.5)
Multiple pregnancy <sup>c</sup>	27 (13.5)	18 (10.7)	6 (27.3)
HIV-positive	46 (23)	43 (25.6)	2 (9.1)
Neonatal			
GA at birth, wk <sup>a</sup>	32.8 (2.7)	32.8 (2.7)	32.7 (2.3)
Birthweight, g <sup>a</sup>	1703 (424)	1719 (439)	1654 (308)
1500-2499 g	138 (69.0)	115 (68.5)	18 (81.8)
1000 to 1499 g	49 (24.5)	42 (25.0)	3 (13.6)
≤999 g	13 (6.5)	11 (6.5)	1 (4.5)
Males	114 (57.0)	96 (57.1)	12 (54.5)
Admission weight, g <sup>a,c,e</sup>	1769 (330)	1794 (343)	1684 (209)
Discharge weight, g <sup>a,c,e</sup>	2025 (304)	2059 (307)	1907 (222)
Days in high care prior to KMC unit <sup>d</sup>	13.2 (12.1)	13.4 (12.1)	13.3 (12.0)
Days in KMC unit <sup>d</sup>	10.2 (7.2)	10.4 (7.6)	9.6 (3.9)
Oxygen therapy <sup>e</sup>	57 (28.5)	49 (29.2)	6 (27.3)
Oxygen therapy (d) <sup>a,e</sup>	3.2 (6.8)	3.4 (7.1)	2.7 (5.0)
Breastfeeding	200 (100)	168 (100)	22 (100)
Medically complex	97 (48.5)	84 (50.0)	10 (45.5)

The sample for discharge readiness was 190. Values in no. (%) except <sup>a</sup>mean (SD). GA: gestational age, DRC-Democratic Republic of the Congo. <sup>b</sup>P=0.05. <sup>c</sup>P<0.05. <sup>d</sup>income per month in Rand; <sup>e</sup>in KMC unit.

(mean difference: 2.3,  $P<0.001$ ); Question 14 'How confident/sure do you feel that your baby is strong enough to go home now?' (mean difference: 2.3,  $P<0.001$ ); and Question 13 'How confident/sure do you feel that your baby's heart and breathing are stable and it is safe to go home?' (mean difference: 2.0,  $P<0.001$ ).

**Table II Mean Scores by Question Category**

	All (n=190)	Discharge readiness groups	
		Ready (n=168)	Less ready (n=22)
Feeding	9.3 (0.9)	9.5 (0.7)	8.3 (1.1)
Infant care	9.4 (0.9)	9.5 (0.8)	8.6 (1.3)
Infant health and medications	9.3 (0.9)	9.4 (0.8)	8.1 (1.1)
Practising KMC	9.8 (0.7)	9.9 (0.4)	8.9 (1.3)
Overall	9.4 (0.7)	9.6 (0.5)	8.3 (0.9)

Values in mean (SD). For comparison between 'ready' and 'less ready' groups,  $P<0.001$  for 'feeding' and for 'infant health and medications' categories, and  $P<0.01$  for 'infant care' and 'practicing KMC' categories. Overall  $P<0.001$ .

## DISCUSSION

To our knowledge, this is the first time a survey instrument has been used to empirically examine maternal discharge readiness in a LMIC setting. The questionnaire developed in the current study builds on an existing validated tool [11], focusing on those components appropriate in the context of facility-based continuous KMC.

Although babies in our study were discharged earlier than higher income settings, most women (88%) still reported high levels of readiness to return home with their infant(s) at the time of discharge. This may reflect the context of facility-based KMC where mothers are their infant's primary caregiver, and the strong focus on discharge preparation and education in the study setting. Women in the current study scored highly on questions specifically related to feeding, infant care, infant health/medications, and ability to practice KMC. Even women who were categorized as 'less ready' for discharge, had a mean score  $>8$  in each questionnaire category. This may indicate that although some mothers felt less ready for discharge in general, the quality of discharge preparation in the KMC unit ensures mothers have the skills to safely care for their infants. The high level of self-reported discharge readiness observed in the current study may also reflect the fact that the study hospital has one of the most well established KMC programs in South Africa.

Some limitations exist with this study. The generalizability of this study is limited by the small sample size, convenience sampling method, and the single-center setting characterized by maternity patients of predominantly low socioeconomic status, as well as early discharge from the KMC unit.

