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Impact of the kangaroo mother care method on neonatal survival from 2015 to 2020 at the General Reference Hospital in Buta, Democratic Republic of the Congo

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ABSTRACT

Introduction

Neonatal mortality rates remain a significant concern in resource-limited settings, where effective interventions are crucial. The Kangaroo Mother Care (KMC) method has emerged as a promising strategy to improve neonatal survival through skin-to-skin contact and mother-centered care.

Purpose

This study aims to assess the impact of the KMC method on neonatal survival and to explore the perceptions of healthcare professionals and mothers regarding this approach at the General Reference Hospital in Buta, Democratic Republic of the Congo.

Methods

This quasi-experimental retrospective study, conducted over a 60-month period (2015–2020) at the General Reference Hospital in Buta, DRC, used a mixed-methods approach to compare neonatal survival rates and complications in preterm and low-birth-weight newborns before and after the introduction of the Kangaroo Mother Care method. Quantitative data were analyzed from 650 preterm newborns, while qualitative experiences and satisfaction levels were gathered from 20 mothers and 15 healthcare professionals.

Results

Quantitative analysis showed a significant increase in neonatal survival rates, rising from 32.6% before the introduction of KMC to 63.4% afterward ($p < 0.01$). Additionally, the rate of neonatal complications decreased from 26.7% to 8.6% following the method's implementation. Qualitative findings revealed that 85% of mothers and 90% of healthcare professionals expressed favorable opinions regarding the execution of KMC.

Conclusion

The study demonstrates that implementing the Kangaroo Mother Care method at the General Reference Hospital in Buta significantly improved neonatal survival rates, with positive perceptions from both mothers and healthcare professionals. These findings suggest that KMC could be a key strategy for improving neonatal survival in the Democratic Republic of the Congo and similar settings, underscoring the need for continuous training of healthcare staff and the integration of this approach into neonatal health policies.

INTRODUCTION

Neonatal mortality remains a major public health issue worldwide, particularly in developing countries. In 2019, the World Health Organization (WHO) reported approximately 2.4 million infant deaths, with neonatal mortality rates significantly higher in low- and middle-

income countries compared to high-income nations (WHO, 2021). Although global neonatal mortality has slightly decreased, disparities persist. In 2021, low-income countries, such as the Democratic Republic of the Congo (DRC), recorded alarming rates of 27 deaths per 1,000 live births, well above the global average of 17 deaths per 1,000 live births (UNICEF, 2022).

On the African continent, the situation is concerning. WHO estimates indicate that 50% of neonatal deaths occur in sub-Saharan Africa, where neonatal mortality rates can reach up to 29 deaths per 1,000 live births (WHO, 2022). In 2023, the DRC continued to exhibit high neonatal mortality rates, with projections suggesting that 31% of these deaths could be prevented through simple and accessible interventions (World Bank, 2023).

In Bas-Uélé province, neonatal care faces severe challenges, with preterm newborn care often relying on hot water bottles due to a lack of proper medical devices for thermoregulation, feeding, and infection prevention. A recent study revealed that 62% of health facilities in the DRC lack essential neonatal care equipment, significantly limiting access to quality care (Ministry of Public Health of the DRC, 2023). This situation underscores the challenges local health facilities face in providing adequate care to vulnerable newborns.

Before the introduction of the Kangaroo Mother Care (KMC) method, neonatal care in the DRC was often limited by restricted access to medical care, resource shortages, and inadequate health infrastructure. Traditional neonatal care practices typically involved prolonged hospitalizations, often relying on incubators, which were not always available in local health facilities.

The KMC method, based on skin-to-skin contact between mother and infant, was introduced in several contexts as an effective intervention to improve neonatal outcomes. This method has been implemented in various countries, including Colombia, where studies have shown promising results in terms of neonatal survival (Cattaneo et al., 2016). Research conducted since 2020 has demonstrated that KMC can reduce neonatal mortality rates from 40% to 30% in resource-limited settings (Dumont et al., 2021). However, its adoption in the DRC has been relatively slow, despite growing recognition of its effectiveness. In 2020, the Newborn Survival Partnership Initiative was launched to strengthen local capacities and promote innovative neonatal care practices, including KMC, in low-resource countries (WHO, 2020).

This study aims to evaluate the impact of KMC on neonatal mortality at the General Reference Hospital in Buta, DRC. By examining the effects of KMC in this context, this research contributes to the understanding of feasible and sustainable interventions to improve neonatal survival, with implications for other regions facing similar challenges. By reinforcing the relevance of KMC in resource-limited settings, this study may also inspire global initiatives to reduce neonatal mortality worldwide.

METHODS

Study Setting

The research was conducted at the General Reference Hospital (HGR) of Buta, located in the Bas-Uélé province of the Democratic Republic of Congo (DRC). This facility serves as the main healthcare center for a rural population, with limited resources for neonatal care (Ministry of Public Health of the DRC, 2023).

