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Original Research Article

Improving duration of kangaroo mother care by using quality improvement methodology of low-birth-weight neonates

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ABSTRACT

Background: Kangaroo mother care (KMC) is an evidence-based neonatal care that resulted in decreased mortality and morbidity in preterm infants. The objective of this study was to improve the duration of KMC for Low Birth Weight (LBW) neonates using a Quality Improvement (QI) methodology.
Methods: This hospital-based study was carried out among eligible low birth weight neonate-mother dyad at the Neonatal Unit of Baba Raghav Das Medical College, Gorakhpur, Uttar Pradesh, India. Quality Improvement methodology was used, which included counseling and sensitization of staff nurse and family members about KMC, reward and positive reinforcement of staff nurse and family members and implementation of a written hospital policy. The effect of KMC was assessed by duration of KMC in three Plan-do-study-act (PDSA) cycles, each of 3 months duration. Data was analyzed by using SPSS.
Results: The total duration of KMC was increased from 6.28 hours/day during PDSA-1cycle to12.13 hours/day during PDSA-3 cycle.
Conclusions: By applying QI methodology with existing infrastructure and staff only, there was improvement in KMC duration in preterm LBW neonates.

Keywords: Kangaroo mother care, Low birth weight, Plan do study act, Quality improvement

INTRODUCTION

Preterm neonates are at increased risk of mortality, inhibited growth, lifetime disability including learning disabilities, visual and hearing problems and increased risk of chronic diseases.[1] According to the World Health Organization, KMC consists of prolonged skin-to-skin contact between mother and infant, on demand exclusive breastfeeding and adequate follow-up and support after discharge.[2] Kangaroo mother care increases the bonding between mother and baby, improves early initiation of breastfeeding (EIBF) which is helpful in successful lactation, improves infant's oxygen saturation and neurodevelopmental outcome.[3-7] The first 12 hours survival of the preterm LBW infant is remarkably better by KMC than by the conventional method of care.[8] When KMC is the standard of treatment mortality is reduced by 40%, among less than 2.0 kg birth weight hospitalized infants.

However, recent data suggest in infants with a birth weight between 1.0 and 1.799 kg, further reduction in mortality at 28 days is found when KMC is initiated immediately after birth before stabilization, either with the mother or a surrogate.[9] This low-cost method of newborn care is particularly beneficial for low-income countries.[10] As a large number of preterm and LBW deliveries are occurring nowadays, universal KMC

should be a part of neonatal care, but the evidences are very low.[11] A QI methodology was used by many authors, which includes small samples, sequential changes in planning, interventions and adoption of new strategies with improvement in the KMC duration.[12,13] We planned this study to improve KMC duration in our setup by using QI methodology.

METHODS

This hospital-based study was carried out in the Neonatal Unit of Baba Raghav Das Medical College, Gorakhpur, Uttar Pradesh, India by applying Quality Improvement methodology. Our hospital has a 40 bedded level III neonatal intensive care unit (NICU) and 20 bedded KMC ward. There are 300-350 deliveries per month, out of which one third are LBW. Ethical approval was taken from Institutional Ethics Committee. Informed written consent in local language was taken from mothers/guardians of each neonate.

Inclusion criteria

All neonates weighing less than 2000 gram, after being hemodynamically stable and shifted to the KMC ward, were included in the study. All these neonates were kept with their mothers. Each eligible LBW neonate-mother dyad was considered a single participant in this study.

Exclusion criteria

Neonates receiving phototherapy, with frequent apnea (>4 in the last 24 hours), with major congenital anomaly, became hemodynamically unstable or expired after enrolment were excluded from the study. Apart from this, the neonates were excluded from the study whose mothers were not willing for KMC, were sick or when eligible relatives were not available for KMC.

"Quality improvement" methodology

Quality improvement methodology was used to increase KMC duration in our Neonatal Unit, in which three sequential PDSA cycles were conducted each of 3 months duration. The study was conducted from July 2019 to June 2020.

Team formation

A team was formed that included one faculty member, one senior resident, one senior sister, two senior staff nurses and the investigator. The purpose of the team was to evaluate the barriers for improving KMC duration and then plan and act accordingly.

Meeting of the team members was done before initiating the PDSA cycles and continued to be held every month for assessing the problems and planning for the efforts to be made so as to bring improvement. To identify the problem baseline data of all the variables were collected 15 days prior in eligible low birth weight neonate-mother dyad. After that, we analyzed the barriers faced by staff members and mothers for providing KMC by using a "fishbone diagram" shown in Figure 1. A predesigned proforma was used to collect all the variables of newborn including KMC duration. A second proforma was used in each cycle to note down the barriers faced for KMC implementation and the planning done to remove them. These low-birth-weight neonates were managed according to standard management protocols.[14]

