GSC Advanced Research and Reviews

eISSN: 2582-4597 CODEN (USA): GARRC2

Cross Ref DOI: 10.30574/gscarr

Journal homepage: https://gsconlinepress.com/journals/gscarr/

(REVIEW ARTICLE)

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A critical review of neonatal parent support programme in United Kingdom: the effect of kangaroo mother care in NHS.

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GSC Advanced Research and Reviews, 2024, 20(03), 054–072

Publication history: Received on 02 July 2024; revised on 10 September 2024; accepted on 12 September 2024

Article DOI: https://doi.org/10.30574/gscarr.2024.20.3.0301

Abstract

It has become critically important to provide a thorough understanding of the effects of the Kangaroo mother care (KMC) phenomenon on infants in the neonatal stage within the United Kingdom (UK). The current body of knowledge suggests numerous research publications globally, but the UK has yet to scale up its KMC practice. This study provides a critical review of the subject for a more nuanced understanding of the subject effect and to identify the current stage of KMC research in the UK. The findings were consistent with the body of knowledge on KMC with slight variations. Specifically, the UK has limited primary study in KMC. Randomized clinical trials (RCT) in KMC are minimal hence the UK is dependent on MedTech like an infant incubator which is a potential threat to KMC scale-up. Breastfeeding figures in the UK suggest depleting practice of KMC. The National and local policies captured KMC components but have impacted morbidity and mortality indices. It also showed three areas of divergence in practice and standardization. To enhance UK national and local policies uniformized guidelines and standardization of postnatal follow-up and community-based supervision are necessary.

Keywords: Neonatal parent support; Kangaroo mother care; Skin to skin care; Mortality and morbidity rate; National Health Service.

1. Introduction

This review will investigate the effect of kangaroo mother care (KMC) as a neonatal parent support programme. The study will provide a synthesized review of KMC through the list of selected papers. It will discuss the methodology; two themes identified from the study and critically appraise the study's findings. This will draw from various studies, comparing statistical findings like mortality and morbidity in the United Kingdom (UK) to other nations like Scandinavia and other European countries. This will be followed by conclusions and recommendations for future service improvement to assist in KMC uptake in the UK.

KMC has become a global practice since originating in Colombia in 1979 (Charpak *et al.,* 2020; Gomes *et al.*, 2021). This global impact is based on its use to provide quality and sound health and well-being for infants (neonates). In its evolution, its medical benefits have seen the practice as one of the leading methods for skin-to-skin care and bonding between parents and infants. The process of KMC invariably triggers various psychological, and emotional responses that help to create a bond between a parent and a child (Dong, Steen, and Wepa, 2022). The current body of knowledge suggests a plethora of research publications, but how many of these studies are in the UK? Hence, the professional responsibility to offer a critical review of the subject studies within the UK for a more nuanced understanding, as well as to identify the current stage of research to understand the relevance of the study as an alternative method for

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neonatal care. The findings could inform public health policies aimed at promoting family-centered care in neonatal and postnatal healthcare settings.

1.1. Background of the study

Kangaroo mother care has moved from hypothesis to theory and is now a public health care intervention to care for premature or low birth weight (LBW) infants. This was developed by two researchers, Edgar Rey Sanabria and Héctor Martínez-Gómez in Bogotá, Colombia, in 1979 as an option for use if the conventional incubator treatment for low-birth-weight infants was absent (Grayson, 2018) or as a technique to improve parents and infants bonding, protection, affection, and attraction (Hassan *et al.*, 2024; Mueller and Grunwald, 2023). According to the World Health Organization (WHO) Kangaroo Mother Care Practical Guide (2003) KMC is defined as a "powerful, easy-to-use method to promote the health and well-being of infants born preterm as well as full-term". It has several important components, such as: early, continuous, and prolonged Skin to Skin Contact (SSC) between the mother and the baby. Baby breastfeeding that is purely exclusive and was initiated in a hospital setting and can be continued at home. Allows for early discharge of the baby to the family and post-discharge follow-up. Skin to skin care (SSC) is a component of KMC thus in this study KMC will include SCC studies. In the UK, the local and national health guidelines, policies and procedures captured some components of KMC with healthcare professionals assigned the duty of KMC practice and dissemination. Specifically, the East of England Developmental Care Guidelines 2021 for neonates and the National Institute for Health and Care Excellence (NICE) 2021 guidelines.

