

Original Research Article

IMPROVING THE PRACTICE OF KANGAROO MOTHER CARE (KMC) IN A TERTIARY NICU: A QUALITATIVE IMPROVEMENT INITIATIVE

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ABSTRACT

Background: Kangaroo Mother Care (KMC) is an evidence-based intervention that improves survival and health outcomes among preterm and low-birth-weight infants. Despite its proven benefits, the duration and implementation of KMC often remain suboptimal due to various caregiver-, provider-, and system-related barriers. This quality improvement initiative was undertaken to improve the practice and duration of KMC in a tertiary-level neonatal intensive care unit (NICU). The objective is to increase the average duration of Kangaroo Mother Care among eligible preterm infants admitted to the neonatal unit through targeted quality improvement interventions.

Materials and Methods: A quality improvement initiative was conducted in the Neonatal Unit of Lokmanya Tilak Municipal Medical College and General Hospital, Sion, Mumbai, from 1st February 2020 to 30th April 2020. All hemodynamically stable preterm infants weighing less than 2 kg and off intravenous fluids, along with their mothers, were included. Baseline assessment showed an average KMC duration of 3 hours per day. Root cause analysis using Fishbone analysis identified barriers to KMC implementation. A multidisciplinary team comprising one team leader, two paediatric residents, and two staff nurses implemented interventions through sequential Plan–Do–Study–Act (PDSA) cycles. Interventions included staff training, caregiver education, improved documentation, fixed KMC time slots, and involvement of female family members in providing KMC. Data were collected using a predesigned proforma, and progress was monitored using run charts.

Results: Educational interventions directed at nursing staff alone did not significantly increase KMC duration. However, counseling and sensitization of mothers and family members increased the average KMC duration from 3 to 4 hours per day. Improved documentation enhanced monitoring but did not independently affect KMC duration. Fixing dedicated KMC time slots resulted in a further increase to 5 hours per day. Allowing female family members to provide KMC when mothers were unavailable led to an additional increase, achieving an average KMC duration of approximately 6 hours per day. Overall, the initiative resulted in a twofold increase in KMC duration compared to baseline.

Conclusion: A structured quality improvement approach using root cause analysis and PDSA cycles successfully improved Kangaroo Mother Care practices in a tertiary NICU. Education of caregivers, active family participation, process reorganization, and continuous monitoring were key contributors to the observed improvement. These low-cost and sustainable interventions can be effectively incorporated into routine neonatal care to

enhance KMC implementation and improve outcomes among preterm and low-birth-weight infants.

Keywords: Kangaroo Mother Care, Quality Improvement Initiative, PDSA Cycle, Neonatal Intensive Care Unit, Preterm Infant, Low Birth Weight, Family-Centered Care.

INTRODUCTION

Preterm birth and low birth weight (LBW) remain major contributors to neonatal morbidity and mortality worldwide, particularly in low- and middle-income countries. The World Health Organization (WHO) estimates that approximately 15 million babies are born preterm each year, and complications related to prematurity account for a significant proportion of neonatal deaths globally.^[1] Early, evidence-based interventions are therefore essential to improve survival and long-term outcomes among these vulnerable newborns.

Kangaroo Mother Care (KMC) is a simple, cost-effective, and evidence-based intervention that involves prolonged skin-to-skin contact between the mother (or caregiver) and the infant, exclusive breastfeeding whenever possible, and early discharge with appropriate follow-up.^[2] Since its introduction in Colombia in the late 1970s, KMC has been widely recognized as an effective strategy for improving thermoregulation, promoting breastfeeding, enhancing maternal-infant bonding, reducing infections, and decreasing neonatal mortality among preterm and low birth weight infants.^[3]

The WHO strongly recommends KMC for clinically stable preterm and low birth weight neonates and has highlighted its role in reducing neonatal mortality by up to 40% and severe infections by nearly 65%.^[4] In addition to its clinical benefits, KMC improves parental confidence and participation in neonatal care while reducing healthcare costs and the burden on neonatal intensive care units (NICUs).^[5]

Despite strong evidence and international recommendations, the implementation and sustained practice of KMC remain suboptimal in many healthcare settings. Various barriers such as inadequate awareness among caregivers, limited staff training, infrastructural constraints, cultural beliefs, maternal discomfort, and lack of institutional support may hinder effective adoption of KMC.^[6] Understanding these barriers and identifying facilitators are crucial for improving KMC uptake and ensuring its integration into routine neonatal care.