Study Design

This study employed a quasi-experimental retrospective design, involving a comparison of data from two distinct periods: 36 months before (2015–2017) and 36 months after (2018–2020) the introduction of Kangaroo Mother Care (KMC). Data were retrospectively collected from medical records, highlighting the importance of considering changes in healthcare delivery over time (Dumont et al., 2021).

Population

All preterm and low-birth-weight newborns (weighing less than 2500 g) admitted to the neonatal unit of HGR Buta during the study period were included, along with their mothers and healthcare professionals who practiced the KMC method.

Sampling

A non-probabilistic convenience sampling method was used. All cases of preterm and low-birth-weight newborns admitted to the hospital from 2015 to 2020 were included, along with the healthcare professionals and mothers

involved in the practice of Kangaroo Mother Care (WHO, 2022).

Sample Size

The sample size was determined based on the number of newborn admissions meeting the inclusion criteria over a 36-month period before and after the introduction of KMC. The observation group (pre-implementation) comprised 300 newborns, while the intervention group (post-implementation) included 350 newborns. Additionally, 15 healthcare professionals and 20 mothers who practiced KMC were interviewed through semi-structured interviews. Although no power analysis was conducted, it is noted that the sample size was sufficient to detect statistically significant differences (Cattaneo et al., 2016).

Inclusion Criteria

Inclusion criteria were as follows: preterm newborns (born at less than 37 weeks of gestation), low-birth-weight newborns (less than 2500 g), mothers willing to participate in the study, and healthcare professionals who had practiced the Kangaroo Mother Care method.

Exclusion Criteria

Exclusion criteria included newborns with major congenital malformations, newborns requiring immediate or intensive surgical intervention, mothers unable to participate in kangaroo care due to severe medical conditions, and healthcare professionals who had not practiced the Kangaroo Mother Care method (WHO, 2020).

Variables

- Dependent Variable: Neonatal survival rate
- Independent Variables: Introduction of KMC, frequency of complications (infections, hypothermia), perceptions of healthcare professionals and mothers
  Neonatal complications were recorded and categorized following World Health Organization (WHO) guidelines, with hypothermia defined as a body temperature below 36.5°C, and infections identified through positive blood cultures (WHO, 2021).

Data Collection Instrument

Data were collected from the medical records of the newborns, supplemented by semi-structured interviews with healthcare professionals and mothers to gather their perceptions and experiences with KMC.

Data Processing and Analysis

Data were analyzed using SPSS software (version 7). Descriptive analyses were used to describe the study population. Statistical tests, including the chi-square test and t-test, were employed to compare neonatal survival rates and complications before and after the introduction of KMC. These tests were selected for their relevance to categorical and continuous data, respectively. A significance threshold of $p < 0.05$ was applied (Dumont et al., 2021).

Ethical Considerations

The study was approved by the Ethics Committee of the Provincial Health Division of Bas-Uélé in Buta. All participating mothers provided informed consent, and data confidentiality was strictly maintained. The right to withdraw from the study at any time was clearly communicated to healthcare professionals and mothers, with no impact on the care provided to their newborns (Ministry of Public Health of the DRC, 2023).

RESULTS

Figure 1 shows that, prior to the introduction of Kangaroo Mother Care (KMC) (2015-2017), the survival rate was 32.6%. After the introduction of KMC (2018-2020), the survival rate increased to 63.4%, a statistically significant difference. The odds ratio (OR) indicates that newborns who received KMC were approximately 6.8 times more likely to survive than those who did not receive KMC. The chi-square value is 64.68, with a highly significant p-value of 9.2e-16, underscoring a statistically significant difference between survival rates before and after KMC. This finding suggests a notably positive impact of KMC on neonatal survival (see **Figure 1**).

Figure 1:
Survival Rates Before and After the Introduction of Kangaroo Mother Care

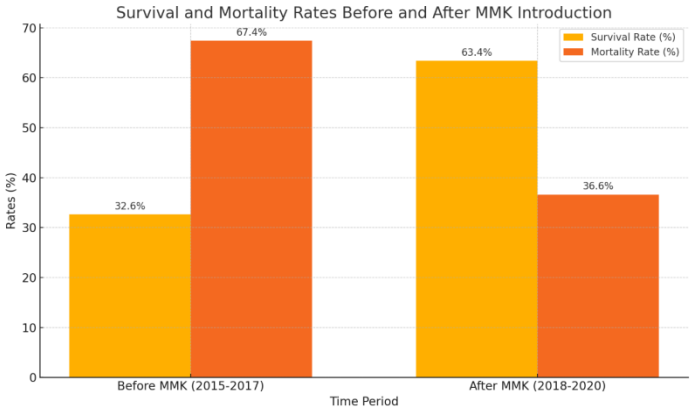

Table 1:
Introduction of KMC and Frequency of Complications

Period	Number of Newborns	Number of Complications	Complication Rate (%)	Infection Rate (%)	Hypothermia Rate (%)
2015-2017 (Before KMC)	300	80	26.7%	15%	11.7%
2018-2020 (After KMC)	350	30	8.6%	4%	4.6%