2. Literature review

Various academic scholarships in recent times have investigated Kangaroo mother care as a public health intervention (Grayson, 2018). For example, Kurt *et al.* (2020) explored the effect of kangaroo care on maternal attachment in preterm infants. Similarly, Mehrpisheh *et al.* (2022) study deals with the effectiveness of Kangaroo Mother Care (KMC) on the attachment of mothers with premature infants. Hardin et al. (2020) and Coşkun and Günay, (2020) studied the infant neurophysiological development and breast-feeding stress of mothers and neonates, respectively. Moving to the other gender binary, Garnica-Torres, Gouveia, and da Silva Pedroso (2021) looked at the attachment between a father and premature baby in kangaroo care in a neonatal unit of a public hospital. Taking that study forward, Vogl *et al.* (2021) examined Kangaroo father care from a pilot feasibility study of physiological, biological, and psychosocial measures to capture the effects of father-infant and mother-infant skin-to-skin contact in Neonatal Intensive Care (NICU). These scholarships all deal with impact assessment, diversified setting arrangement (Daga, 2018) barriers, and enablers (Walker *et al.,* 2022) and survival rate (Cho *et al.*, 2022). Their findings pointed to the beneficial role of this intervention and in some instances suggested that its applicability is only in low-income countries. The United Kingdom (UK) as a high-income country has limited KMC studies, as such, this present study will look at these studies, juxtaposing them to draw similarities and differences to help KMC uptake in the UK.

2.1. Statement of the problem

Despite the improvement and benefits of KMC, there seems to be a departure in acceptance in the UK (Stefani *et al.,* 2022) but not globally (Donald, 2017; Linner *et al*., 2022b; Mehrpisheh *et al.,* 2022; Stefani *et al.,* 2022). This departure is associated with two facts: Firstly, the unfriendly nature of European scientists and institutions in accepting or domesticating research findings emanating from low-income countries like Colombia, India and Nigeria. Secondly, the fact that technological innovation is accepted in the UK, thus, placing incubator treatment of neonates higher than the World Health Organisation (WHO) recommended KMC. Even with the technological acceptance of incubation methods, the neonatal death rate in the UK, according to a report from MBRRACE-UK stood at 3.54 stillbirths per 1000 total births and 1.65 neonatal deaths per 1000 live births in 2021. In 2022, the neonatal death figure rose to 2.9 deaths per 1000 lives birth prompting government intervention. The figures continue to rise from 2020 to 2023 mainly accelerated by the COVID-19 virus (Office of National Statistics, 2021). Therefore, the synthesized evidence-based interventions for preterm and low birthweight (LBW) neonates in LMICs, their associated neonatal mortality rate (NMR), and barriers have necessitated the need for the UK to scale up its KMC implementation strategy or risk not meeting up the WHO year 2030 goal of eliminating neonatal mortality.

Also validating this argument are the limited research on KMC in the UK and the variety of research findings on KMC globally. The various approaches by different National Health Service (NHS) such as the East of England Developmental Care Guidelines (2021) for neonates has necessitated continuous research and public enlightenment of parents on KMC (Donald, 2017). This study will look at all the KMC studies in the UK from 2015 till date because of the limited number of primary studies on KMC in the UK. The inclusion of these studies is not just to increase selection list but to interrogate the acceptance and awareness level over time and to integrate findings that can move the study forward in a way that could benefit scientists and institutions interested in the study in the UK.

2.2. Research question

- What is the effect of KMC as a neonatal parent support program in the UK health sector?
- How do the current UK national and local policies impact the uptake of KMC and constitute a barrier to its scale up in the UK?

2.3. Aims and objectives.

The study aims to identify research papers on the effect of KMC as a neonatal parent support program in the UK healthcare sector and to review them by discussing the underlining themes. It will also conduct findings based on a critical appraisal of the selected research papers.

3. Methodology

To study this aim, the above research objectives and research question were formulated based on PICO (Grindlay and Karantana, 2018). The study search terms, as well as the eligibility criteria were outlined according to the Centre for Evidence-Based Medicine (CEBM) (2021)

Table 1 PICO research question

S/N	Question type	Patient/problem	intervention	Comparison	Outcome
1	Therapy	Neonates / low birth weights babies	Kangaroo mother Care (KMC) / Skin to skin care	Incubator	i. Weight gain in neonates ii. Bonding and Attraction

3.1. Search strategy

A search for appropriate literature on the effect of kangaroo mother skin-to-skin care on neonates was carried out on broader electronic databases such as Google Scholar, CINAHL, Medline and PubMed. A broader spectrum of this search would provide grounds for selection criteria and narrow selection based on the specificity and sensitivity (Bramer *et al.,* 2018). According to Siddaway, Wood and Hedges (2019) recommendation, Boolean operators, keywords, and truncations were consistently applied to generate the most relevant search results for the literature review.

3.2. Selection criteria

This study utilized 8 primary studies done in the UK from 2015 to 2024 because of limited KMC primary research in the UK. As well as articles written in English, from peer-reviewed journals, and with abstracts relevant to the chosen topic. In addition, for a study to be included, it must have been published worldwide.

3.3. Exclusion criteria

This present study has developed an independent eligibility criterion using the above criteria, which is also consistent with works by Xiao and Watson (2019). This means all secondary source studies and duplicate studies were excluded, as were any other studies that fell outside the inclusion criteria.