Quality improvement initiatives focusing on behavioral, organizational, and system-level factors have shown promise in enhancing KMC implementation in hospital settings.^[7] Qualitative approaches provide valuable insights into the experiences, perceptions, and challenges faced by healthcare providers and parents, enabling the development of context-specific strategies to improve KMC practices.^[8]

In a tertiary-level NICU, where a substantial proportion of admitted neonates are preterm or low birth weight, optimizing KMC practices can significantly contribute to better neonatal outcomes. Therefore, the present qualitative improvement initiative was undertaken to explore existing practices, identify barriers and facilitators, and implement measures aimed at improving the practice of Kangaroo Mother Care in a tertiary NICU setting.

Objectives: To increase the mean duration of Kangaroo mother care (KMC) in preterm infants through a Quality improvement (QI) approach in a tertiary-care neonatal unit from 3 hours to 8 hours per day.

MATERIALS AND METHODS

Study Design: This was a Quality Improvement (QI) initiative conducted using the Plan–Do–Study–Act (PDSA) methodology to improve the practice of Kangaroo Mother Care (KMC) in a tertiary-level Neonatal Intensive Care Unit (NICU).

Study Setting: The study was conducted in the Neonatal Unit of Lokmanya Tilak Municipal Medical College and General Hospital (LTMMC & GH), Sion, Mumbai–400022.

Study Duration: The study was carried out over a period of three months from 1st February 2020 to 30th April 2020.

Study Population: The target population included all preterm neonates weighing less than 2 kg who were admitted to the neonatal unit during the study period and were hemodynamically stable and off intravenous fluids, along with their mothers.

Eligibility Criteria

Inclusion Criteria

- Preterm neonates weighing less than 2 kg.
- Hemodynamically stable neonates.
- Neonates not requiring intravenous fluid therapy.
- Mother-infant dyads willing to participate in Kangaroo Mother Care.

Exclusion Criteria

- Hemodynamically unstable neonates.
- Neonates requiring intensive respiratory or circulatory support.
- Neonates receiving intravenous fluid therapy.

Recruitment Procedure: Each eligible mother–infant dyad was considered a single participant in the study. Consecutive eligible dyads admitted to the neonatal unit during the study period were enrolled and monitored.

Baseline Assessment: A retrospective review of unit records over the preceding one year demonstrated that the average duration of Kangaroo Mother Care being provided in the neonatal unit was

approximately 3 hours per day. Baseline data were collected using a predesigned proforma documenting demographic details of eligible preterm infants and their mothers, along with the daily duration of KMC provided.

Root Cause Analysis: A root cause analysis was performed using Fishbone (Ishikawa) analysis to identify barriers to effective implementation of KMC. Factors related to healthcare providers, mothers, family members, hospital policies, infrastructure, and documentation practices were explored.

One-to-one discussions were conducted with mothers to understand factors limiting KMC duration. It was observed that a considerable amount of maternal time was spent expressing breast milk and feeding the infant, which reduced the time available for KMC.

Quality Improvement Team: A multidisciplinary quality improvement team was constituted comprising:

- One Team Leader
- Two Paediatric Residents
- Two Staff Nurses

Intervention Strategy: Based on the findings of the root cause analysis, a comprehensive KMC improvement package was developed and implemented. The intervention package included:

- Formation of a dedicated KMC team with a designated team leader.
- Identification of barriers through root cause analysis.
- Education and sensitization of healthcare providers regarding the importance and benefits of KMC.
- Daily documentation and monitoring of KMC duration.
- Assessment of knowledge regarding KMC among mothers and family members.
- Policy modifications to facilitate and promote KMC practices.
- Regular counseling and reinforcement sessions for mothers and caregivers.
- Continuous feedback to healthcare workers regarding progress and outcomes.

Plan–Do–Study–Act (PDSA) Cycles: The interventions were tested using the Plan–Do–Study–Act (PDSA) methodology. Five PDSA cycles were conducted, each lasting two weeks.

