Section: Neonatology

Original Research Article

IMPROVEMENT IN KMC UPTAKE IN MOTHERS OF PRETERM INFANTS RECEIVING CPAP – QUALITY IMPROVEMENT PROJECT

Nikhil P. Prajapati[1], Jatin Mistri[2], Mahipal Chauhan[3]

[1]Assistant Professor, Department of Pediatrics, GMERS Medical College, Vadnagar, Gujarat, India
[2]Consultant Neonatologist, Department of Pediatrics, Setu New Borne Care center, Ahmedabad, Gujarat, India
[3]Junior Resident, Department of Pediatrics, GMERS Medical College, Vadnagar, Gujarat, India

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Corresponding Author:
Dr. Nikhil P. Prajapati,
Email: drnikhilprajapati@gmail.com

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ABSTRACT

Background: Kangaroo Mother Care (KMC) offers significant benefits for preterm infants, yet its uptake in those receiving Continuous Positive Airway Pressure (CPAP) support remains suboptimal. This quality improvement (QI) project aimed to evaluate the effect of targeted interventions on KMC uptake and daily duration among mothers of preterm infants on CPAP. **Materials and Methods:** A prospective QI study was conducted in the neonatal intensive care unit of a tertiary care center over 90 days. Preterm infants between 25–34 weeks' gestation on CPAP were eligible, with exclusions for hemodynamic instability, invasive ventilation, or presence of central/umbilical lines. Of 32 eligible infants, 27 were included. Baseline data were collected, followed by two sequential Plan–Do–Study–Act (PDSA) cycles of six weeks each. Interventions included staff education, safe technique demonstrations, individualized counselling, and use of visual aids. The primary outcomes were the proportion of infants receiving KMC and average daily KMC duration. **Result:** The median gestational age was 29+3 weeks, and the median birth weight was 1080 g. KMC uptake improved from 65% at baseline to 73% after the first PDSA cycle and further to 89% after the second cycle. Average daily KMC duration increased from 2 hours at baseline to 3 hours after cycle 1 and 4 hours after cycle 2, demonstrating a consistent upward trend across study phases. **Conclusion:** Structured QI interventions significantly improved both the uptake and duration of KMC among mothers of preterm infants on CPAP. A phased, team-based approach addressing knowledge, technique, and motivation proved effective and can be integrated into routine NICU practice to enhance neonatal care.

INTRODUCTION

Kangaroo Mother Care (KMC), defined by prolonged skin-to-skin contact and promotion of exclusive breastfeeding, is an evidence-based intervention that significantly improves survival and short-term outcomes for preterm and low-birthweight infants. Systematic reviews and meta-analyses have demonstrated reductions in neonatal mortality, sepsis, and hypothermia, and improvements in breastfeeding rates and weight gain among infants who receive KMC.[1]

Recent large trials and pooled analyses have extended understanding of early and continuous KMC, showing benefits for early stabilization and several clinically relevant outcomes in resource-limited and tertiary settings.[2,3]

Despite robust evidence of benefit, KMC implementation in neonatal units is inconsistent, particularly for high-risk subgroups such as preterm infants receiving respiratory support. Historically, concerns about airway stability, device displacement, monitoring, and staff apprehension have limited KMC practice for neonates on CPAP or other respiratory support modalities.[4] Recent feasibility reports and physiological studies, however, indicate that with appropriate training, positioning techniques, and monitoring, KMC can be safely performed in selected infants receiving noninvasive respiratory support, and may confer respiratory and cardiorespiratory stability advantages.[5]

Barriers to routine KMC — including lack of staff training, limited time, cultural and logistic constraints, and insufficient parental counselling — are well described and often amenable to structured implementation strategies.[6] Quality improvement (QI) methodologies, especially Plan–Do–Study–Act (PDSA) cycles and point-of-care QI approaches, have been successfully applied in neonatal units to increase both the proportion of eligible infants

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receiving KMC and the duration of daily skin-to-skin contact.[7]

Given the evidence base for KMC and the documented feasibility for selected infants on CPAP, targeted QI interventions that address knowledge, technique, and caregiver support may increase uptake and duration of KMC among mothers of preterm infants receiving CPAP. The present prospective QI project was designed to evaluate whether sequential PDSA cycles focused on staff education, skill demonstration, and individualized maternal counselling could improve both the proportion of infants receiving KMC while on CPAP and the mean daily duration of KMC.