Table 2 Study Identification and Selection

Data Base	Results	Articles for Abstract Review	Abstract after Excluding Duplicates	Relevant Abstracts	Results After Subsequent Filtering
Google scholar	8620	20	12	3	Impact of KMC 4
CINAHL	327	5	2	2	KMC 2
PubMed	88	32	12	2	SCC 2
Medline	85	12	3	0	0

Source: Researcher's computation

Based on the selection criteria, 8 research papers were selected and subjected to the Critical Appraisal Skills Programme according to Long, French and Brooks (2020) as outlined in the CASP Guidelines (CASP, 2018). Based on the careful juxtaposition of the research aim and objective, thematic analysis is possible in a way that narrative analysis could be applied, to validate data and reinforce research arguments (Castleberry and Nolen, 2018; Mertova and Webster, 2019; Terry *et al.,* 2017).

Table 3 Selected studies with critical appraisal and data extraction**.**

S/N	Authors, Year and country of study	Study Type and sample size	Major findings in relation to our research purpose/goal	Critical strengths and weakness of the studies
1	Bailey, McIntyre and Harvey (2017).	A mixed method design. A pilot study using quantitative and qualitative data. 11 participants out of 18 women who showed interest.	SCC does not unsettle baby. It does, however, improves breastfeeding appetite in 6/11 neonates. Neonatal axilla temperature showed no significant clinical or statistical differences because it is between (0.0 to -0.1) degrees Celsius. Infant feeding cues and maternal responsiveness were noticed. 11 dyads showed feeding cues with increased activity (n=5), head bobbing (n=8), rooting (n=3), and fussing (n=2). Verbal cooing and smiling (n=4), stroking of the baby's back and head (n=2), and facilitating the move to the nipple (n=7). Enabling positional change for baby (n=5), reclining their position (n=4), gazing or reciprocal eye contact (n=4), and laughter (n=1). Results showed a positive impact of KMC.	The study strength lies in shifting of the focus from hospital setting to community base research. The dyadic focus gives a comprehensive insight into the effectiveness and perception. Its weakness is majorly on the small sample size of 11 participants. This mostly because pilot study is usually small hence it is not generalizable. It is statistically insignificant. Again, implementation of KMC in community could face logistical challenges.
2	Gregson *et al*. (2016) UK	A randomized controlled trial. 366 women with 182 in study group and 187 in control	There is no breastfeeding without KMC hence there was a 5% increase in breastfeeding rate at 48hr and 7% at 6 weeks. (P = 0.25 and 0.44) There was no statistically significant difference between the two values. There is a high correlation (P = 0.04) between breastfeeding at 48 hours and skin to skin performance. Findings showed a positive effect of KMC.	This study is RCT had the rigor, focus and significant sample size. It had a narrow focus that deals with the effect of skin to skin contact after elective caesarean section on breastfeeding rate. The intervention examines in detail. Also, the study findings have two implications that will assist in the improvement of breastfeeding rate. The second, is an improvement in maternal-infant bonding after caesarean section.
3	Higman *et al.* (2015). UK	The study uses survey method: The Neonatal Unit Clinician Assessment Tool (NUCAT). 51 Healthcare professionals (medical and nursing staff)	KCC assisted in building rapport between staff and parents. Level of Clinical awareness of positive touch during KMC/ KMC knowledge was good. Clinical KMC training is important. Clinician scored positive score during the training.	This study is not the randomized clinical trial hence had no rigor and had a small sample size. It had a narrow focus with unequal gender representation. Also, the study findings have two implications that will assist in the improvement of KMC The second, is medical professionals' knowledge

		51 participants completed NUCAT involving medical/ANNPs (17%, *n* = 9) nursery nurses (11%, *n* = 6), and neonatal nurses (70%, *n* = 36). Most 90.2%, (*n* = 47) were women, with a spread of ages and experience since qualification in neonatal care. More than half had KCC training.		and confidence with KMC within the context of the study. NUCAT is a tool that can assess clinicians' competencies and identify areas for improvement. The weakness is rooted in the fact that self-assessment data sometime have bias and can lead to inaccurate data entry. Small sample size implies that findings can not be generalized. It had predominantly female HCP participants, meaning that what is known about male staff confidence and knowledge limited.
4	Kwah *et al*. (2018) UK	Semi-structured interview was used. Two neonatal intensive care units participated, and 47 clinicians completed the Neonatal Unit Assessment Tool (NUCAT) pre and post-intervention.	Clinicians directly attributed subsequent individual and unit-wide change in practice to an increase in knowledge and confidence because of KMC. This study suggests that a clinician focussed intervention can lead to positive changes in clinician confidence, knowledge and practice in supporting parents to undertake breastfeeding and kangaroo care in neonatal units.	Its weakness is that it had a moderate sample size; hence, generalization is reasonably conclusive within its context. It had practical intervention that can improve neonatal care practices. It also had pre- and post-evaluation that can be used to measure effectiveness. Its weakness is that it is short term focus in terms of variation in knowledge and confidence.
5	Lowson *et al.* (2015). UK	The study uses economic models and random selection. 120 staff members across 42 maternity and neonatal units. 4,000 babies were audited. Weekly audit had an average of 125 babies involved in the audit each week.	The effect of KMC is beneficial in terms of clinical and economic benefits such as a reduction in healthcare costs, improved health outcomes, cost-effectiveness that incurred £4.00 for KMC and £13.82 for breastfeeding for every £1 invested. Positive feedback from healthcare providers.	Has a significantly high sample size for mothers involved in KMC and moderate number for health professionals; hence, findings are reasonably conclusive within the UK. It cuts across various ethnicities, so inference can be drawn relative to the demography examined. It showed a valuable economic analysis and insight to KMC cost in neonatal units. It had a pragmatic method for intervention in clinical practice. So, findings are relevant and applicable. It is limited in clinical details because of economic focus. Its findings can only be applied in the context which it was studied.
6	Neczypor and Holley (2017). UK	Unspecified	Implementation can improve breastfeeding rates, decrease maternal and neonatal morbidity, and promote mother–newborn bonding, with minimal cost.	Unspecified sample size hence suggests that research is not empirical. It has golden hour evidence-based focus with practical guidelines that could improve neonatal outcomes. It had comprehensive overview of