The major interventions included:

- Education and sensitization of healthcare providers.
- Education and counseling of mothers and family members.
- Reinforcement of ongoing KMC practices.
- Continuous monitoring and feedback.

Weekly meetings involving the team leader, resident doctors, and staff nurses were conducted during the implementation phase to review progress, discuss barriers, and plan corrective measures.

Outcome Measurement

Primary Objective: To increase the average duration of Kangaroo Mother Care from the baseline level of 3 hours per day to at least 8 hours per day.

Assessment Method: The duration of KMC was recorded by the staff nurse on duty during each 8-hour shift for every eligible mother–infant dyad. The cumulative daily KMC duration was calculated and recorded.

Average daily KMC duration was plotted on run charts to monitor trends and assess the impact of interventions over time. Outcome evaluation was performed fortnightly throughout the implementation phase.

Data Collection

Data were collected using a predesigned proforma that included:

- Neonatal characteristics
- Maternal details
- Eligibility status
- Daily duration of KMC
- Knowledge assessment findings
- Intervention-related observations

Data Management: Data entry, compilation, and management were performed by the investigator.

Statistical Analysis: Statistical analysis was performed using Microsoft Excel. Descriptive statistics such as frequencies, percentages, means, and averages were calculated. Run charts were generated to assess trends in KMC duration and evaluate the effectiveness of the quality improvement interventions over the study period.

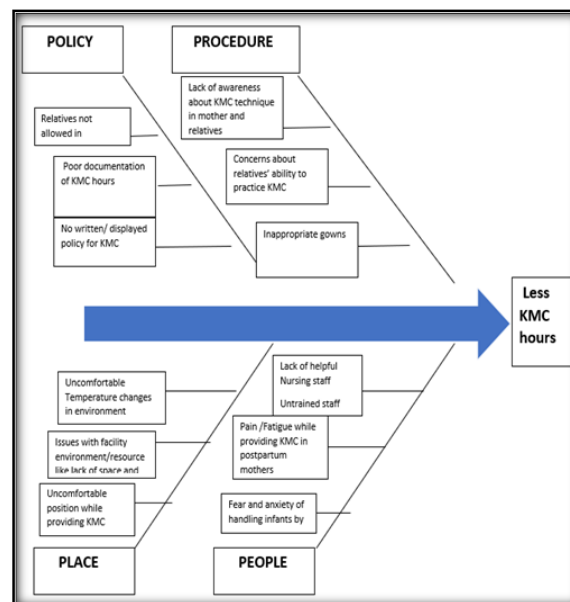


Figure 1: Fish Bone Analysis to understand the root causes for lesser duration of KMC

RESULTS

The table presents the various change ideas identified through root cause analysis to improve Kangaroo Mother Care (KMC) practices in the neonatal unit. These interventions were prioritized based on their perceived feasibility and potential impact on

increasing KMC duration. The highest priority was given to creating awareness and training among nursing staff (Priority I), followed by educating mothers and family members (Priority II). Proper documentation and process reorganization through fixed KMC time slots were assigned intermediate priorities. Structural and policy-related interventions, including allowing female relatives into the unit,

improving seating arrangements, increasing chair availability, and displaying a written KMC policy, were also considered important supportive measures. These prioritized interventions formed the basis for implementation through successive PDSA cycles aimed at achieving sustained improvement in KMC practices.

Table 1: Prioritization of Change Ideas Identified Through Root Cause Analysis for Improving Kangaroo Mother Care (KMC) Practices

Change in Ideas	Why Will It Improve Care	Priority
Creating awareness among nursing staff and training them	Easier communication, improved understanding of KMC, and reduction in time wastage	I
Creating awareness among mothers and relatives	Education and motivation of mothers, family support, and reduction in time wastage	II
Proper documentation by nursing staff	Improved monitoring, accountability, and assessment of KMC duration	III
Fixing a time slot for providing KMC	Better organization and streamlining of the care process	IV
Allowing female relatives into the premature unit	Ensures continuity of KMC when mothers are unwell, provides family support, and allows maternal rest	V
Changing placement of chairs away from direct sunlight	Improves maternal comfort during KMC sessions	VI
Making available more chairs	Improves availability of resources and facilitates KMC practice	VII
Displaying a written KMC policy	Enhances awareness and standardization of KMC implementation	VIII