In conclusion, the maternal discharge readiness questionnaire is a useful tool for use among mothers in an established continuous KMC unit in a LMIC setting. Most

### WHAT THIS STUDY ADDS?

- This study highlights the importance of quality preparation for mothers practising continuous kangaroo mother care prior to discharge from hospital.

women undertaking continuous KMC in the study setting reported high levels of perceived readiness at the time of discharge, including preparedness with feeding and caring for their infants, confidence in their infants' health, and their ability to continue KMC at home. Further research is needed in different LMIC contexts to see if results are comparable across settings.

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**Note:** Additional material related to this study is available with the online version at [www.indianpediatrics.net](http://www.indianpediatrics.net)

**Ethics clearance:** Research Ethics Committee of the Faculty of Health Sciences, University of Pretoria (187/2017; 9 June, 2017), the Research Ethics Committee of Kalafong Hospital (KPTH 34/2017; 13 June, 2017), and the Human Ethics Committee, University of Western Australia (RA/4/1/9307; 25, July 2017).

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**Web Table I Scores on Individual Maternal Discharge Readiness Items**

<i>Questionnaire Item</i> All (n=190)	<i>Ready ( n=168) Less ready (n=22)</i>		
<i>How prepared do you feel...</i>			
Q1. ...to breastfeed your baby? <sup>b</sup>	9.2 (1.3)	9.4 (1.2)	8.1 (1.8)
Q2. ...to express your own breastmilk for your baby? <sup>d</sup>	9.2 (1.4)	9.5 (1.1)	7.7 (2.0)
Q3. ...to cup feed expressed breastmilk to your baby? <sup>a</sup>	9.1 (1.5)	9.2 (1.3)	7.6 (1.6)
Q4. ...to know how much FM 85 powder to add to your expressed breastmilk?	9.0 (1.8)	9.1 (1.9)	8.5 (1.2)
Q5. ...to bathe, change nappy and dress your baby? <sup>c</sup>	9.8 (0.8)	9.9 (0.7)	9.2 (1.3)
Q6. ...about your knowledge of how many wet nappies and bowel movements your baby will have per day? <sup>b</sup>	8.8 (2.1)	8.9 (2.0)	7.6 (2.4)
Q7. ...to know that your baby is warm enough? <sup>e</sup>	9.2 (1.6)	9.3 (1.5)	8.4 (2.1)
Q8. ...on what medicines your baby will take at home?	9.6 (1.1)	9.6 (1.1)	9.1 (1.3)
Q9. ...to give these medicines to your baby? <sup>c</sup>	9.6 (1.1)	9.7 (1.0)	8.7 (1.7)
Q10. ...about what you must do when your baby has a fever or gets sick at home? <sup>b</sup>	9.1 (1.5)	9.3 (1.3)	7.9 (2.0)
Q11. ...to practise continuous KMC at home? <sup>b</sup>	9.8 (0.7)	9.9 (0.4)	8.8 (1.5)
Q12. ...to tie your baby in the KMC position? <sup>c</sup>	9.8 (0.9)	9.8 (0.8)	9.0 (1.4)
<i>How confident/sure do you feel...</i>			
Q13. ...that your baby's heart and breathing are stable and it is safe to go home? <sup>a</sup>	8.9 (1.6)	9.2 (1.5)	7.2 (1.5)
Q14. ...that your baby is strong enough to go home now? <sup>a</sup>	9.0 (1.4)	9.3 (1.2)	7.0 (1.7)
Q15. ...that you will be able to breastfeed your baby at home? <sup>b</sup>	9.6 (0.9)	9.8 (0.7)	8.8 (1.5)
Q16. ...that you will be able to cup feed your baby at home? <sup>b</sup>	9.4 (1.3)	9.4 (1.2)	8.7 (1.2)
Q17. ...that you know when and how often to feed your baby during the day/night? <sup>c</sup>	9.7 (0.7)	9.8 (0.6)	9.0 (1.3)
Q18. ...that you are ready for your baby to come home? <sup>a</sup>	9.6 (1.0)	9.9 (0.3)	7.3 (1.4)
Q19. ...that you can carry your baby skin-to-skin at home? <sup>b</sup>	9.8 (0.7)	9.9 (0.3)	8.9 (1.4)
Q20. ...that you will be able to take care of your baby at home? <sup>c</sup>	9.8 (0.5)	9.9 (0.3)	9.3 (1.1)
Q21. ...to give your baby the daily medicine?	9.8 (0.7)	9.8 (0.7)	9.5 (0.8)
Q22. Please tell us how ready you feel overall to take your baby home <sup>a</sup>	9.7 (1.0)	10.0 (0.2)	7.7 (2.0)

Value in mean (SD). <sup>a</sup>P<0.001; <sup>b</sup>P<0.01; <sup>c</sup>P<0.05; <sup>d</sup>P=0.01; <sup>e</sup>P=0.05.