				evidenced based practices. Broad spectrum related articles. Examines critical first hour after birth. Its broad nature could mean lack of depth on a particular intervention. Its recommendation requires it to be adjusted to different setting.
7	Skene *et al.* (2019) UK	Mix method involving action research method /22 participants.	Implementation of practice changes in improved skin-to-skin contact and unlimited parental presence at the cot-side. There were positive improvements in Family Centred Care: information-sharing with parents. Providing family support, enabling parental participation in care and improved competence supporting parents in caregiving, Parental feedback.	Implementation can improve breastfeeding rates, decrease maternal and neonatal morbidity, and promote mother–newborn bonding, with minimal cost. It has a small sample size; hence, generalization cannot be made. However, the mixing method improves results finding and reproducibility. The research involved healthcare professionals in the development and implementation process. It can lead to ownership and practical applicability of the interventions. It also had a comprehensive data collection because it used multiple data collection methods like focus groups, interviews, observations and reflective diaries. Its weaknesses are that it cannot be generalized because the study was performed in one neonatal intensive care unit (NICU). Outcome applicability is therefore limited. In a rapidly changing clinical setting action research is a time-consuming process
8	Walker, Ojha and Mitchell (2023). UK	Online cross-sectional survey/ 518 responses and 60 healthcare professionals (HCPs)	57 participants (95%) regularly implement KMC. Excess noise and crowding were barriers in hospital. Limited staff support in KMC. It showed a positive impact of KMC and examples of KMC barrier in UK setting.	Has a significant sample size; hence, generalization is reasonably conclusive. It has demographic reach that captures ethnicity and age It is current and relevant in terms of practice and attitude in the UK. It had an inclusive perspective in terms of parental and healthcare professionals' involvement The focus in the UK means it cannot be used to generalize. Self-reported data sometimes bring bias and findings' accuracy is thus poor. Online survey does not have the rigor of randomized controlled trial hence finding is open to subjectivity and bias.

3.4. Major themes

Table 4 below showed the themes pulled out from selected articles with pros and cons to help shed light on the subjects significant in terms of applicability.

Table 4 Themes pulled out from selected articles with pros and cons to help shed light on the subjects significant in terms of applicability

S/N	Articles	Themes pulled out	Pros	Cons
1	Bailey, McIntyre and Harvey (2017).	Mother-infant bonding was highlighted via skin to skin. It also illustrated improvement in bonding due to emotional connection between infant and mother. Physiological benefit was positive as it showed there was consistent with improved temperature regulation, breastfeeding success and growth. Community acceptance and support of KMC from the study showed it required education and support for both healthcare workers and families to overcome cultural or logistical barriers.	The mixed method design of the pilot study is a plus because quantitative and qualitative data can be obtained. Direct observation of the mother-infant dyads limit bias and improves accuracy and dependability.	It had a small sample size thus it is not suitable for use in generalizing research study. Cultural resistance is still a challenge showing that to overcome the cultural barrier extensive community education and support are needed. The data focused on short term benefits and challenges hence had limited long term use.
2	Gregson *et al*. (2016)	The beneficial role of immediate skin-to-skin contact in post-caesarean The impact of breastfeeding rates and success Other themes include maternal satisfaction and psychological well-being, Hospital policies and practices. Overall, themes extracted from these all point to a single fact or theme the beneficial impact of SSC	Immediate SSC promotes early parental bonding that is important for emotional and psychological health. It also improves the possibility of successful breastfeeding initiation and therefore impact positively on a baby's temperature, heart rate and respiratory rate. Overall, maternal anxiety is minimized as mothers reported being calmer and connected to their babies. From the article, increased breastfeeding rate is observed as well as better long term health outcome of breastfeeding. Hospital that supports SSC can	Implementation of immediate SSC can lead to logistical challenges as a result of surgical procedures, need for post-operative care hence requiring more hospital resources, training of staff for a safe implementation. Lastly, it has a high-risk factor in the event of medical complications for the baby or mother thus will need post-surgery health supervision and intervention. Immediate SSC promotes early parental bonding that is important for emotional and psychological health. It also improves the possibility of successful breastfeeding initiation and therefore impact positively on a baby's temperature, heart rate and

