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IMPROVING KANGAROO MOTHER CARE HOURS IN THE NEONATOLOGY DEPARTMENT: A QUALITY IMPROVEMENT INITIATIVE

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Abstact:

Aim: To assess barriers to initiating and sustaining Kangaroo Mother Care (KMC) in the neonatology department and implement a Quality Improvement (QI) initiative to increase KMC hours for neonates weighing less than 2500g and below 37 weeks of gestation.

Methods: This quasi-experimental study was conducted at Saveetha Medical College neonatology department. All neonates under 37 weeks and under 2500gm born between January 2024 and September 2024 and those under 2500g delivered between January 2023 and December 2023 were included. The baseline KMC duration was assessed over one year. A QI team, including doctors and nurses, used fishbone analysis to identify barriers and categorised them under policy, people, procedure, and place. Interventions were implemented through four Plan-Do-Study-Act (PDSA) cycles, each lasting three weeks, followed by six weeks of monitoring. Strategies included nurse education, patient counselling, and involving family members in care. Outcomes were measured by the increase in average KMC hours.

Results: At the start, the average KMC duration was 8 hours/day for eligible neonates. After four PDSA cycles, which included staff education and family involvement, the average KMC duration increased to 10.4 hours/day. The QI initiative led to a successful and sustainable increase in KMC hours, and KMC was integrated into routine NICU practice.

Conclusion: The QI initiative significantly improved KMC hours by addressing department - specific barriers. This approach is a simple, effective way to enhance neonatal care practices. Future projects will focus on immediate KMC implementation and its impact on growth and mortality.

Keywords: Plan-Do-Study-Act (PDSA), Kangaroo Mother Care (KMC), Quality Improvement (QI), Neonatal Intensive Care Unit (NICU).

INTRODUCTION

The newborn period accounts for 44% of mortality in children under five worldwide and 36% of newborn deaths occur in the first 24 hours (1,2).13.4 million newborns are born preterm and 35% of newborns are caused by preterm delivery which occurs before 37 weeks of pregnancy. Preterm birth is frequently low birth weight, which is defined as birthweight<2,500 gm. Preterm and low birth weight babies are more prone than both term and normal weight babies to suffer from acute respiratory, gastrointestinal, immunologic, central nervous system, hearing, and visual issues. Together, Asia and sub-Saharan Africa account for the largest percentage of

preterm births and low-birth weight (LBW) worldwide (around 60%)(3–5) . Prematurity accounts for roughly 18% of live births in India(6) . The National Family Health Survey-4 estimates that 20% of live newborns are affected by LBW(7).

For LBW infants, Kangaroo Mother Care (KMC) is an evidence-based, low-resource, high-impact intervention(8). KMC is defined by the WHO as "early, continuous, and prolonged skin-to-skin contact between the mother (or other carers) and the baby"(9). It is one of the markers of standard of neonatal care worldwide. It is well documented that KMC lowers mortality by more than 50% when compared to standard infant care. It lowers morbidities like hypothermia by 23% and severe infection by 42%. Additionally, it helps with weight, head circumference, and length growth. It facilitates breastfeeding and the development of a mother-baby relationship(10). Immediate Kangaroo Mother Care (iKMC) is a practice that involves skin-to-skin contact and exclusive breastfeeding for a newborn as soon as possible after birth. Neonatal sepsis and mortality from sepsis can be avoided with immediate kangaroo mother care. (11,12).

Since there is no established clinical model for resource-constrained settings or a uniform WHO definition, clinical stability has been defined differently in prior KMC trials. Compared to incubator care, continuous KMC (aiming for > 18 h/day) lowers mortality at discharge or 40 weeks post-menstrual age by 36–51% in neonates <2000 g who have completed stabilisation or post-natal transition(8,13–15). The mortality effect is only seen in settings with limited resources. But there is a lack of data about newborns who have not yet reached full stabilisation, who are at the highest risk of dying or suffering a negative result(15). KMC was started at an average age of ≤ 4 days in seven trials out of 20 that evaluated mortality at the most recent follow-up and were included in three systematic reviews(13–15).