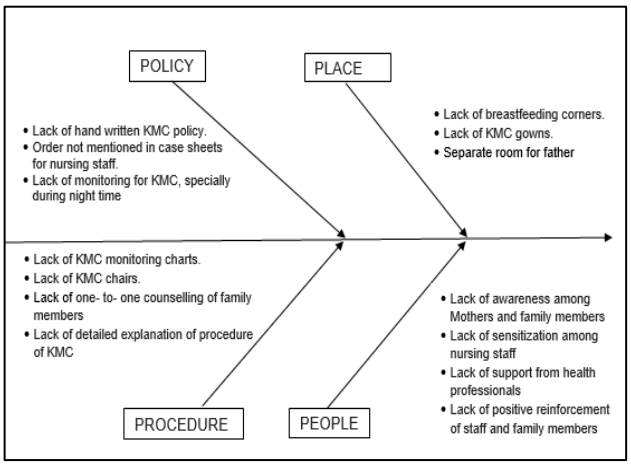

Figure 1: Fishbone diagram.

During PDSA cycle 1, we implemented some changes in our KMC ward. We started a hand written KMC policy in our ward, mothers waiting area and in OPD. A breastfeeding corner was created in our ward. A comprehensive counseling was done of the staff nurse working in KMC ward, by the members of the team. These nursing staffs working in different shifts were involved in counseling of the mothers and their family members. Bedside counselling of mothers and family members was done by direct demonstrating the procedure.

They take the help of videos and charts on KMC also. KMC friendly and supportive environment was created in KMC ward. Team members alleviate the anxiety related to KMC of very LBW neonates, particularly those just recovered from respiratory support. Junior doctors were advised to mention the total duration of KMC in their order sheets. Other family members were allowed for KMC. Nurses, mothers and family members were praised for showing improvement in KMC. By the end of first PDSA cycle, the mean duration of KMC was increased from 3.15 hours to 6.28 hours (Table 2).

In PDSA cycle 2 barriers in the implementation of steps taken during first PDSA cycle were resolved. One-to-one counseling of mothers and family members continued. During this cycle, we encouraged the participation of the father for KMC in a separate room attached to our KMC ward. Night shift nurses were strictly advised to increase the duration of KMC at night. The staff nurses and

mothers were praised for increasing KMC duration in periodic meeting of team. The mean duration of KMC was increased from 6.28 hours to 8.98 hours by the end of second PDSA cycle (Table 2).

In PDSA cycle 3, the staff nurses assigned for the KMC were felicitated by the team for helping the mothers in KMC. Counseling of the mothers and other family members for KMC was the part of QI. The staff nurses and mothers/family members were encouraged for increasing the duration of KMC per session. Nurses encouraged to positively reinforce the mothers and the family members for KMC.

At the end of third cycle, average number of hours of KMC increased from 8.98 to 12.13 hours (Table 2). Graphical presentation of improvement in KMC duration after 3 PDSA Cycles is shown in Figure 2.

Data analysis

IBM SPSS Statistics ver. 25.0 (IBM Co., Armonk, NY, USA) was used for analysis of data. Quantitative data was expressed by mean and standard deviation and qualitative data by the percentages. ANOVA test was used to show the difference between the means p value of <0.05 was taken as significant.

RESULTS

A total of 135 low birth weight newborn-mother dyads were taken for study out of which 27 were excluded (12 became hemodynamically unstable, 8 left against medical advice, 5 mothers not willing to participate, 2 mothers were sick) as per exclusion criteria. The assessment was done on the remaining 108 low birth weight newborn-mother dyads, which included 3 pairs of twins.

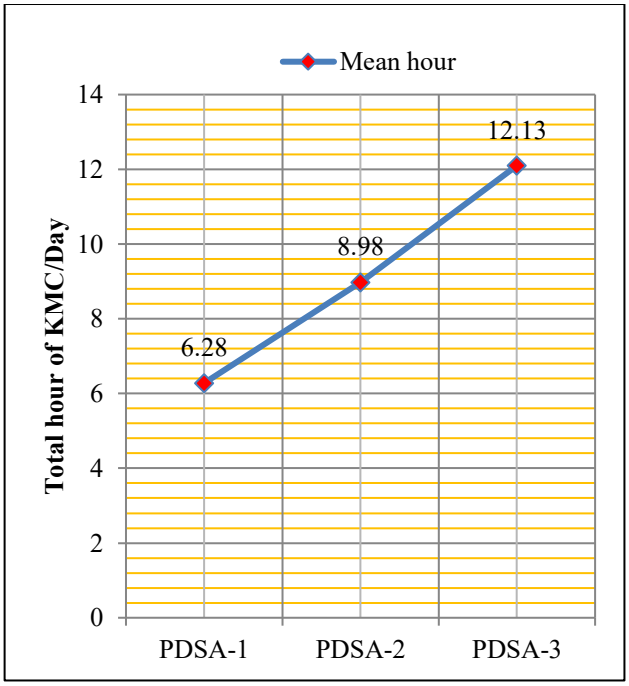

Figure 2: Total duration of KMC/day.