			provide a conducive environment for breastfeeding as well as encourage mothers to increase the duration of their breastfeed rate.	respiratory rate. Overall, maternal anxiety is minimized as mothers reported being calmer and connected to their babies. Inconsistent implementation as a result of variability in implementation at different hospital as such it can yield different outcomes or inconsistent results. The short-term focus of the study suggests that long term breastfeeding will require continuous support and education. Both of which require resource allocation hence create logistical issues.
3	Higman *et al.* (2015).	The first theme from this article is knowledge and understanding of kangaroo care and positive The second theme is basically, clinicians' confidence in performing kangaroo care and positive touch.	The pros are that it can lead to improved clinical outcomes as a result of high level of knowledge among clinicians. It can also lead to improvement in the consistent implementation of positive touch and KMC. Neonatal outcome is also improved in terms of parental bonding, breastfeeding success and weight gain in pre-terms. Its pros included enhance care quality, empowerment and job satisfaction for clinicians. Clinician who feels confident are likely to experience job satisfaction and a sense of empowerment both can lead to enhanced care quality, improved team morale and retention rate	Standardized care can be affected by knowledgeable clinicians which directly impact on the reduction of different neonatal treatment and care. The gap in clinicians' knowledge is the reason for inconsistency in practice and implementation. Therefore, optimization of KMC and PT is negatively impacted. To address knowledge gap, require resources allocation in terms of training and education. This can impact NHS already stress budget and resources in neonatal units (Robertson *et al.*, 2017). The cons indicate a variable in confidence level among clinicians therefore can lead to inconsistencies in care. Clinicians that are less confident can avoid KMC and positive touch.
4	Kwah *et al*. (2018)	The primary theme is enhanced clinician education, training and practice in neonatal care settings.	The pros indicate that improved clinicians' knowledge about KMC components can lead to positive outcome for neonatal therefore crucial for their health. With improved knowledge and training comes confidence to practice and support KMC. It also can lead to standardization of KMC practice across different NHS services with overall consistency and reliability in neonatal care.	It is also time and resource intensive endeavour to implement comprehensive training program across different services. This will then negative impact the limited resources of neonatal ward. Again, overtime knowledge can diminish if KMC training is not reinforced regularly.

		Intervention outcomes is also a theme in this study.	Its pros indicated in a positive feedback report from clinicians which implied that it was accepted and valued as an intervention. Intervention is measurable especially with clinician knowledge and confidence. This is an indication that intervention is effective and practicable.	It has limited scope with short term evaluation. This is demonstrated in non-assessment of long-term impact of KMC on clinical behaviour and patients' outcomes. Hawthorne effect is highly likely because clinicians could have altered their behaviour due to the knowledge that they are being studied **(**Demetriou *et al*., 2019). This could lead to positive outcome.
5	Lowson *et al.* (2015).	This study theme is on economic benefit of KMC and breastfeeding.	Its pros reflect the importance of cost savings, improved health outcomes and resource efficiency connected with KMC. It highlights also the hospital stay reduction, minimized medical intervention that brings about drastically reduced health cost, especially with minimized incidence of infection and complications.	The cons showed that KMC intervention will require initial investment in training, facilities and staffing as a result of this, financial burden on hospitals is increased. Similarly, variable savings may occur because contextually, each neonatal unit in different hospitals has different demographic, existing practice and infrastructure. Again, quantification of these economic benefits may become challenging due to insufficient data.
6	Neczypor and Holley (2017).	The benefits of evidence-based practices in neonatal care.	The pros showed that neonates will receive the current, efficient and effective treatment because of the implementation of evidenced based practice. Similarly, it showed that evidence-based practices in neonatal care provided standardized approach to neonatal care. This could reduce variance and guarantee improved quality care across different settings. Up to date competence and professional development in neonatal care are also improved	Evidence-based practices in neonatal care have implementation challenges such as staff resistance to change, varying levels of staff training and experience which require resources investment. It is also problematic to establish and follow comprehensive evidence-based practices in neonatal care due to the fact that there is limited research specificity in that area.
7	Skene *et al.* (2019)	The benefit of family-centred care (FCC) and enhanced practice in terms of family-centred care (FCC)	The pros are promoting active family members in the care of their neonates. This can lead to improve bonding and emotional support. FCC can reduce stress, improve recovery time because of supportive family environment. It can lead to parental empowerment and satisfaction. It is seen in getting parents involve in the decision regarding their baby's care. Confidence in neonatal care is also improved.	The disadvantage is that it leads to increased staff demand and potentially increases stress. Resources requirements are increased.