Only one RCT started continuous KMC in pre-stabilized neonates within 24 hours after birth. A 40% decrease in mortality was reported in this Ethiopian trial (RR = 0.57, 95% CI 0.33–1.00, $p < 0.05$); however, there was a substantial risk of bias because over half of the unstable neonates were omitted and the qualifying requirements were not clear(13) . Despite KMC being a high impact intervention, implementation and coverage among hospitals is in varying degrees. In the current study we wanted to evaluatethe barriers for implementation and continuation of KMC in our department. The objective of the study was 1. Baseline assessment of obstacles to starting KMC in the neonatology department. 2. Increase KMC hours to more than 12 hours per day for eligible neonates.

MATERIAL AND METHODS

This quasi-experimental study was conducted at Saveetha Medical College neonatology department. All neonates under 37 weeks and below 2500g born between January 2024 and September 2024 and those under 2500g delivered between January 2023 and December 2023 were included. The baseline KMC duration was assessed over one year. The baseline KMC duration was assessed over one year. A QI team, including doctors and nurses, used fishbone analysis to identify barriers categorised under policy, people, procedure, and place. Interventions were implemented through four Plan-Do-Study-Act (PDSA) cycles, each lasting three weeks, followed by six weeks of monitoring. Strategies included nurse education, patient counselling, and involving family members in care. Outcomes were measured by the increase in average KMC hours.

The baseline data was collected at the end of December 2023. We created a fishbone diagram to identify potential obstacles to achieving KMC hours in our department after discussing them at the first QI meeting. The fishbone diagram is displayed in Figure 1.

We created a list of potential interventions based on this study. To determine the weekly sequence of testing updates, a priority matrix was created. The QI team made the decision to do one intervention per PDSA cycle and hold weekly meetings to talk about the results. One of our department's research nurses was tasked with gathering data every day. During the post-implementation phase, the QI team met monthly to evaluate pertinent data and provide ongoing feedback to all staff members in order to continue the improvement. Furthermore, the idea of a weekly champion announcement inspired the medical professionals. A run chart was used to plot the KMC runtime. Mothers gave their informed consent before being enrolled in the study.

To evaluate the effectiveness of the Quality Improvement (QI) initiative, both process and outcome indicators were systematically monitored. Process indicators included the percentage of healthcare providers trained in KMC protocols, the proportion of neonates with documented daily KMC hours, the number of caregiver

counselling sessions conducted, the availability and use of KMC chairs in the NICU and postnatal wards, the establishment of a Mother and Newborn Care Unit (MNCU), and the frequency of audits and QI team review meetings. Outcome indicators focused on the average daily KMC hours per eligible neonate, the proportion of neonates receiving more than six hours of KMC per day, the percentage increase in overall KMC coverage among eligible neonates, as well as improvements in neonatal weight gain and reduction in hospital stay duration where data were available. These indicators allowed the QI team to track implementation fidelity and measure the direct impact of the interventions on patient care practices.

Statistical analysis: Statistical data analysis is presented as mean ± standard deviation Comparisons were made between the control and ionic solutions using student t-test. All data were analysed using GraphPad Prism software *p<0.01 indicates a statistically significant difference.