Table 2 shows output of implementation of QI methodology on KMC, in the form of number of sessions/day, duration of KMC/session and total duration of KMC/day.

Authors found there was no significant change in the number of sessions/days of KMC but a statistically significant (p=<0.0001) increase in the duration of KMC was found in each session after three PDSA cycles. Total duration of KMC in hours/day also increased significantly (p=<0.0001) after the completion of three PDSA cycles (Figure 2).

Table 1: Details of PDSA cycles conducted and their outcome.

PDSA cycle	Plan	Do	Study	Act
PDSA 1	Sensitization of staff nurse and parents. Documentation of KMC duration	Comprehensive counselling was done of KMC staff nurse and parents. Residents instructed to monitor KMC procedure and duration. Other family members were encouraged for KMC	The average duration increased from 3.15 hours to 6.28 hours.	Included in written policy.
PDSA2	Identifying and praising parents, nurses and residents for their good work. Participation of father for KMC.	Fathers were encouraged for participation in KMC. A separate room was identified for the father attached to KMC ward to conduct KMC. Night shift nurses are strictly advised for night time KMC	The average duration increased from 6.28 hours to 8.98 hours.	Ongoing sensitization continued.
PDSA3	Close monitoring specially for night time KMC		The average duration increased from 8.98 to 12.13 hours.	Plan adopted

KMC[#]: Kangaroo mother care, PDSA[†]: Plan-do-study-act.

Table 2: Demographic data of study participants.

Variables	Frequency n=135	%	Mean±SD
Age of mothers (in year)			
20-24	48	44.4	25.6±3.87
25-30	50	46.3	
31-35	8	7.4	
36-40	2	1.9	
Educational status of mothers			
Illiterate	9	8.3	
Literate	9	8.3	
Primary	3	2.8	
Middle school	12	11.1	
Higher and above	75	69.5	
Vaginal delivery	75	69.40%	
Gestational age of neonates (in weeks)			
25-30	29	24.2	32.74±2.75
31-35	71	59.2	
35-40	20	16.6	
Birth weight of neonates (Kg)			
<1-1.0	9	7.5	1.95±0.21
1.0-1.5	65	54.2	
1.5-2.0	46	38.3	

Table 3: Effect of quality improvement methodology on KMC.

KMC# detail	PDSA† cycle 1 Mean±SD*	PDSA cycle 2 Mean±SD	PDSA cycle 3 Mean±SD	P value
Number of sessions/day	3.58±0.78	3.53±0.72	3.83±0.59	0.127
Hour of KMC/session	1.8±0.46	2.63±0.53	3.21±0.59	<0.0001
Total duration of KMC/day	6.28±1.66	8.98±1.14	12.13±2.01	<0.0001

KMC#: Kangaroo mother care, SD*: Standard deviation, PDSA†: Plan-do-study-act.

DISCUSSION

WHO has described KMC as an effective and easy method to promote health, exclusive breastfeeding and improve overall well-being of preterm infants.[2] But there are many barriers in implementation of KMC which were studied by a number of authors in different studies. Yue et al from China reported fixed traditional postpartum practices and grandparents' resistance as barriers in implementation of KMC but Jamali et al in Pakistan and Seidman et al reported overburdened health workers with unfavorable environment in their health facility.[15-17]

Fixed traditional postpartum practices and poor health professional's motivation to implement KMC was reported by Bilal et al from Ethiopia. Hadush et al also from Northern Ethiopia reported increased workload on health workers, nonacceptance of holding babies in the front and unfavorable environment in health facility as barriers for KMC.[18,19] As KMC is low-cost beneficial practice for newborn, we had planned this study to increase the KMC duration by implementing QI methodology. Although authors are routinely practicing KMC for our newborn babies, but the duration is less. So, we found out the barriers in our setting by using a fishbone diagram and removed them in a phasic manner through PDSA cycles. As the staff nurse and health workers are already sensitized to benefits of KMC, we found a significant improvement in KMC duration. Jegannathan et al, Joshi et al and Yue et al have also reported improvement in KMC duration using the same methodology without much additional resources.[12,13,15]

Authors have used the same existing resources and infrastructure for strengthening KMC without addition of extra manpower, as recruitment of new staff for the project may temporarily show improvement, which will fade with withdrawal of support.

This was achieved by motivating our nurses and other staff, involving family members and increasing the night duration of KMC. The active involvement of other family members for KMC will definitely show improvement in home-based KMC after discharge, which has been reported by Panda et al in their study during COVID-19 infection.[20]

The study was a single-center QI study. In present study, the effect of KMC on growth of newborn, effect on breastfeeding and morbidity data was not evaluated. Data was not collected for the KMC continuation of each newborn after discharge.

CONCLUSION

By applying QI methodology with existing infrastructure and staff only, we have demonstrated the improvement in KMC duration in preterm LBW neonates.

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Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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