MATERIALS AND METHODS

Study Design and Setting: This was a prospective, hospital-based quality improvement project conducted in the neonatal intensive care unit (NICU) of a tertiary care center. The study was carried out over a period of 90 days.

Study Population: During the study period, 32 preterm infants met the eligibility criteria. Of these, 27 infants were included in the final analysis.

Inclusion criteria

- Preterm infants with a gestational age between 25 and 34 weeks.
- Infants receiving CPAP support.

Exclusion criteria

- Hemodynamically unstable infants.
- Infants requiring invasive mechanical ventilation.
- Presence of umbilical or central venous lines.

Study Phases: Baseline (pre-intervention) data on KMC uptake and duration while on CPAP were collected. QI measures were implemented in two sequential Plan–Do–Study–Act (PDSA) cycles, each lasting six weeks, followed by post-intervention assessment.

PDSA Cycle 1

- Educational sessions for nurses, supportive staff, and designated KMC champions on the benefits and feasibility of KMC during CPAP.
- Hands-on demonstrations of safe positioning and handling techniques for KMC in infants on CPAP.

PDSA Cycle 2

- Individualized counselling of mothers by physicians and KMC champions to address concerns and encourage participation.
- Use of visual aids, including photographs and videos, to reinforce the correct technique and benefits of KMC while on CPAP.

Data Collection and Analysis: For each eligible infant, data were recorded on the number of days KMC was provided during CPAP therapy and the mean daily duration of KMC. Measurements were documented separately for the pre-intervention phase and after each PDSA cycle to allow for comparison.

RESULTS

[Figure 1] illustrates the distribution of gestational ages for cases. The median gestational age was being 29+3 weeks. [Figure 2], a scatter plot, visualizes the distribution of weights (in grams) for cases. The median weight for this dataset was 1080 grams.

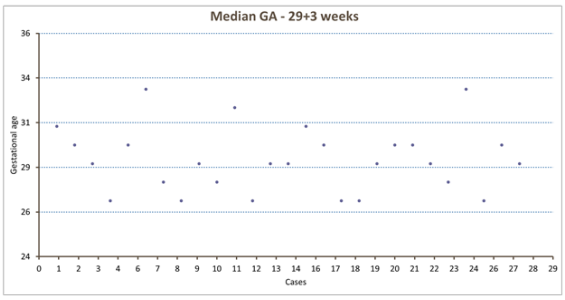

Figure 1: Gestational Age distribution

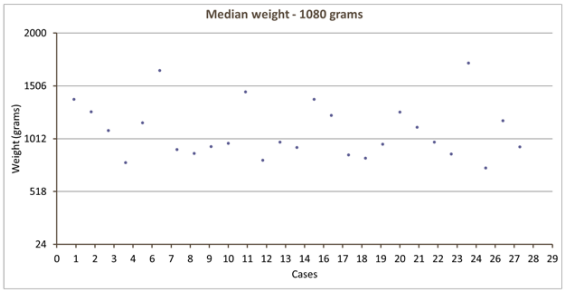

Figure 2: Weight distribution

[Figure 3] is a line graph showing the uptake of Kangaroo Mother Care (KMC) over three distinct time points: pre-intervention, cycle 1, and cycle 2. The data points on the graph show a clear and consistent increase in KMC uptake over time. The uptake was measured at 65% during the pre-intervention phase. This percentage increased to 73% in cycle 1 and further to 89% in cycle 2. This suggests that the intervention implemented between the time points was associated with a significant and progressive improvement in the rate of KMC adoption. The upward trend of the line graph indicates a positive relationship between time and KMC uptake.