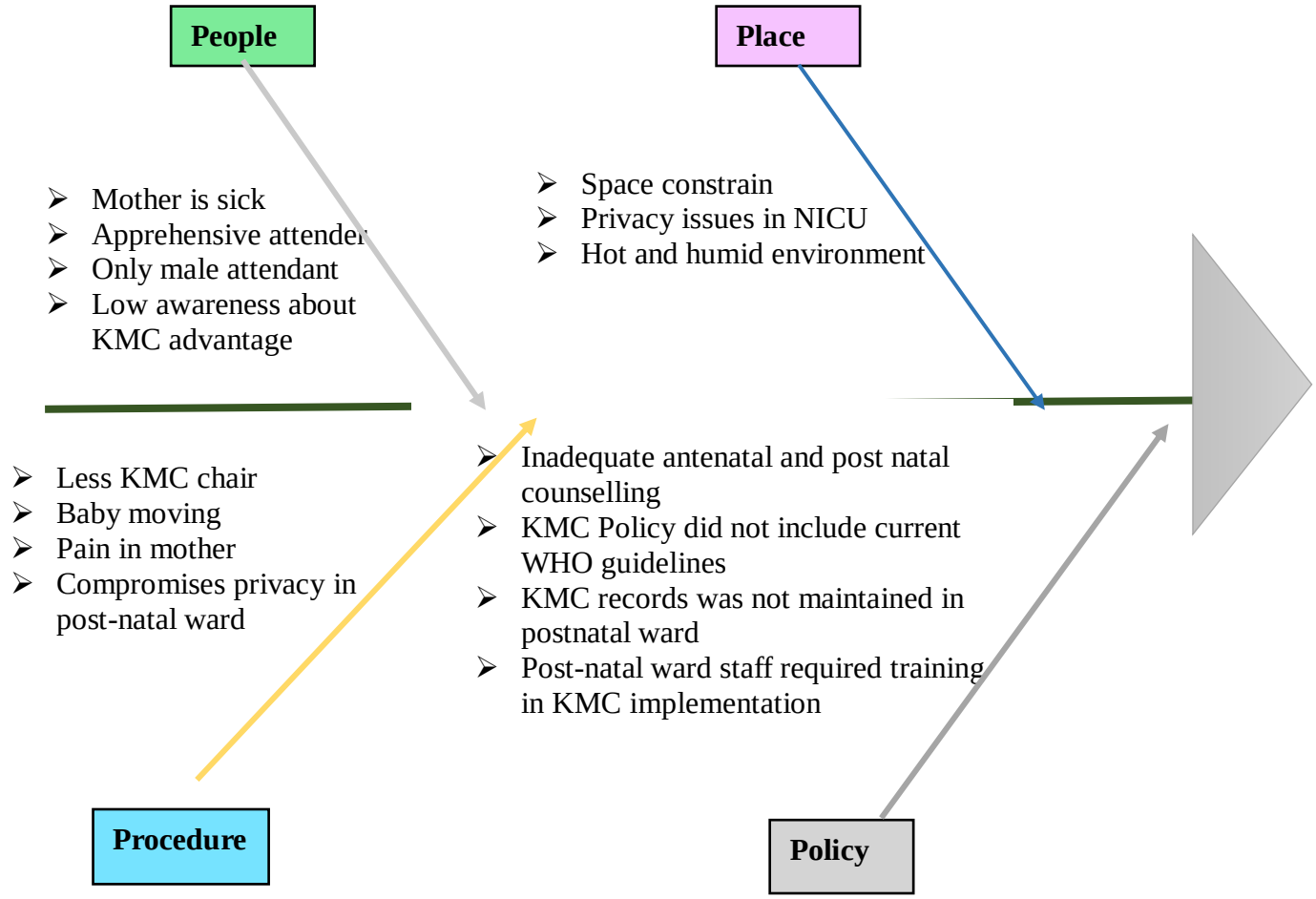

Fig 1: A fish bone analysis of KMC

RESULTS

We analysed the data using MS Excel 2019. We plotted the KMC coverage daily in the initial phase. Weekly average in the improvement phase, and monthly average in the sustenance phase. We used the mean and SD of the percentages for plotting on the statistical process control chart. The upper and lower control limits helped note and review common and special cause variations. We also documented the trending up of seven consecutive data points.

