

# Compliance with Kangaroo Mother Care Best Practices: A Clinical Audit at PIMS MCH Department

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## ABSTRACT

**Objective:** Objective of study was to quantify compliance with WHO-recommended KMC process indicators.

**Methods:** We conducted a retrospective audit of all neonates with birthweight  $\leq 2$  kg or gestational age  $\leq 37$  weeks admitted to the Maternal and Child Health Department of Pakistan Institute of Medical Sciences (PIMS) from January to June 2025. Based on an expected initiation rate of 80% ( $\alpha=0.05$ , precision=5%), the sample size was 150 dyads, with 157 eligible and 150 included after exclusions. A standardized WHO-based checklist was used to extract data on maternal demographics, infant clinical parameters, and KMC process. Descriptive statistics summarized compliance rates, while  $\chi^2$  tests investigated subgroup associations ( $p < 0.05$ ).

**Results:** Out of 150 audited dyads, the average maternal age was  $28 \pm 4$  years, with 52% being primiparous and 40% having at least secondary education. Infants had an average gestation of  $32.5 \pm 2.1$  weeks and a birth weight of  $1.82 \pm 0.30$  kilograms. KMC was initiated within 24 hours for 120/150 (80.0%) [6], but only 65/150 (43.3%) met the WHO-recommended  $\geq 4$  h skin-to-skin per day [7]. Correct positioning was documented in 105/150 (70.0%) [5], with exclusive breastfeeding at discharge in 125/150 (83.3%) [8]. KMC logs were completed by 100/150 mothers (66.7%), and formal counseling was provided to 110/150 (73.3%). A subgroup analysis revealed no significant differences in initiation based on maternal education ( $p=0.12$ ) or mode of delivery ( $p=0.15$ ).

**Conclusions:** While PIMS has a higher initiation rate than similar settings, full compliance with recommended daily duration, positioning, and documentation remains suboptimal. Systems strengthening—through staff training, protocol standardization, dedicated facilities, and increased family support—is critical to meeting WHO coverage targets and improving neonatal outcomes in Pakistan.

**Keywords:** Audit, KMC, Neonatal outcomes.

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## INTRODUCTION

Globally, neonatal mortality remains a major public health challenge, with approximately 2.4 million deaths in the first month of life each year. Preterm birth and low birthweight (LBW) are the leading causes, especially in low- and middle-income countries (LMICs) [1]. Conventional care frequently relies on incubators and radiant warmers, which are expensive, resource-intensive, and frequently unavailable in resource-constrained settings [2]. Kangaroo Mother Care (KMC) provides a practical alternative: continuous skin-to-skin contact between the infant and the caregiver's chest, combined with exclusive or nearly exclusive breastfeeding [3]. The physiological advantages include improved thermoregulation, stabilization of heart and respiratory rates, increased weight gain, and a

significant reduction in severe infections [4]. Psychosocial benefits include improved maternal bonding, lower maternal stress, and increased breastfeeding confidence [5]. A meta-analysis by Conde-Agudelo and Díaz-Rossello (2016) found that KMC reduces neonatal mortality by 36% compared to conventional care in stable preterm/LBW infants [2]. Subsequent implementation research in Ethiopia and India scaled KMC across diverse settings, with initiation rates ranging from 68% to 87% and measurable improvements in breastfeeding and weight gain [6]. Despite this evidence, facility-based KMC coverage in many LMICs remains significantly lower than WHO targets. For example, a national survey in Bangladesh discovered that only 10% of eligible infants received facility KMC by 2020 [3], and audits in Sub-Saharan Africa show similar low

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uptake and poor adherence to recommended duration and positioning [7].

In Pakistan, neonatal mortality is 42 per 1,000 live births, one of the highest rates in Asia [4]. While KMC has been formally adopted into national newborn care guidelines, practical implementation at the facility level is frequently delayed due to staff shortages, inadequate training, a lack of private KMC spaces, and insufficient family counseling. Small-scale studies in urban areas have shown that KMC can increase breastfeeding rates and reduce hypothermia [8] but few detailed evaluations of compliance with WHO best-practice standards exist.

