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Research Article

Barriers to Kangaroo Mother Care and Increasing Kangaroo Mother Care Rates for Preterm and Low-Birth-Weight Newborns in a Special Care Newborn Unit - A Quality Improvement Initiative

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Abstract

Background: Kangaroo mother care is a well-recognized, evidence-based, low-cost intervention for preterm and/or low birth weight infants. Despite numerous benefits of KMC, it's still not well practiced in Bangladesh. There is a lack of knowledge about the importance of KMC for preterm and/or low-birth-weight babies among the general population and health care providers. The goal of this quality improvement project is to raise the KMC rate for preterm and/or low birth weight babies in our SCANU by using it as a baseline study.

Objectives: To assess the effectiveness of the quality improvement program in increasing the rate of KMC for preterm and/or LBW newborns admitted to SCANU.

Methods: Over the course of a year, this QI study was carried out in the Special Care Newborn Unit, Kurmitola General Hospital, Dhaka. This study comprised neonates < 37 weeks and/or ≤ 2400 gm and mother dyads. Baseline data were gathered during the observation period. The comprehensive counselling package, demonstration, documentation and reporting of KMC, provision of KMC bags and the display of KMC posters and videos marked the beginning of the intervention phase.

Results: A total of 116 preterm and/or LBW newborn and mother pairs were included in this study. Small for gestational age were more prevalent in the observation phase, while preterm were more prevalent in the intervention phase. Following the implementation of the QI initiative, the percentage of KMC initiation increased from 24.13% to100% and the mean postnatal age of KMC initiation improved from 3.35 ± 2.6 to 1.66 ± 1.2.

Conclusion: This study identified several challenges to KMC, including a lack of counselling, information, attitude, practice, and logistics. The rate of KMC and early beginning of KMC among preterm and/or LBW newborns admitted to the Special Care Neonatal Unit has significantly increased as a result of this quality improvement initiative.

Keywords: *Kangaroo Mother Care; Quality Improvement; Preterm; Low Birth Weight*

Introduction

The World Health Organization estimates that over 13 million babies are born prematurely every year, making up over 10% of all live births globally [1]. KMC is one of the five life-saving interventions for preterm care recommended by FIGO [2].

Among the 103 countries in the world, Bangladesh ranks first in the world for preterm birth, and this rate is 16.2%. Bangladesh holds the second position among 158 countries for low birth weight (LBW) in 2020. Twenty-five thousand newborns die per year in Bangladesh from prematurity and low birth weight [3].

Kangaroo mother care (KMC), commonly referred to as skin-to-skin contact, is an affordable, evidence-based intervention for preterm and LBW newborns. KMC reduces the risks of mortality by 32% during birth hospitalization or 28 days of age. KMC reduces the incidence of severe sepsis by 15% and hypothermia by 68%. Newborns who receive KMC show greater weekly improvements in anthropometric parameters (weight, length, and head circumference). Rates of exclusive breastfeeding were greater at discharge/28 days of life [4].

It can save about 450,000 fatalities annually and has a major effect on haemodynamic stability [5]. KMC provides a number of benefits, including early initiation of feeding, better growth and neurodevelopmental outcomes, and fortifies the mother-infant relationship [6].

Research indicates that KMC can reduce hospital stays for preterm and low-birth-weight infants [7]. Nevertheless, its innumerable benefits, KMC adoption and implementation have been limited. Even in places where KMC has previously been implemented, the period of practice remains minimal. Despite recommendations from WHO to implement immediate KMC after birth, there is still a delay in initiating KMC.

In 2013, the National Core Committee of Neonatal Health under the Ministry of Health and Family Welfare, International Centre for Diarrhoeal Disease Research, Bangladesh, and other partners implemented a policy that integrates KMC with newborn and maternal health. The goal is to reduce under-five mortality to 20 per 1,000 live births by 2035 by several techniques, including KMC for preterm/LBW infants.