Table 1: Summary of PDSA Cycle in implementation Phase

PDSA Cycle number	Plan	Do	Study	Act
1	Update the Kangaroo Mother Care (KMC) policy to include current WHO guidelines and introduce individual patient records in post natal ward, maintained by healthcare providers.	KMC policy was updated to include all neonates born before 37 weeks of gestation and below 2500gm. Individual patient records in ward and ICU were maintained by healthcare providers including number of hours of KMC given per day.	Total average KMC duration= 8 hours/baby/day	Written KMC policy was made available in ward and ICU. Every patient's KMC record was collected from the ward and ICU
2	Conduct KMC training sessions for healthcare providers.	This included showing them movies and KMC graphical charts in small groups and creating a supportive environment for KMC in the NICU	Total average KMC duration= 8.6 hours/baby/day	KMC procedure, benefits and training in implementation was given to health care workers
3	Provide counselling sessions to parents and family members about the importance of KMC.	Advantages of KMC and how it improves the survival of LBW babies	Total average KMC duration= 11 hours/baby/day	We educated the mothers and family members about benefits of prolonged KMC
4	Establish a mother and newborn care unit and sufficient KMC chairs were provided in KMC ward and post natal ward.	Provided sufficient KMC chairs	Total average KMC duration= 10.3 hours/baby/day	KMC chairs were made available to all mothers practising KMC in our unit

Initial phase: The KMC coverage decreased from a base- line of 30%–40% within 4 days after KMC record-keeping and healthcare worker sensitization initiation. It rise up to 80% in the next 3 days with an audio-visual session and hands- on with the mother. The team achieved a KMC coverage of 100% within 2 weeks.

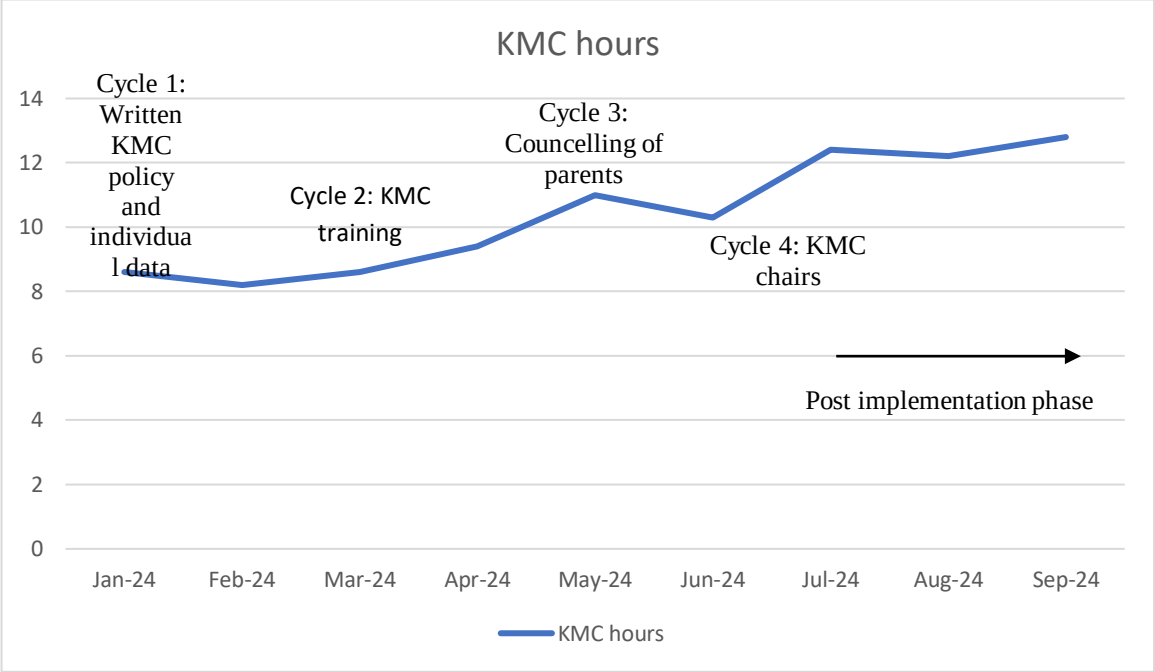

Fig 2: Run graph showing average KMC duration during implementation phase.Cycle 1:Jan 1 2024 to Jan 21 2024. Cycle 1 Observation : 22 Jan 24 to 26 Feb 24. Cycle 2 : 27 Feb 24 to 19 March 24. Cycle 2 Observation : 20 Mar 24 to 30 April 24. Cycle 3 : 1 May 24 to 22 May 24. Cycle 3 Observation : 23 May 24 to 4 June 24. Cycle 4: 5 Jun 24 to 26 Jun 24. Cycle 4 Observation : 27 Jun 24 to 8 July 24