Table 2: PDSA Cycle 1 for Improving Kangaroo Mother Care (KMC) Duration

PDSA Cycle No.	Timeline	Plan	Do	Study	Act
1	1st–2nd Week	To create awareness among nursing staff and provide training regarding the importance, benefits, and implementation of Kangaroo Mother Care (KMC).	Nursing staff were sensitized regarding KMC practices. The unit policy for providing KMC to eligible preterm infants was communicated, and staff members were trained in counseling mothers and documenting KMC duration.	No significant improvement was observed in the average duration of KMC provided to eligible neonates. Further assessment revealed the presence of additional barriers affecting KMC implementation.	It was decided to continue the intervention and identify other barriers contributing to inadequate KMC duration. Additional strategies were planned for subsequent PDSA cycles to improve KMC uptake and duration.

During the first PDSA cycle, emphasis was placed on educating and sensitizing the nursing staff regarding the importance of Kangaroo Mother Care and the unit policy related to its implementation. Training sessions were conducted to improve staff knowledge and encourage active promotion of KMC among eligible mother–infant dyads. Despite these efforts,

no appreciable increase in KMC duration was observed. This indicated that factors beyond healthcare provider awareness were limiting KMC practice. Therefore, further root cause analysis was undertaken, and additional interventions targeting other barriers were planned for the next PDSA cycle.

Table 3: PDSA Cycle 2 for Improving Kangaroo Mother Care (KMC) Duration

PDSA Cycle No.	Timeline	Plan	Do	Study	Act
2	3rd–4th Week	To create awareness among mothers and their relatives regarding the importance and benefits of KMC.	Mothers and family members were educated about KMC. The procedure was demonstrated, and daily counseling sessions were conducted to encourage prolonged KMC practice.	The average duration of KMC increased by approximately 1 hour, from 3 hours to 4 hours per day. Mothers showed improved understanding and acceptance of KMC.	Further interventions were planned to increase KMC duration and address any anxiety, misconceptions, or practical difficulties experienced by mothers during KMC.

During the second PDSA cycle, efforts were directed towards educating mothers and family members regarding the benefits and proper technique of Kangaroo Mother Care. Daily counseling and

demonstrations helped improve awareness and motivation among caregivers. This intervention resulted in an increase in the average KMC duration by one hour, indicating that caregiver education

played an important role in improving KMC practices. Additional measures were planned to

further enhance KMC duration and alleviate maternal concerns.

Table 4: PDSA Cycle 3 for Improving Kangaroo Mother Care (KMC) Duration

PDSA Cycle No.	Timeline	Plan	Do	Study	Act
3	5th-6th Week	To improve documentation of KMC duration by nursing staff.	Nursing staff were instructed to accurately record the duration of KMC received by each eligible infant in a separate, dedicated register maintained for KMC monitoring.	Improved documentation and monitoring were achieved; however, there was no significant increase in the average duration of KMC provided.	The intervention was continued as proper documentation was essential for monitoring compliance and identifying gaps. Additional strategies were planned to directly address barriers affecting KMC duration.

The third PDSA cycle focused on strengthening documentation practices. Nursing staff were encouraged to maintain systematic records of KMC duration in a dedicated register. Although this intervention improved accountability and monitoring

of KMC practices, it did not directly increase the duration of KMC provided. Nevertheless, accurate documentation was considered essential for ongoing quality improvement and was therefore adopted as a routine practice in the neonatal unit.

Table 5: PDSA Cycle 4 for Improving Kangaroo Mother Care (KMC) Duration

PDSA cycle no	Time line	Plan	Do	Study	Act
4	5th week 6th week	Fixing a time slot for providing KMC	Discussed with mother about her free time availability and informed nursing staff and relatives, so that Mother will be able to give undisturbed KMC.	Average duration increased was 1 hours (up to 5hours)	Plan as made for further increasing duration and to allot time intervals accordingly

During the fourth PDSA cycle, emphasis was placed on reorganizing the KMC process by fixing convenient time slots for mothers. Discussions were held with mothers to identify periods during the day when they could comfortably provide KMC without interruption from feeding schedules, personal activities, or clinical procedures. Nursing staff and family members were informed of these schedules to

facilitate uninterrupted KMC sessions. This intervention resulted in a further increase of approximately one hour in the average duration of KMC, bringing the total average duration to 5 hours per day. The positive response suggested that structured scheduling improved adherence to KMC practices and justified continuation of the strategy in subsequent cycles.