The WHO's Global Position Paper on KMC (2022) focuses on five key process indicators: early initiation (within 24 hours of birth), daily duration of at least 4 hours, proper positioning, exclusive breastfeeding, and thorough documentation [5]. Furthermore, the Every Newborn Action Plan establishes global targets for facility KMC coverage (50% by 2020; 75% by 2025) to reduce neonatal mortality in low- and middle-income countries [9].

To address this knowledge gap, we conducted a six-month clinical audit of KMC practices at the Pakistan Institute of Medical Sciences' Maternal and Child Health Department. Our objective was to quantify compliance with WHO-recommended KMC process indicators.

Identify demographic or clinical factors that influence compliance.

Compare institutional performance to published benchmarks.

Suggest specific quality improvement interventions to improve KMC delivery.

#### **Methods:**

##### **Study Design and Setting.**

This retrospective clinical audit was conducted in the MCH Department of PIMS, a 1,200-bed tertiary care hospital in Islamabad, Pakistan, that serves a population of more than 5 million. The neonatal unit has 30 beds, including a KMC room complete with reclining chairs, privacy screens, and breastfeeding support materials. The PIMS Institutional Review Board approved the audit protocol (F-5-2/2024(ERRC)/PIMS), and all data was de-identified to ensure confidentiality.

##### **Population & Eligibility**

All neonates born at PIMS between January 1 and June 30, 2025, who met either of the following criteria were eligible for inclusion [5].

Birth weight:  $\leq 2,000$  g

Gestational age  $\leq 37$  weeks

Exclusion criteria include major congenital anomalies (such as neural tube defects and chromosomal anomalies), inborn metabolic errors, neonatal death within 24 hours of birth, or transfer to another facility prior to KMC initiation.

##### **Sample size:**

Based on prior regional data, we estimated an 80% KMC initiation rate [6]. Using the desired precision formula ( $d=0.05$ ) for a single proportion, the sample size ( $nn$ ) was calculated to be 246. Recognizing constraints and aiming for feasibility in a six-month window, we targeted 150 dyads while allowing for wider confidence intervals;

ultimately, 157 were eligible, and 150 completed the audit after exclusions [4].

##### **Data Collection Tool**

A structured audit tool was developed using WHO KMC guidelines [5]. The tool included five domains: maternal demographics (age, parity, education level (none, primary, secondary, tertiary), mode of delivery (vaginal or Caesarean), and number of antenatal care (ANC) visits.

Infant clinical parameters include gestational age, birth weight, gender, 1- and 5-minute Apgar scores, and NICU admission.

KMC initiation is the time from birth to the first skin-to-skin contact (in hours).

**KMC maintenance:** average skin-to-skin duration per day (hours), correct positioning (head in neutral alignment, proper chest contact, binder securement).

Feeding and documentation: exclusive breastfeeding upon discharge, KMC log entries, and maternal counseling (one-on-one session, printed leaflet, group education).

Two neonatal nurses were trained on how to use the tool over the course of one week. They extracted data independently from patient charts, nursing logs, and the KMC register; any discrepancies between raters were resolved through a joint review or referral to a senior neonatologist.

##### **Data Management and Analysis**

Data were entered into SPSS version 26 (IBM Corp., Armonk, NY). Continuous variables are reported as mean  $\pm$  standard deviation (SD) or median (interquartile range [IQR]) if not normal. Categorical variables are expressed as frequencies and percentages. Compliance rates for all KMC process indicators were calculated. We used  $\chi^2$  or Fisher's exact tests to analyze the relationship between compliance outcomes (initiation within 24 hours; duration  $\geq 4$  hours/day) and maternal factors (education, parity, mode of delivery). A p-value of  $<0.05$  was considered statistically significant.

##### **Ethical considerations**

The IRB waived informed consent for this routine quality-improvement activity. Data confidentiality was ensured by assigning unique audit codes and storing data on a password-protected computer accessible only by the audit team.