8	Walker, Ojha and Mitchell (2023)	The primary theme is on attitudes and perceptions of healthcare professionals which is categorized under clinician knowledge and practice in neonatal care settings.	The pros are that it can lead to positive attitudes towards KMC. The professional relationship between parents and health care workers are improved. Clinical training and guidelines assisted to improve confidence and ability to support KMC practice correctly. Also, standard guidelines are adhered to.	The disadvantage of this practice is that it has a workload and time constraint. Resistance to change is likely due to scepticism or habit. It requires a cultural shift within healthcare settings. It requires interdisciplinary coordination that can be challenging if there are no clear protocols and communication channels.

4. Discussion of themes

The primary theme is associated with the beneficial impact of KMC as studied by Gregson, *et al.* (2016) and Lowson, Offer, Watson, et al. (2015). Earlier study by Carfoot, Williamson & Dickson (2005) was collaborated in the studies' findings. These research works central themes delved into the positive impacts of KMC such as in the provision of maternal-infant bonding (Carfoot, Williamson & Dickson, 2005; Lowson *et al.* 2015; Norén et al., 2018). It positively accelerates the degree of breastfeeding (Curley, Jones and Staff, 2023; Gallegos *et al.*,2020), In terms of cost-effectiveness, KMC has global applicability (Bailey, McIntyre and Harvey, 2017; Donald, 2017; Walker, Ojha & Mitchell, 2023; Lowson *et al.*,2015; Stefani *et al*., 2022). According to the World Health Organization and the United Nations Children's Fund, 2020, it minimizes the need for technological dependence and post-discharge costs of medical care. Lastly, it reduces the risky occurrence of morbidity and mortality in preterm infants (Cailes *et al.,* 2018; Cunningham *et al.*, 2017). In the UK for example, mortality and morbidity are race, class and age dependent. According to data from the Office of National Statistics (2021), the neonatal mortality rate was 2.7 deaths per 1,000 live births in England and Wales. Infant mortality and child mortality rates in England and Wales were 3.7 deaths per 1,000 live births and 8 deaths per 100,000 population. In contrast, The Maternal, Newborn and Infant Clinical Outcome Review Programme, delivered by MBRRACE- UK (2023) and Statista (2022) data showed a slight variation from 4.1 deaths per 1000 to 3.1 from 2012 to 2022. While the reduction in infant mortality may slightly be attributed to the scale-up and advance stage of research in KMC in Scandinavia, it is not so in the UK where the barrier to KMC is prevalent due to a socio-cultural preference for technology and innovation, lack of will from some parents to practice KMC and standardized policy. According to Donald (2017) study, there is a lack of standard clinical policy and guidelines recommending Kangaroo Mother Care as best practice within NHS UK-wide. Based on the foregoing, a practice-based improvement was adopted, such as East of England Developmental Care Guidelines (2021), London Neonatal Network Guidelines and Policies **(**2023) and the Scottish Government Maternity Services Action Group (MSAG) (NHS Scotland, 2021). These documents demonstrate broader and multidisciplinary approach to KMC. Notwithstanding, KMC is potentially ignored in emergencies or due to morbidity concern (Donald, 2017). For example, the global Burden of Disease Study (2016) results were consistent with the UK government's assertion that the morbidity rate was high, birth and age dependent, placing low birth weight at the highest level of mortality. When figures in the UK are compared to Scandinavia, for example, infant mortality rate diminished from 50 to 100 per 1000 in 1993 to 2.4 in 2012 and 2.0 in 2022 (Bakketeig *et al.,* 1993; Statista, 2022). Preterm birth (PTB) is one of the primary risk factors for neonatal mortality and morbidity ranking it a global health problem. Thus, in Europe, according to Delnord *et al.* (2015) about 75% of all neonatal deaths and 60% of all infant deaths were directly connected to PTB. However, Scandinavian countries have some significantly reduced rates of PTB due to indices like KMC practice, high human development and developed healthcare systems (Murray *et al.,* 2019). 5.8% of 287, 642 infants born in Nordic countries were preterm with (0.83%) very preterm and (0.28%) extremely preterm. Juxtaposing the UK morbidity and mortality rate from the NHS maternity statistic (2022) showed that 74.7% of babies born at 37 weeks had skin-to-skin contact within 1 hour. In the UK 53, 000 babies fall under preterm or extreme preterm cases illustrating significant figure compared to Scandinavia. 6.5% of babies died at pre-discharged stage and morbidity related death stood at 61.4% (Tommy, 2024). These indicators reinforced the need for KMC scale up in the UK healthcare system to assist in its technology dependent during emergency (UKIR, 2021, NICE, 2021).