One of the primary obstacles was a lack of updated guidelines for initiating KMC which was resolved in the first PDSA cycle. Kangaroo Mother Care (KMC) policy was updated to include all neonates below 37 weeks of gestation and below 2500gm. It was made available in ICU and wards. Individual patient records in both the ward and ICU were maintained by healthcare providers (Fig 3). In this cycle, average 6.5 hours/baby KMC was received when compared to KMC duration 8 hours/day for eligible neonatesin observation phase(Table 1).

In the second PDSA cycle we conducted KMC training session for healthcare providers. In this phase we have selected nursing staff working with mothers and their family members. This included showing them movies and KMC graphical charts in small groups and creating a supportive environment for KMC in the NICU. The designated bedside nurse provided one-on-one counselling to the mother and family members regarding KMC and its advantages. In order to extend the length of KMC, the nurses encouraged and acknowledged mothers and family members. In the second PDSA cycle, the average KMC duration was7.1 hours/baby (Table 1) (Fig 3).

In the third PDSA cycle we have provided a counselling sessions to parents and family members about the importance of KMC. We were successful in persuading the administrators of the advantages of KMC and how it improves the survival of LBW babies. As a result, numerous quality assurance measures could be guaranteed, such as expanding the number of KMC chairs, opening the MNCU. In the third PDSA cycle, average 8.85 hours/day KMC was received.

In the last PDSA cycle,weestablished a mother and newborn care unit equipped with sufficient KMC chairs.As part of a quality assurance effort, the unit's KMC chair count was increased during this cycle. The percentage of moms doing KMC without a KMC chair served as the process indicator. In the last PDSA cycle, average 10.4 hours/baby KMC was received (Table 1).

In the current study the duration of average KMC hours was studied from the date of initiation. It was found that the average no of KMC 6.5 hours/baby KMC were received in the month of January and it was increased in the month of sept-2024 i.e., 10.4 hours/day KMC was received.