Since 2013, WHO has facilitated the demonstration of the use of KMC at Dhaka Shishu Hospital in Bangladesh to enhance the survival of premature and LBW babies [8]. KMC implementation in Bangladesh is suboptimal due to structural circumstances and a lack of information about its benefits among the general public and healthcare personnel, particularly in rural areas.

To improve KMC throughout the country, it's important to prevent the initial separation of mother and baby, provide counselling and support to mothers and family members, and ensure WHO recommendations are followed from grassroots to tertiary centers. Every year, the SCANU at Kurmitola General Hospital cares for about 150 preterm and low birth weight babies. Despite its benefits, we noticed less practice of KMC in this SCANU.

Quality improvement activities increased KMC initiation among eligible preterm babies from 16% to 94.8% over an 8-week period [9]. Despite improvements in newborn KMC rates over the past decade, there is still a lack of support for mothers and caregivers to commence and sustain KMC in our country.

This study seeks to identify barriers to KMC and evaluate the impact of a comprehensive counselling package in enhancing KMC rates for preterm and/or LBW neonates admitted in the SCANU.

Materials and Methods

Study design

This QI study was done in the Special Care Newborn Unit, Kurmitola General Hospital, Dhaka, from July 2023 to June 2024.

Eligibility criteria

Inborn Preterm neonates < 37 weeks and/or ≤ 2400 gm and mother dyads, were eligible for enrolment. This study excluded newborns with gross congenital anomalies, any surgical condition, haemodynamic instability and babies who were getting phototherapy.

Data collection procedures

The following data were gathered: maternal sickness, number of fetuses, gestational age, birth weight, date of admission, mode of delivery, and demographic and socioeconomic data. There were two stages to this study. Baseline data were gathered during the observation phase, which ran from July 2023 to December 2023. The baseline data comprised counselling about the importance of KMC for a preterm and/or low birth weight baby, KMC demonstration, postnatal age of KMC commencement, average daily KMC duration per baby, and total number of days of receiving KMC.

Neonates < 37 weeks and/or ≤ 2400 gm and mother dyads who were included in the observation phase were regarded as the observation group. The intervention phase was started three weeks after the observation phase. During this intervening period, a quality improvement (QI) team was formed which comprised of two faculty in charge and two senior staff nurses. The principal investigator was a part of the QI team as a faculty in charge. Healthcare professionals were made aware of this plan so as to raise their awareness of the study.

To determine the potential causes of the lack of KMC in SCANU, a fishbone analysis was conducted. Important core causes were identified as the following: separation of mother and baby after birth because of admission to SCANU; lack of counselling, logistics, demonstration, and documentation of KMC; and inadequate knowledge of KMC among families and healthcare personnel.

Mothers had no ideas about KMC services when they gave birth to preterm and/or low-birth-weight babies. Therefore, it was challenging to convince them to practice KMC in the initial days following birth. Mother as well as families was not eager to provide KMC. However, the knowledge, attitude, and practice of health workers were insufficient to guide and persuade them. Healthcare professionals were unable to adequately explain the KMC idea and benefits, as well as who should receive it and why. Mothers therefore considered it as an additional burden.

To determine a priority among several root causes, pareto analysis was used. The actual data is shown in bar charts in descending order. The percentage of cumulative data is shown in ascending order on the line graph. An 88% reduction in KMC practice at SCANU was caused by a lack of awareness, counselling, logistic support, KMC demonstration, and documentation. Therefore, the goal of the intervention was to eradicate these significant underlying issues in order to improve KMC practice at SCANU.

The intervention phase (January 2024-June 2024) commenced with the implementation of a quality improvement effort. The features of the quality improvement initiative were a comprehensive counselling package, demonstration and documenting of KMC, and involvement of family members for giving KMC.