Table 6: PDSA Cycle 4 for Improving Kangaroo Mother Care (KMC) Duration

PDSA cycle no	Time line	Plan	Do	Study	Act
5	7th week 8th week	Allowed one female member into premature unit	If mother was unwell or unable to give Kmc, one female family member was encouraged to give KMC	Average duration increased was 1 hour.	Plan was made for further increasing duration and to know any barriers

During the fifth PDSA cycle, family involvement was enhanced by permitting one female relative to provide Kangaroo Mother Care when the mother was unable to do so. This intervention addressed one of the key barriers identified during the root cause analysis, namely interruptions in KMC due to maternal illness, fatigue, or other responsibilities.

The participation of family members ensured continuity of care and resulted in an additional one-hour increase in the average daily KMC duration. The findings highlighted the importance of family-centered care in improving KMC practices and supported the continuation of this strategy in routine neonatal care.

Table 7: PDSA Cycle 5 for Improving Kangaroo Mother Care (KMC) Duration

PDSA cycle no	Time line	Plan	Do	Study	Act
6	9th week 10th week	Change the placement of chairs away from direct sunlight	Semi-reclining chairs were provided and placed away from direct	Average duration was same (up to 6 hours)	Plan adopted

			sunlight so that mother can give KMC in a comfortable environment.		
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During the fifth PDSA cycle, family involvement was enhanced by permitting one female relative to provide Kangaroo Mother Care when the mother was unable to do so. This intervention addressed one of the key barriers identified during the root cause analysis, namely interruptions in KMC due to maternal illness, fatigue, or other responsibilities. The participation of family members ensured continuity of care and resulted in an additional one-hour increase in the average daily KMC duration. The findings highlighted the importance of family-centered care in improving KMC practices and supported the continuation of this strategy in routine neonatal care.

DISCUSSION

Kangaroo Mother Care (KMC) is a proven, low-cost intervention that improves survival and health outcomes among preterm and low-birth-weight infants. Despite strong evidence supporting its benefits, implementation of KMC in neonatal intensive care units often remains suboptimal because of barriers related to healthcare providers, mothers, family members, institutional policies, and infrastructure. The present quality improvement initiative was undertaken to increase the average duration of KMC in a tertiary-level neonatal unit using a systematic approach based on root cause analysis and sequential PDSA cycles.

At baseline, the average duration of KMC in our unit was approximately 3 hours per day, which was substantially lower than the recommended duration for obtaining maximum benefits. Root cause analysis identified multiple barriers including inadequate awareness among healthcare providers and caregivers, lack of structured documentation, absence of fixed schedules, limited family participation, and policy-related constraints. Similar barriers have been reported in previous studies evaluating KMC implementation in neonatal care settings.

The first intervention focused on educating and sensitizing nursing staff regarding KMC. Although no immediate increase in KMC duration was observed, this step was essential for establishing a supportive environment and ensuring uniform understanding of KMC practices among healthcare providers. Staff training has been recognized as a critical prerequisite for successful KMC implementation, as nurses play a pivotal role in counseling mothers and monitoring KMC practices. The second PDSA cycle targeted mothers and family members through education, demonstration, and daily counseling. This intervention resulted in an increase of approximately one hour in the average duration of KMC. The finding highlights the

importance of caregiver awareness and motivation in improving adherence to KMC. Previous studies have similarly demonstrated that maternal education and family engagement significantly enhance KMC uptake and continuation.

Improving documentation practices during the third PDSA cycle did not directly increase KMC duration. However, systematic recording of KMC hours improved monitoring and accountability, allowing accurate assessment of progress and identification of gaps. Quality improvement initiatives frequently emphasize the importance of reliable data collection as a foundation for sustainable change.

The fourth intervention involved fixing convenient time slots for KMC based on maternal availability. This process modification resulted in an additional one-hour increase in average KMC duration. Structured scheduling reduced interruptions and enabled mothers to plan their activities around dedicated KMC sessions. The success of this intervention suggests that organizational barriers can be effectively addressed through simple workflow modifications.