Drawing from Donald (2017) and earlier study by Carfoot, Williamson & Dickson (2005) randomised controlled trial in the north of England examining the effects of skin-to-skin care on breast feeding suggested beneficial impact that were consistent with studies by (Bailey, 2020; Daga, 2018; Mehrpisheh *et al.*, 2022; Warren *et al.*, 2019; Wilcox and Dryden, 2021) as against Helmer *et al.* (2020) suggestion that there was no significant benefit. Similarly, Walker, Ojha & Mitchell (2023) and Lowson *et al.*, (2015) studied Parents and healthcare professionals' attitudes to Kangaroo Care for preterm infants in the United Kingdom and the economic benefits of increasing KMC and breastfeeding in neonatal units

respectively. These studies identified the economic value of KMC. It contextualizes the role of both parents and practitioners in KMC intervention strategy. It also highlights some KMC limiting factors like crowding and excess noise (Franck, McNulty and Alderdice, 2017). Similarly, a Scandinavia study according to Linnér *et al*. (2022a) and Linnér *et al.* (2022b) showed KMC has significant beneficial effects such as survival benefits, stabilization of physiological conditions and 25% mortality reduction. This is consistent with studies in Gambia and the UK (Cho *et al.,* 2022; Cailes *et al.*, 2018 and Donald, 2017). 25% reduction in mortality could have lowered the UK mortality rate if KMC was scaled up. In contrast, KMC increased stress for mothers (Neu *et al.,* 2014), with challenging implementation steps (Chan *et al.,*2016). Mothers complain of physical discomfort and fatigue from prolong SSC and disruption with family dynamics (Blomqvist *et al.,* 2013; Lamy *et al.,* 2011). It is linked with infection risk (Conde-Agudelo & Díaz-Rossello, 2016). However, Cailes *et al.* (2018) study point to the epidemiology of UK neonatal infections and the outlook suggested the possibility that KMC can protect against neonatal sepsis, hypothermia, hyperthermia, hypoglycaemia, hospital readmission and mortality associated with low birth weight, especially with estimated 834,000 hospital acquired infections in England every year, neonatal morbidity continues to rise, leading to morbidity associated with Gram positive bacteria (Kent *et al*., 2016; Kleinhout *et al.,* 2021; Mahumud, Sultana, and Sarker, 2017). According to the Organisation for Economic Co-operation and Development (OECD) Countries (2020) report there was a slight change in the proportion of low-birth-weight babies in the UK from 7.5% in 2000 to 6.5% in 2020. Countries like Japan and Greece have had the highest proportion of low-birth-weight babies, while Sweden and Finland have consistently had the lower numbers of LWB at 3.9% with the UK in the middle at 6.4% in 2021 (OECD, 2024). This means that 6.5% of low-weight babies will likely need the KMC technique due to its inherent benefits which are in line with UK findings from Stefani *et al*. (2022) which illustrated the evolutionary benefit of KMC. Notwithstanding, the National Neonatal Audit Programme (NNAP) report on 2022 data focused on 5 major premature and sick baby care areas with 19 audit measures that included the incubation process and the only KMC parameters included was SSC and breastfeeding. This points again to the KMC barrier that is possibly rooted in a limited research UK input, socio-political and cultural factors.

4.1. Theme two

Enhanced clinician knowledge and practice in neonatal care settings makes up the second theme. It is reflected in the studies by Higman *et al.* (2015); Kwah *et al.* (2018); Skene *et al.* (2019) and Walker, Ojha and Mitchell (2023). These studies highlighted the degree of knowledge, confidence and practice of KMC by healthcare professionals. Advance knowledge in that field did not result in majority uptake of KMC. It however led to the adoption of some components of KMC (skin to skin contact and breastfeeding). Notwithstanding, UNICEF report from 2005-2010 showed that the UK is lagging, with 81% of mothers stopping breastfeeding early. The Clinician knowledge, confidence, awareness and practice led to a 2018 gradual increase in skin-to-skin breastfeeding in Scotland from 32% to 43% (McFadden, Kendall and Eida, 2023) but not in the UK generally because the infant nutritional survey showed a decline. NHS service improvement encourages the skin-to-skin breastfeeding of premature babies to minimize the occurrence of postnatal depression, infection and increases confidence for mothers and promotes healthy weight gain in babies. Skin-to-skin breastfeeding as one of the KMC parameters is under threat as revenue figures from (Statista, 2015) showed that the infant food and breastfeeding market reached 1.4 billion pounds in 2020 and will reach 1.7 billion in 2025 (Statista, 2023). What can be synthesized from this is the fact that the number of mothers favoring skin-to-skin breastfeeding of infants and preterm is depleting.