In the intervention phase, counselling was done for all the eligible mothers and family members. During the observation phase, we noticed that counselling was only done before the commencement of KMC. In the intervention phase, counselling was done during admission to SCANU, prior to beginning KMC and throughout the hospital stay to keep the mothers and family members motivated to start KMC as soon as possible after birth. Counselling is also done to keep the baby in KMC position as much as possible throughout the hospital stay and at home. As a result, mothers found themselves emotionally connected to their babies admitted to SCANU, which alleviated their fear and strengthened their mental fortitude. These all contributed to the early start and continuation of KMC.

Demonstration of KMC was done both by dummies and with the baby to mother and other family members. Demonstrations were done during admission, before starting KMC and throughout the hospital stay whenever needed. Pictorial demonstration as well as video demonstration of KMC through mobile phone were delivered among team members, mothers, and caregivers.

In the KMC position, mothers and other carers were afraid of slipping off the baby and moving with them without a binder. In order to make KMC more pleasant for moms and other caregivers, a KMC bags were provided for babies.

Posters were made depicting the concept, position and importance of KMC for preterm and/or low-birth-weight babies. These posters were hung on the wall and at the entrance of SCANU, which was very helpful for mothers and caregivers.

Written KMC order was started to give in treatment sheets with date and time so that it was ensured like other orders of feeding and drugs. To ensure KMC in the evening and at night, written handover was given by duty doctors and nurses. Whereas during the observation period, no written order and handover of KMC were given. Moreover, a reminder was given by the faculty in charge and nurses of the QI team through mobile phone to on-duty doctors and nurses, respectively.

Documentation was started using the KMC chart, which included the duration and vital signs of the baby. The KMC chart was filled up by on-duty nurses and doctors in each shift.

At the same time, we started maintaining the government's KMC record book, which made our documentation process more organized and robust. In contrast, the follow-up sheet was used for documentation during the observation period, which was not kept up to date, particularly during the night and evening shifts.

We started KMC reporting to the Director General of Health Services (DGHS). Since reporting to DGHS, we were able to sustain good quality of KMC services as healthcare providers became more alert regarding KMC, as below-average services would decrease the rating of our SCANU.

The key outcome was an increase in the KMC rate. The postnatal age at which KMC began, its length, and the total number of days spent in the hospital were the secondary outcomes. Data on outcome variables were collected and the two groups were compared.

Data analysis: Following collecting, data were entered into a computer, analyzed, and plotted in tables. The data were analyzed with SPSS version 20. Quantitative data were reported as mean ± SD and quantitative variables were compared using an independent sample t test. Categorical variables were expressed as percentage and compared using the Chi squared and Fisher's exact tests. P values < 0.05 were considered significant.