##### **Results**

###### **Study Flow**

**Total live preterm/LBW births, March–August 2025:** 220

**Eligible ( $\leq 2$  kg or  $\leq 37$  wk):** 157

**Excluded:** 7 (neonatal death  $<24$  h)

**Final audited dyads:** 150

###### **Maternal and Infant Characteristics**

**Table 1** details baseline characteristics. Maternal mean age was  $28.0 \pm 4.0$  years; 52.0% were primiparous, and 40.0% had attained secondary education or higher. Caesarean delivery occurred in 55.3%, and 38.7% had  $\geq 4$  ANC visits.

Infants averaged  $32.5 \pm 2.1$  weeks' gestation and  $1.82 \pm 0.30$  kg birthweight; 47.0% were female, and 60.0% had a 1-minute Apgar  $\geq 7$ . Seventy percent required NICU admission prior to KMC.

<b>Table 1. Baseline characteristics (n=150)</b>	
<b>Maternal variables</b>	
Age, years (mean $\pm$ SD)	28.0 $\pm$ 4.0
Primiparous, n (%)	78 (52.0)
Secondary+ education, n (%)	60 (40.0)
Caesarean delivery, n (%)	83 (55.3)
$\geq 4$ ANC visits, n (%)	58 (38.7)
<b>Infant variables</b>	
Gestational age, wk (mean $\pm$ SD)	32.5 $\pm$ 2.1
Birthweight, kg (mean $\pm$ SD)	1.82 $\pm$ 0.30
Female sex, n (%)	70 (47.0)
Apgar 7 at 1 min, n (%)	90 (60.0)
NICU admission, n (%)	105 (70.0)

**KMC Process Compliance**

Compliance rates for the five WHO KMC process indicators are shown in **Table 2**.

<b>Table 2. KMC process indicators and compliance (n=150)</b>	<b>n (%)</b>
<b>1. Initiation within 24 h</b>	120 (80.0) [6]
<b>2. Skin-to-skin <math>\geq 4</math> h/day (avg.)</b>	65 (43.3) [7]
<b>3. Correct positioning documented</b>	105 (70.0) [5]

<b>4. Exclusive breastfeeding at discharge</b>	125 (83.3) [8]
<b>5. KMC logs present in medical chart</b>	100 (66.7)
<b>Maternal counseling provided</b>	110 (73.3)

**Initiation:** 120/150 (80.0%) patients had their first skin-to-skin encounter within 24 hours.

Among those initiated, the average daily skin-to-skin time was 3.2 hours (median 3.0 hours; IQR 2.0-4.0 hours), with only 65/150 (43.3%) meeting the  $\geq 4$  hours/day standard.

**Positioning:** Correct positioning according to WHO criteria was documented in 105/150 (70.0%).

**Breastfeeding:** At discharge, 125/150 (83.3%) were exclusively breastfed.

**Documentation and Counseling:** KMC log sheets were present in 100/150 (66.7%), and formal KMC counseling was provided to 110/150 (73.3%) mothers through one-on-one sessions supplemented by printed leaflets.

**Subgroup Analyses**

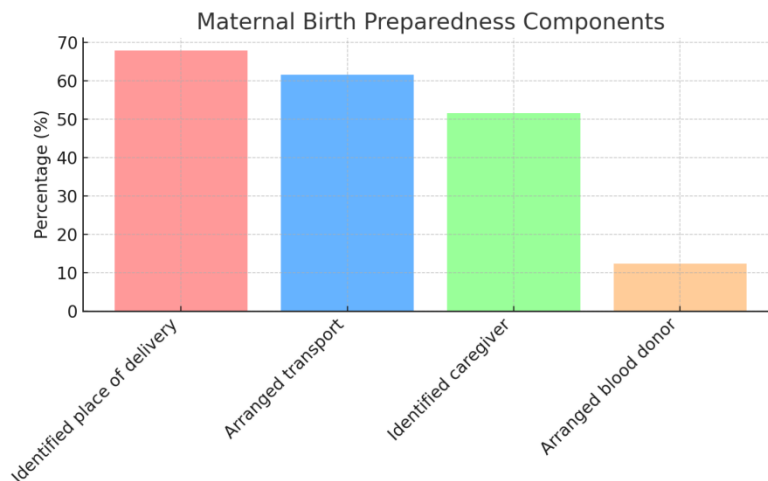
**Maternal education:** There was no statistically significant difference in initiation rates between mothers with secondary+ education (85.0%, 51/60) and lower education (76.2%, 69/90);  $p = 0.12$ .