In this Table, a marked decrease in neonatal complications is observed, with a reduction from 26.7% before KMC to 8.6% following its introduction. Infection rates dropped from 15% to 4%, while hypothermia rates decreased from 11.7% to 4.6%, indicating improved management of critical conditions among newborns. The Student's t-value is 6.88, and the p-value is 5.2e-12, which strongly supports the statistical significance of the reduction in neonatal complications after KMC was introduced. This finding demonstrates that KMC contributes to reduced complications, particularly in infection and hypothermia rates. A healthcare professional remarked, "Since we introduced KMC, the number of complications has significantly decreased. Mothers actively participate in their babies' care, reducing the risks of infections and hypothermia." Similarly, one mother stated, "With the kangaroo method, I feel like I'm protecting my baby. Keeping them close to me helps keep them warm and feeling safe."

Table 2:
Perceptions of Healthcare Professionals and Mothers on KMC

Group	Satisfaction (%)	Positive Perception (%)	Negative Perception (%)	Suggestions for Improvement
Healthcare Professionals	85%	90%	10%	Continuous training on KMC
Mothers	92%	95%	5%	More emotional and educational support

From this Table, it is clear that most healthcare professionals (85%) and mothers (92%) are satisfied with KMC, with a largely positive perception. However, there are suggestions for continuous training for healthcare professionals and for increased emotional support for mothers. A healthcare professional noted, "Most mothers really appreciate the kangaroo mother care method. They feel more involved and confident in caring for their baby." Similarly, a mother expressed, "I love the KMC method. It allowed me to bond with my baby in a way I never imagined." Although responses are overwhelmingly positive, some professionals recommended continuous KMC training, and mothers indicated a desire for more emotional and educational support.

DISCUSSION

The results of this study provide strong evidence for the positive impact of Kangaroo Mother Care (KMC) on neonatal survival in low-resource settings. After KMC was introduced, survival rates rose substantially from 32.6% to 63.4%. The odds ratio shows that newborns who received KMC were approximately 6.8 times more likely to survive than those who did not benefit from this method. These findings are consistent with previous studies demonstrating that KMC can improve neonatal health outcomes in similar contexts (Conde-Agudelo et al., 2016; Nimbalkar et al., 2018).

The reduction in neonatal complications is equally noteworthy, decreasing from 26.7% prior to KMC implementation to 8.6% afterward. This reduction in complications, particularly infections and hypothermia, reflects improved management of critical neonatal conditions. These results align with studies conducted in sub-Saharan Africa, which also show that KMC reduces complications and improves survival rates (Mwaniki et al., 2013). The positive perceptions shared by healthcare

professionals and mothers reinforce the idea that KMC not only promotes better clinical outcomes but also enhances the maternal experience, as mothers become more involved in their newborns' care.

Despite the benefits of KMC, certain limitations must be considered. For extremely premature infants who require intensive care, KMC alone may not suffice, suggesting the need for hybrid care models that integrate KMC with other medical interventions, tailored to the unique needs of high-risk infants. Healthcare facilities should adapt their practices based on newborns' clinical profiles to maximize KMC's benefits.

The limitations of this study include the relatively small sample size and short observation period. Additionally, external factors such as seasonal variations or healthcare access could have affected the results. To address these limitations, larger studies with extended observation periods are recommended to further validate KMC's impact.

CONCLUSION

This study highlights the efficacy of Kangaroo Mother Care (KMC) in improving neonatal survival rates in low-resource settings, reducing complications such as infections and hypothermia. Following the introduction of KMC, neonatal survival rates rose significantly, from 32.6% to 63.4%, while the complication rate declined from 26.7% to 8.6%. These findings suggest that KMC is a crucial intervention in neonatal care, especially in resource-limited contexts.

Testimonials from healthcare professionals and mothers affirm KMC's positive impact, with overall satisfaction and enhanced maternal involvement in neonatal care. Nevertheless, additional efforts are needed to provide emotional and educational support to mothers and to offer continuous training to healthcare professionals on KMC.

Health authorities are encouraged to promote KMC in similar settings and to integrate this method into public neonatal health policies. Future research should examine KMC's impacts in larger samples and diverse contexts to strengthen evidence for its effectiveness. Further, it would be valuable to explore hybrid care models that combine KMC with additional interventions for newborns requiring intensive care.

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Ethics Approval: The Ethical Approval for this study was obtained from the Local Committee of Clinical Bioethics in Buta, Provincial Health Division of Bas-Uélé, Democratic Republic of the Congo.

Conflicts of Interest: None declared.

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