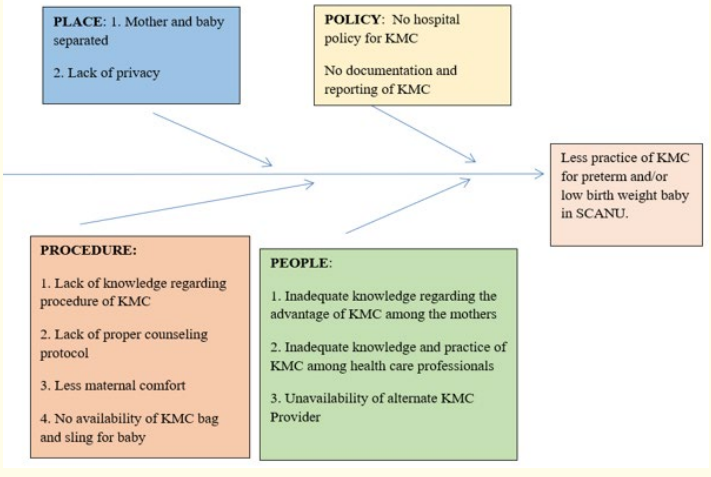

Figure 1: *Fishbone analysis; KMC: Kangaroo Mother Care.*

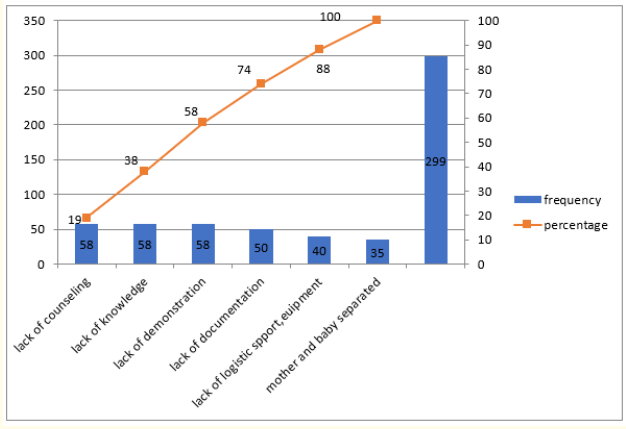

Figure 2: *Pareto analysis.*

Results

A total of 145 preterm and/or low-birth-weight babies were admitted during the study period. Among them, 70 were in the observation period. Among the 70 babies, 12 were excluded. Three babies were excluded due to major birth defects, two babies were referred to other hospitals, and seven babies developed jaundice. In the intervention phase, among 75 babies 17 were excluded due to jaundice, major congenital anomaly and haemodynamic instability. After exclusion, a total of 58 mothers and neonate dyads with gestational age < 37 weeks and/or birth weight ≤ 2400 grams were included in each group.

Parameter	Observation group (n = 58)	Intervention group (n = 58)	P -Value
Maternal age, n (%)			
<20 yrs	0	9 (15.5)	
20-30 yrs	40 (69)	38 (65.5)	0.251^{ns}
31-39 yrs	18 (31)	11 (19)	
Maternal education, n (%)			
Less than high school	5 (8.6)	15 (25.9)	
High school and above	35 (60.3)	28 (48.3)	0.677^{ns}
Degree and above	18 (31.0)	15 (25.9)	
Parity, n (%)			
Primipara	5 (8.6)	16 (27.6)	1.00^{ns}
Multipara	53 (91.4)	42 (72.4)	
No of antenatal visits, n (%)			
<4	4 (8.3)	3 (6.3)	1.00^{ns}
≥ 4	44 (91.7)	45 (93.8)	
PIH, n (%)	20 (34.5)	23 (39.7)	1.00^{ns}
Preeclampsia, n (%)	11 (19.0)	17 (29.3)	0.64^{ns}
GDM, n (%)	13 (22.4)	9 (15.5)	0.261^{ns}
PPROM, n (%)	22 (37.9)	23 (39.7)	0.527^{ns}

Table 1: *Baseline characteristics of maternal factors in studied groups (N = 116).*

The general characteristics of mothers are shown in table 1. Baseline characteristics were comparable between the two groups.

Parameter	Observation group n = 58	Intervention group n = 58	P-value
Gestational age (weeks) Mean ± SD	36.4 ± 2.58	35.9 ± 1.84	0.267^{ns}
Birth weight (gm) Mean ± SD	1830.94 ± 320.04	1887.93 ± 244.28	0.283^{ns}
Fetal growth, n (%)			
SGA	45 (77.6)	21 (36.2)	<0.001^{s}
AGA	13 (22.4)	37 (63.8)	
Gender of the baby, n (%)			
Male	24 (41.4)	28 (48.3)	0.576^{ns}
Female	34 (58.6)	30 (51.7)	
Gestation age category, n (%)			
Preterm	19 (32.8)	38 (65.5)	<0.001^{s}
Term	39 (67.2)	20 (34.5)	
Mode of delivery, n (%)			
Vaginal delivery	12 (20.7)	13 (22.4)	1.00^{ns}
LUCS	46 (79.3)	45 (77.6)	

Table 2: *Baseline characteristics of neonates in studied groups (N = 116).*

Table 2 outlines the general characteristics of newborns. The mean gestational age and birth weight were similar across the two groups. Preterm newborns were more in the intervention period, while small-for-gestational age babies were more in the observation phase.