The fifth PDSA cycle focused on enhancing family participation by allowing one female family member to provide KMC when the mother was unable to do so. This strategy resulted in a further increase of approximately one hour in KMC duration and ensured continuity of care. Family involvement is increasingly recognized as an important component of neonatal care, particularly in resource-limited settings where mothers may experience fatigue, illness, or competing responsibilities.

Overall, the sequential implementation of targeted interventions led to a progressive increase in the average duration of KMC from the baseline of 3 hours to approximately 6 hours per day. The improvement observed in this study demonstrates that barriers to KMC are largely modifiable and can be addressed through low-cost, context-specific quality improvement strategies. Educational interventions directed at both healthcare providers and caregivers, coupled with process modifications and family participation, were the most effective measures in increasing KMC duration.

The strengths of this study include the use of a structured quality improvement methodology, multidisciplinary team involvement, continuous monitoring through run charts, and regular feedback to staff. The interventions were simple, feasible, and required minimal additional resources, making them suitable for replication in similar neonatal units.

However, the study had certain limitations. It was conducted in a single tertiary-care center over a relatively short duration, which may limit generalizability. The project primarily evaluated KMC duration and did not assess long-term neonatal

outcomes such as weight gain, breastfeeding rates, duration of hospital stay, or mortality. Future studies with longer follow-up periods may help determine the sustainability of these interventions and their impact on neonatal outcomes.

In conclusion, this quality improvement initiative demonstrated that a systematic approach involving root cause analysis and iterative PDSA cycles can substantially improve Kangaroo Mother Care practices in a tertiary neonatal unit. Education of healthcare providers and caregivers, structured scheduling, improved documentation, and active family participation were key factors contributing to the observed improvement in KMC duration.

CONCLUSION

This quality improvement initiative demonstrated that Kangaroo Mother Care (KMC) practices in a tertiary neonatal unit can be significantly improved through a structured approach involving root cause analysis and sequential Plan–Do–Study–Act (PDSA) cycles. The implementation of targeted interventions, including education and sensitization of healthcare providers, counseling of mothers and family members, systematic documentation, scheduling of dedicated KMC time slots, and involvement of female family members, resulted in a progressive increase in the average duration of KMC from 3 hours to 6 hours per day.

Among the interventions, caregiver education, family participation, and process reorganization were found to be the most effective in improving KMC duration. The study highlights that many barriers to KMC are modifiable and can be addressed through simple,

low-cost, and sustainable quality improvement measures.

The findings emphasize the importance of multidisciplinary teamwork, continuous monitoring, and active engagement of both healthcare providers and family members in promoting KMC. Such interventions can be successfully integrated into routine neonatal care practices and may contribute to improved outcomes for preterm and low-birth-weight infants. Further efforts aimed at sustaining these improvements and achieving longer durations of KMC are warranted.

REFERENCES

1. World Health Organization. Preterm birth. Geneva: WHO; 2023.
2. World Health Organization. Kangaroo Mother Care: A Practical Guide. Geneva: WHO; 2003.
3. Charpak N, Ruiz-Peláez JG, Figueroa de CZ, Charpak Y. Kangaroo mother versus traditional care for newborn infants ≤ 2000 grams: a randomized controlled trial. *Pediatrics*. 1997;100(4):682-8.
4. World Health Organization. WHO recommendations for care of the preterm or low-birth-weight infant. Geneva: WHO; 2022.
5. 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;137(1): e20152238.
6. Seidman G, Unnikrishnan S, Kenny E, Myslinski S, Cairns-Smith S, Mulligan B, et al. Barriers and enablers of kangaroo mother care practice: a systematic review. *Acta Paediatr*. 2015;104(5): e197-e208.
7. Bergh AM, Rogers-Bloch Q, Pratomo H, Uhudiyah U, Sidi IP, Rustina Y, et al. Progress in the implementation of kangaroo mother care in 10 hospitals in Indonesia. *BMC Health Serv Res*. 2014; 14:293.
8. Chan GJ, Valsangkar B, Kajeepeta S, Boundy EO, Wall S, et al. Improving newborn survival through kangaroo mother care: a systematic review. *Int Health*. 2016;8(1):8-16.