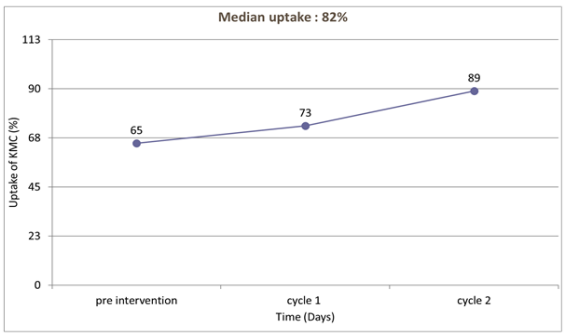

Figure 3: Uptake of KMC

[Figure 4] is a line graph showing the duration of KMC in hours per day across three time points. The data reveals a consistent and significant increase in

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the daily duration of KMC over time. During the pre-implementation phase, the average duration was 2 hours per day. This increased to 3 hours per day in cycle 1 and further to 4 hours per day in cycle 2. The upward slope of the line indicates a positive and progressive trend, showing that as the intervention progressed, the daily duration of KMC also increased.

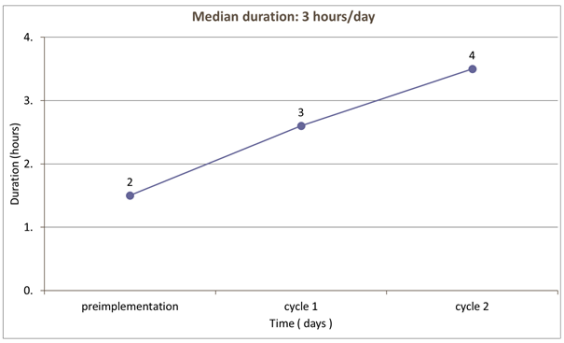

Figure 4: KMC duration per day (Hours)

DISCUSSION

In this quality improvement (QI) initiative, uptake of Kangaroo Mother Care (KMC) among mothers of preterm infants on CPAP support improved from 65% to 82%, and median daily duration increased from 1.5 to 3 hours. These findings underscore the effectiveness of structured interventions—comprising staff training, safe technique demonstration, and individualized counselling—in enhancing KMC delivery even within high-acuity settings.

Our results are consistent with other QI studies aiming to improve KMC uptake and duration. For instance, in twin preterm neonates, a QI programme successfully increased average KMC duration from 2.7 to 7.9 hours per infant per day using sequential PDSA cycles and team-based focus group planning.[8] Similarly, a tertiary Nigerian neonatal unit achieved significant extension of KMC duration from 0.6 hours to over 10 hours per baby per day through bundled interventions, parental sensitization, and recognition of KMC champions.[9] These comparisons affirm that incremental, phased QI strategies can markedly improve KMC metrics in resource-constrained settings.

The observed enhancement in KMC uptake and duration aligns with established links between prolonged skin-to-skin care and improved neonatal stabilization, thermoregulation, breastfeeding outcomes, and reduced morbidity—even when delivered in short or intermittent bouts.[10] Increased KMC duration also correlates with reduced length of hospital stay, contributing to decreased healthcare costs and diminished parental burden.[11] Thus, the improvements achieved in our project likely have broader implications for neonatal health and service efficiency.

Conducting KMC in infants receiving CPAP presents unique challenges—concerns regarding airway stability, monitoring, and staff apprehension may deter practice. However, evidence indicates that, when delivered safely with proper positioning and monitoring, KMC is feasible and may even aid respiratory stability by promoting calm and reducing apnea episodes.[12-14] Our intervention directly addressed provider concerns through demonstrative sessions and counselling, likely facilitating increased confidence in delivering KMC in these higher-risk infants.

Nonetheless, our study has limitations. The relatively small sample size, short intervention duration, and absence of long-term follow-up limit generalizability. Additionally, we did not assess clinical outcomes such as weight gain, duration of respiratory support, or breastfeeding rates—important endpoints in KMC research. Future studies should incorporate larger cohorts, extended follow-up, and evaluation of neonatal and maternal outcomes to better understand the clinical impact of enhanced KMC in infants on CPAP.

CONCLUSION

Implementation of targeted quality improvement measures in the NICU led to a notable enhancement in Kangaroo Mother Care practice among mothers of preterm infants on CPAP. The uptake increased from the pre-implementation rate of 65% to 82%, while the median daily duration rose from 1.5 hours to 3 hours. These findings underscore the effectiveness of structured, team-based interventions—comprising staff education, safe technique demonstrations, and individualized counselling—in overcoming barriers to KMC in high-risk neonates. Incorporating such measures into routine care may further strengthen neonatal outcomes and promote family-centered practices.

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