Parameter	Observation group n = 58	Intervention group n = 58	P-value
Received KMC, n (%)	14 (24.13)	58 (100)	0.001^{s}
Postnatal age of starting KMC, Mean ± SD	3.35 ± 2.6	1.66 ± 1.2	0.001^{s}
Duration of KMC per day per baby, Mean ± SD	3.28 ± 1.08	3.43 ± 1.14	0.668^{ns}
Total day of KMC, Mean ± SD	4.00 ± 2.48	5.44 ± 2.09	0.126^{ns}

Table 3: *Comparison of KMC status between two groups (N = 116).*

Table 3 reveals that there was a statistically significant difference between the two groups in terms of KMC initiation rate. KMC was begun earlier in the intervention period than in the observation phase, which was statistically significant. There was no statistically significant difference between the two groups in terms of KMC duration and total day.

Discussion

The purpose of this quality improvement project was to raise the KMC rate for eligible preterm neonates admitted to Kurmitola General Hospital's SCANU over the course of a year. Similar quality improvement efforts for improving the rate of KMC for preterm and/or low birth weight babies have been detailed in earlier publications. We included neonates weighing ≤ 2400g in accordance with WHO guidelines, even though the majority of studies included babies weighing less than 2000g.

While ours is a 10-bed SCANU with insufficient resources and no separate KMC unit, the majority of the research was carried out at level 3 NICUs. Furthermore, there was a dearth of understanding regarding KMC and its significance among health care workers. KMC is associated with a 36% decreased risk of neonatal mortality among LBW neonates and a significantly lower risk of sepsis, hypoglycemia, and hypothermia when compared to standard therapy [10]. Despite the overwhelming evidence that KMC improves the health of preterm and/or LBW infants receiving it, including a recent World Health Organisation recommendation that KMC should be standard care for newborns weighing < 2,500g it has never been fully integrated into health systems around the world [11].

Some barriers to KMC adoption in healthcare settings were identified by previous systematic evaluations. An important obstacle to extending KMC has been identified as the absence of family support and involvement in KMC [12]. According to a study conducted in Bangladesh, moms did not obtain support to practice KMC from family members, primarily their mother-in-law and sister-in-law [13]. We encountered similar problems during the observation period. To address this issue, we arranged family centered care in our SCANU, where the mother and one other female relative were permitted to stay with the newborn in addition to providing KMC as soon as the infant is hemodynamically stable.

Quasem., *et al.* reported that mothers and other family members are ignorant about advantage of KMC [13]. According to Hadush., *et al*. health workers most frequently mentioned a lack of manpower, a shortage of educated health workers, and a lack of logistics support, including facilities and equipment for KMC practice. Additional challenges identified by the study were lack of support, the mother's felt duty for the rest of the family, cultural and social barriers of KMC, and the general belief that an incubator is better for the thermal care of premature LBW. Insufficient counselling is provided to parents and other family members about the core principles and benefits of KMC. They believe that KMC was imposed upon them because medical professionals instructed them to undertake KMC without any explanation [14].

Another barrier was identified by KMC providers: during hot and humid weather, babies became irritable during KMC because of their mothers' sweating [15]. Less frequently, carers mentioned discomfort at not being able to see their newborn during KMC [12]. Another barrier was lack of bonding between mothers and preterm and/or LBW babies [12,15]. It might be due to fear and anxiety related to preterm birth and separation of baby and mother due to admission of baby in SCANU [12].

Lack of awareness of the importance of KMC among the healthcare staff and mothers and other family members was the main barrier for the practice of optimum KMC [13] which was observed in our unit too. A systematic review on barriers to KMC showed that lack of a written policy for KMC, counselling and training of women would increase the workload of healthcare professionals, take more time away from their schedules, and decrease their time with other important patients [17].