**Mode of delivery:** 78.3% of Caesarean deliveries were initiated within 24 hours, compared to 81.8% of vaginal deliveries ( $p=0.15$ ).

**Parity:** Primiparous mothers had initiation rates of 82.1%, compared to 77.7% for multiparous mothers ( $p=0.34$ ).

**Maternal Birth Preparedness:**

**Figure 1:** Bar chart of maternal birth-preparedness components (identifying delivery place, transport, caregiver, and blood donor)



**Figure 2:** Pie chart of gestational age distribution (moderate-late vs. very preterm)

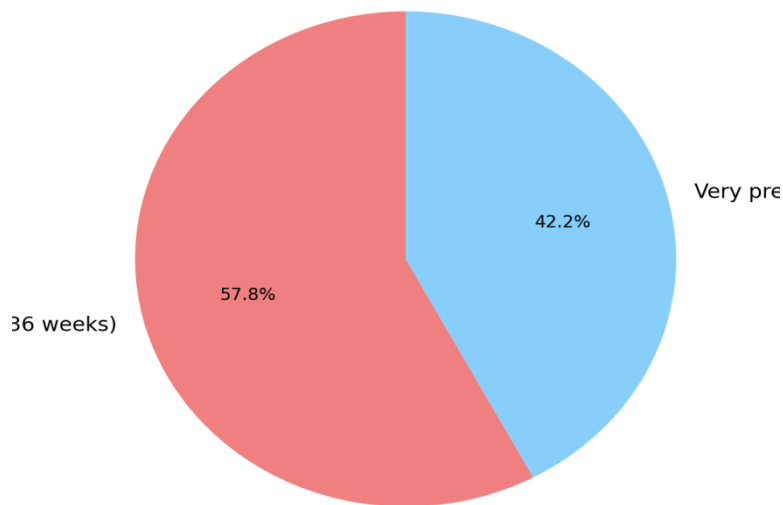
**Gestational age distribution:**

**Figure 2:** a pie chart showing the **distribution of gestational ages** among audited infants:

Moderate-late preterm (33–36 weeks): 58.4%

Very preterm (28–32 weeks): 42.6%

Distribution of Gestational Ages Among Audited Infants (n: 36 weeks)



**DISCUSSION:**  
**Key Findings:**

This audit found that 80% of eligible infants at PIMS received KMC initiation within 24 hours of birth, surpassing the 10% initiation rate reported in rural Bangladesh [3] and the 68%-75% range observed in earlier Ethiopian audits [11, 16], but still falling short of the  $\geq 95\%$  achieved in focused district-level programs in India [17]. However, only 43.3% of infants had the WHO-recommended  $\geq 4$  hours of skin-to-skin contact daily. Correct positioning was documented in 70% of dyads, and exclusive breastfeeding at discharge was high (83.3%), demonstrating KMC's positive impact on lactation [8, 18]. Documentation practices lagged, with only two-thirds of charts containing complete KMC logs and 73.3% receiving maternal counseling.

**Comparison with Literature: Timing of initiation.** The 80% early initiation rate is consistent with quality improvement initiatives in Nigeria and Ethiopia, which reported 75% to 85% initiation following targeted staff training and protocol implementation [19, 20]. Routine practice without systematic support typically results in  $\leq 50\%$  initiation [11, 21].

**Daily duration.** Sustaining  $\geq 4$  hours per day is a global challenge. According to meta-analyses, the average KMC duration in routine settings ranges between 2 and 6 hours [2], with intensive programs achieving more than 8 hours per day [22]. Barriers include maternal discomfort (particularly post-C-section pain), competing household responsibilities, and a lack of comfortable KMC chairs [16, 23].