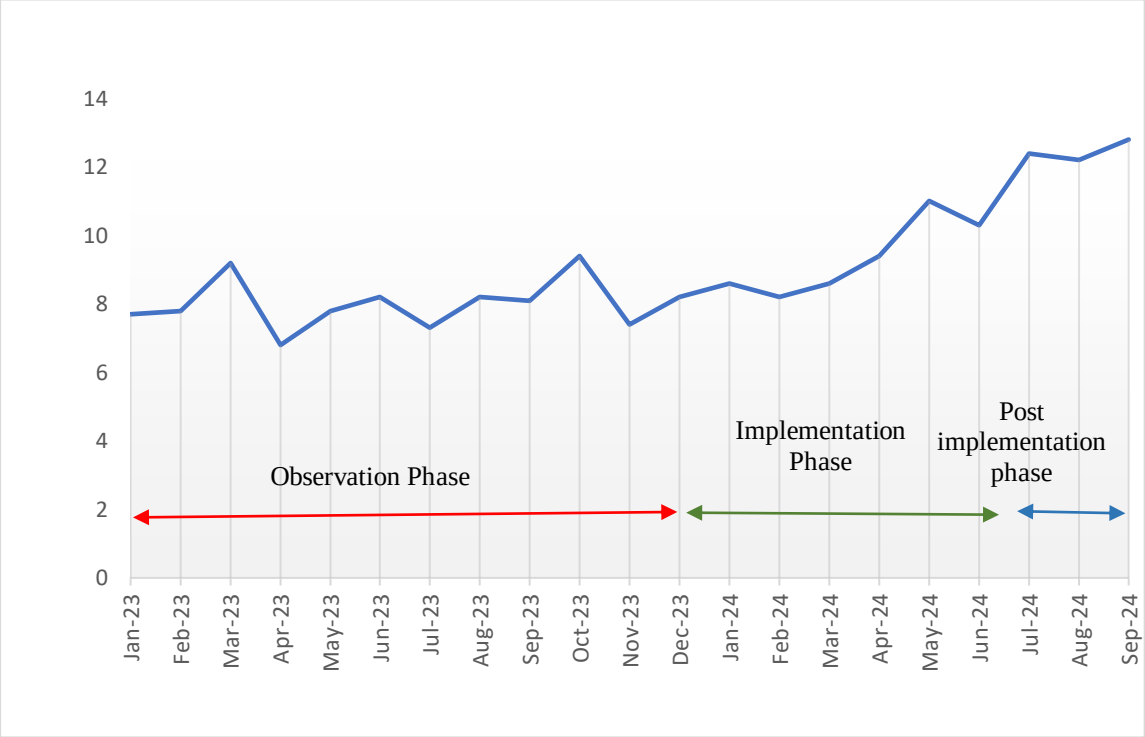

Fig 3: Figure showing the average KMC duration in hours/baby/day form the day of initiation. According to the baseline data, the median duration (in hours) of KMC practice was 10.4 hours. All data were analysed using GraphPad Prism software *p<0.01 indicates a statistically significant difference. Values are Mean ± SD, p value<0.01*

DISCUSSION

Beyond ensuring the immediate survival of newborns, kangaroo mother care (KMC) is an evidence-based, cost-effective strategy that promotes healthy growth and long-term development(16,17). According to Engmann et al. (2013), KMC can save up to 450,000 premature deaths annually with nearly universal coverage. Potential obstacles to KMC coverage and execution include problems with the environment and resources of the facility, the attitude of healthcare providers, and their ignorance of the advantages of KMC. An indication of the quality of care is an increase in KMC coverage. A monitoring methodology has been put forth by Bergh et al. for institutional settings in order to measure their success in implementing KMC(18)

According to Brimdyr et al., one of the obstacles was the hot weather, which caused moms to become irritated and perspire, which shortened the KMC length. Although the majority of the moms did not often complain, they believed that wearing KMC slings increased perspiration, which is why utilising slings is not as common in our unit. Bonding between the mother and the child is crucial for achieving a longer KMC duration. According to Kambarami et al., a lack of bonding results in a shorter KMC duration(14). In order to guarantee that the mother stays close to the child and spends more time with them, the MNCU idea was established.

The effect appears to be ephemeral and diminishes with the removal of support, even though it is recognised that scaling up KMC practices may be achieved by increasing staff support and using temporary project workers(19,20). Utilising the infrastructure and resources already in place to boost KMC was a novel approach in our study. One of the main pillars of quality improvement initiatives for altering health workers' behaviour is audit and feedback. This continuous policy served as a significant turning point in our research. To assess the possible causes of the shortened KMC duration, we performed a weekly audit in our study. In the current study, the duration of average KMC hours was studied from the date of initiation. It was found that the average no of KMC 6.5 hours/day were received in the month of January and it was increased in the month of sept-2024 i.e., 10.4 hours/day KMC was received. Furthermore, the idea of a weekly champion announcement inspired medical professionals. Recent research from Western India has described a similar role of healthcare champions(21).

Our research was a quality improvement initiative conducted at Saveetha Medical College. The lack of evaluation of the morbidity data was the study's limitation. Data on the day of KMC commencement and information on each baby's KMC continuance following discharge were not prospectively gathered. Mothers felt uncomfortable performing KMC while eating or walking. Therefore, in order to facilitate KMC, we turned to the active participation of other family members. The hours reached is still below the WHO requirement. However, we believe that more progress is anticipated with ongoing education during the post-implementation phase.

CONCLUSION

Our research was a quality improvement initiative conducted at Saveetha Medical College. The QI initiative significantly improved KMC hours by addressing unit-specific barriers. This approach is a simple, effective way to enhance neonatal care practices. Future projects will focus on immediate KMC implementation and its impact on growth and mortality.

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