Fathers are the primary decision-makers in the family, and their reactions can either be barriers (if crucial) [18,19] or enablers (if supportive) [18,20]. Fathers could be very supportive to their partners, even performing skin-to-skin care themselves according to studies done in high [21,22] as well as in low and middle-income income countries [23].

Some of the obstacles to KMC that we found in our study align with the results of previous researches. Lack of trained healthcare workers, paucity of knowledge regarding the concept, benefits of KMC among the healthcare professionals and general people. Lack of structured counselling, demonstration, documentation and reporting of KMC, and provision of KMC bags for babies.

Prior research has demonstrated that structured counselling for mothers and other family members, as well as training of healthcare personnel, are significant facilitators of KMC. Family members' active participation promotes in-hospital KMC and maintains home-based KMC following discharge [24]. Scaling up KMC practices is known to be achieved by employing more supporting staff and temporary project personnel, but the effects are transient and disappear when assistance is removed [25,26]. We did not engage additional manpower during this study.

A distinctive attempt in our study was the utilization of existing manpower and infrastructure to implement the QI intervention. Recommendations from a study to scale up facility based KMC include training of health care providers before initiation of KMC; health facilities need to be fully equipped with required equipment, logistics and supplies and development of a culturally appropriate KMC binder and/or KMC-friendly dress that meets local needs for privacy and decency of mothers and other family members providing KMC [27].

As part of our study, the QI team also trains our healthcare staff on KMC. Government training programs provided the QI team members with KMC training. We conducted comprehensive counselling and KMC demonstrations for women and family members; however we did not include fathers in the KMC delivery process due to other moms' privacy concerns. Lack of physical space and insufficient privacy are clearly significant obstacles to supporting KMC at the facility level [28-30]. There is no separate KMC ward in our unit, so we ensure KMC beside the bed of the baby. Although we don't have enough KMC chairs, we provided KMC bags for every baby. Furthermore, recording, reporting, auditing, and gathering input from KMC providers and team members strengthened our study. To evaluate our performance, we performed audits every two weeks. The intervention was reviewed, and any necessary additions or modifications were made.

KMC provided within 24 hours of delivery lowers infant mortality and may reduce clinical sepsis till 28 days, compared to later commencement [4]. In our study, following the intervention, the mean postnatal age of commencing KMC was 1.66 days, compared to 3.22 days in the observation phase, and the percentage of eligible neonates undergoing KMC increased from 24.13% to 100%. Kapoor., *et al*. found that implementing an education strategy and counselling led to earlier beginning of KMC (2.49 ± 0.67 vs. 4.65 ± 0.99d) and a higher proportion of eligible preterm receiving KMC during hospitalization (100% vs. 75%) [31].

According to findings of our quality improvement study, a aids in improving the rate of KMC commencement and early KMC initiation for preterm and/or LBW admitted to SCANU. The study's strength is that any SCANU or NICU can use this QI program without any modifications to its infrastructure or human resources.

Limitations of the Study

1. At night, the KMC duration could not be precisely recorded.
2. There were instances where KMC could not be closely observed at night.
3. We might have assessed sustainability of KMC upon discharge.
4. There was no prospective collection of information on weight gain during KMC or post-discharge continuation.

Conclusion

This study identified several challenges to KMC, including a lack of counselling, information, attitude, practice, and logistics. The rate of KMC and early beginning of KMC among preterm and/or LBW newborns admitted to the Special Care Neonatal Unit has significantly increased as a result of this quality improvement initiative.

Declaration of Conflicting Interests

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Ethical Approval

As per international standards or institutional standard written ethical approval has been collected and preserved by the author

Authors Contribution

All authors contributed to the study's conception and design. QI team preparation and coordination, conducting intervention phase, were done by both first and second author. Counseling, demonstration, data collection, documentation, and statistical analysis were done by first author. Other authors helped in counseling, demonstration, data collection and documentation. The manuscript was written by the first author and respected other authors further reviewed and commented on the first and the following drafts.

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