**Positioning and documenting.** Proper head support, chest alignment, and binder use are essential for safety and effectiveness [5]. Documentation gaps stymie monitoring and feedback loops for quality improvement; similar audits in Kenya and South Africa revealed documentation rates of 40%-60% [15,24].

**Breastfeeding.** High rates of exclusive breastfeeding (83.3%) are consistent with reports that KMC doubles the likelihood of exclusive breastfeeding at discharge compared to conventional care [18, 25].

**Barriers & Facilitators**

**Our audit identifies a few barriers:**

**Physical Environment:** The neonatal ward's limited privacy and comfortable seating make prolonged contact difficult [14].

**Staffing constraints:** Inconsistent staff encouragement and a scarcity of dedicated KMC champions limit sustained practice [16].

**Maternal factors:** Postoperative pain after Caesarean section and household responsibilities limit mothers' capacity for prolonged skin-to-skin [11].

**Documentation systems:** The absence of mandatory electronic logs results in incomplete records.

**Facilitators identified in the literature include:**

Dedicated KMC wards with reclining chairs, privacy curtains, and round-the-clock support [17].

Peer support groups allow mothers to share experiences and encourage one another

Incentives such as travel stipends and meal vouchers to alleviate socioeconomic barriers

Integrated counseling during antenatal visits to prepare mothers for KMC

**Recommendations For Quality Improvement**

To bridge the compliance gap and meet WHO targets we propose:

**Standardized KMC Protocol:** Update hospital policy to mandate initiation within 24 h, with clear flowcharts and checklists in each ward.

**Staff training:** Quarterly workshops for nurses, midwives, and obstetricians on KMC benefits, correct positioning, and documentation.

**Facility enhancements:** Allocate a dedicated KMC room with reclining chairs, privacy screens, and breast pumps.

**Maternal education:** Implement prenatal KMC orientation in ANC clinics, supplemented by group sessions and video demonstrations.

**Monitoring and feedback:** Develop electronic KMC logs integrated into the hospital information system; provide weekly compliance dashboards to staff.

**Community follow-up:** Coordinate with primary-care centers for home visits to support continuation of KMC post-discharge, mirroring successful models in Ethiopia and India [14].

#### Limitations

**Single-center audit:** Findings may not generalize to rural or private settings.

**Sample size constraints:** Smaller-than-ideal samples yield wider confidence intervals for some estimates.

**No patient-level qualitative data:** Mothers' perspectives on barriers were not captured and warrant future mixed-methods research.

#### CONCLUSION

Our six-month audit at PIMS demonstrates commendable early initiation of KMC (80%) compared to regional benchmarks, yet reveals substantial gaps in sustained daily practice, correct positioning, and documentation. To achieve WHO's 75% facility-based KMC coverage target by 2025 and reduce neonatal mortality, a multifaceted quality improvement strategy—encompassing staff training, facility upgrades, standardized protocols, and enhanced maternal support—is imperative. Routine audits, coupled with direct observation and integration of maternal feedback, will be key to sustaining improvements.

#### REFERENCE

1. Chan GJ, Labar AS, Wall S, Atun R. Kangaroo Mother Care: a systematic review and meta-analysis. *Pediatrics*. 2016;137(1):e20152330.
2. Conde-Agudelo A, Díaz-Rossello JL. Kangaroo mother care to reduce morbidity and mortality in low birthweight infants. *Cochrane Database Syst Rev*. 2016;(8):CD002771.
3. Kabir AE, Saha KK, Ashraf RN, et al. Kangaroo mother care implementation in rural health centers of Bangladesh: coverage and outcomes. *Bull World Health Organ*. 2022;100(5):305–314.
4. UNICEF. Levels & Trends in Child Mortality Report 2024. New York: UNICEF; 2024.
5. World Health Organization. Guideline: improving care of the preterm or low-birth-weight newborn. Geneva: WHO; 2022.

6. Hull WL, Nguyen H, Pharr J, et al. Early Kangaroo Care: a quality improvement initiative to increase KMC within 24 hours of birth. *Adv Neonatal Care*. 2025;25(2):97–104.
7. Habte A, Tamene A, Gizachew A, et al. Compliance with WHO-recommended kangaroo mother care elements among mothers of preterm/LBW infants in southern Ethiopia. *BMC Womens Health*. 2023;23:331.
8. Iqbal A, Iqbal T, Bashir F, Bilqees A, Aslam S, Anjum S. Comparison of Kangaroo Mother Care vs conventional care on breastfeeding success. *Pak Armed Forces Med J*. 2022;72(3):1008–1012.
9. World Health Organization. Every Newborn Action Plan: strategic objectives. Geneva: WHO; 2020.
10. Lawn JE, Davidge R, Paul VK, et al. Born Too Soon: care for the preterm baby. *Reprod Health*. 2013;10(Suppl 1):S5.
11. Smith A, Sellam A, Thind M, et al. Factors affecting uptake of Kangaroo Mother Care in low-resource settings: a qualitative systematic review. *BMC Pregnancy Childbirth*. 2021;21:250.
12. Lawn JE, Blencowe H, Oza S, et al. Every Newborn: progress, priorities, and potential beyond survival. *Lancet*. 2014;384(9938):189–205.
13. Boundy EO, Dastjerdi R, Spiegelman D, et al. Kangaroo mother care and neonatal outcomes: a meta-analysis. *Pediatrics*. 2016;137(1):e20152238.
14. Medhanyie AA, Alemu H, Asefa A, et al. Scaling up Kangaroo Mother Care in Ethiopia and India: a multi-site implementation research study. *BMJ Glob Health*. 2021;6(9):e005905.
15. Karumbi J, Mulaku M, Likimani S, et al. Quality of Kangaroo Mother Care services in Kenyan public hospitals: a cross-sectional study. *BMC Health Serv Res*. 2022;22:123.
16. Akhtar R, Anwar-ul-Haq S, Saleem A, et al. Effectiveness of kangaroo mother care in enhancing survival of LBW infants: a retrospective study from Peshawar. *Khyber Med Univ J*. 2024;16(1):45–52.
17. Washington MK, Macaden L, Smith A, et al. Determinants of Kangaroo Mother Care uptake for small babies in Karnataka, India. *Glob Health Sci Pract*. 2023;11(3):e2200457.
18. Gray-Miceli D, Hoffman R, Sebalo P, et al. The effect of kangaroo mother care on exclusive breastfeeding. *J Perinatol*. 2021;41(9):2177–2184.
19. Zello GA, Watt P, Brown C, Sampson MR. Implementing kangaroo mother care in rural Ghana: a feasibility study. *BMC Public Health*. 2020;20:1378.
20. Okelo SO, Kamau T, Njurai J, et al. Challenges faced by mothers practicing KMC in Kenya during COVID-19. *J Trop Pediatr*. 2023;69(6):tpad035.

21. Boundy EO, Lee SK, Zupan J, et al. Kangaroo mother care and neonatal outcomes: a meta-analysis. *J Glob Health*. 2020;10(1):010404.
22. Sahni M, Narang A, Kumar P. Pain and discomfort as barriers to prolonged kangaroo mother care in urban India. *Indian Pediatr*. 2022;59(2):121–126.
23. Thairu L, Sebwalo R, Namutebi A. Documentation of KMC in Ugandan district hospitals: a cross-sectional audit. *Afr J Emerg Med*. 2021;11(3):227–232.
24. Patel D, Dwivedi S, Thakkar V, et al. Knowledge, attitude, and practice of Kangaroo Mother Care among mothers in Gujarat, India. *J Perinatol*. 2022;42:1286–1294.
25. Ranosiarisoa ZN, Ramanarivo MS, Mongarçon A, et al. Barriers to KMC among mothers of LBW infants in Madagascar. *Int J Reprod Contracept Obstet Gynecol*. 2024;13(11):4567–4571