5. Result

The result of Bailey, McIntyre & Harvey (2017) illustrated that SCC does not unsettle baby. It does, however, improves breastfeeding appetite in 6/11 neonates. Neonatal axilla temperature showed no significant clinical or statistical differences because it is between (0.0 to -0.1) degrees Celsius. Infant feeding cues and maternal responsiveness were noticed. 11 dyads showed feeding cues with increased activity (n=5), head bobbing (n=8), rooting (n=3), and fussing (n=2). Verbal cooing and smiling (n=4), stroking of the baby's back and head (n=2), and facilitating the move to the nipple (n=7). Enabling positional change for baby (n=5), reclining their position (n=4), gazing or reciprocal eye contact (n=4), and laughter (n=1). Results showed a positive impact of KMC. In the same vein, Gregson *et al*. (2016) study showed that skin to skin led to a 5% increase in breastfeeding rate at 48hr and 7% at 6 weeks (P = 0.25 and 0.44). Notwithstanding there was no statistically significant difference between the two values. There is a high correlation (P = 0.04) between breastfeeding at 48 hours and skin to skin performance. Similarly, Neczypor and Holley (2017) findings showed that KMC implementation can improve breastfeeding rates, decrease maternal and neonatal morbidity and promote mother–newborn bonding at a minimal cost.

From the study by Higman *et al.* (2015) the results showed that KCC assisted in building rapport between staff and parents. The level of clinical awareness of positive touch during KMC/ KMC knowledge were significant. It also asserts that KMC training is important since participants confirmed to have received training in KMC. These findings were

supported by Kwah *et al*. (2018) results. The results showed that clinicians directly attributed subsequent individual and unit-wide change in practice to an increase in knowledge and confidence because of KMC. This study suggests that a clinician focused intervention can lead to positive changes in confidence, knowledge and practice in supporting parents to undertake breastfeeding and kangaroo care in neonatal units. Similarly, Lowson *et al.* (2015) study found that the effect of KMC is beneficial in terms of clinical and economic benefits. The economic benefits showed a reduction in health care costs and improved health outcomes. The cost-effectiveness led to revenue generation amounting to £4.00 for KMC and £13.82 for breastfeeding for every £1 invested.

Taking the study further, result from Skene *et al.* (2019) found out that there was a positive improvement in family centred care, information sharing between parents and healthcare professionals (HCP). Nevertheless, it was Walker, Ojha and Mitchell (2023) study that found the challenges faced during KMC. In the study, it identified excess noise, crowding and limited staff support as barriers in hospitals for KMC practice. The study confirmed that 57 (95%) of staff and HCP regularly implement KMC.

6. Discussion

Considering the findings above, the effect of KMC on neonates can be deduced to have both economic and medical benefits. Despite the rigor of research output by Bailey, McIntyre and Harvey (2017); Walker, Ojha & Mitchell (2023); Lowson *et al.* (2015); Kwah *et al.* (2018) and Neczypor & Holley (2017) gold standard, the NHS and UKIR want a technology driven healthcare system in the UK in line with the National Institute for Health and Care Excellence guidelines (NICE) (2021) guidelines. Technology is part of science and KMC is science driven, for example, the "gold standard" RTC which is known for its rigor and robustness in validating the connection between cause and effect (Hariton and Locascio, 2018) points to the study reproducibility in terms of findings. The consistency in their findings dates to previous UK studies by Carfoot, Williamson & Dickson (2005) and Finigan and Long (2014) as well as Scandinavian studies by Kristoffersen *et al*. (2016); Lemmen, Fristedt and Lundqvist, (2013) and Olsson *et al.* (2012). In the current study, the findings provide an alternative to address the morbidity gap in the UK compared to Scandinavia or OECD countries. The NICE guidelines 2021 acknowledge these benefits via the local and national resources on the ability to improve services for quality patient care. The NHS England and NHS Improvement recommendations of the Neonatal Critical Care Transformation Review require Local Maternity Systems (LMSs) and Neonatal Operational Delivery Networks (ODNs) to synergistically develop an action plan to support neonatal services. The aim is to meet the UNICEF UK Baby Friendly accreditation by developing neonatal capacity, expert neonatal workforce and enhancing the experience of families. The East of England Developmental Care Guidelines (2021) and London Neonatal Network Guidelines and Policies (2023) produced quality guidelines that were consistent with the findings of these research, The NICE (2021) guidelines advocated the promotion of skin-to-skin contact, encouragement of breastfeeding, support for parental involvement and bonding. However, there were three areas of NICE (2021) guidelines divergent with KMC. They are in the scope of care practice for preterm such as the use of incubators, radiant warmers thus flexible in application. Integration of medical support with technology in medical emergencies that may require intensive monitoring, respiratory support or intravenous therapy which is unsuitable for continuous KMC. The guidelines seek balance between KMC and medical support for infants' immediate clinical needs. Lastly, it emphasizes multidisciplinary care.

Most of the selected studies showed low sample size (Table 2.4) hence generalization and applicability are limited. Higman *et al.* (2015); Kwah *et al.* (2018); Skene *et al.* (2019) showed how an expert neonatal work force can be built via training, education, competence and confidence. Notwithstanding the barrier to these benefits is still evident (Walker, Ojha and Mitchell, 2023).

Barriers to KMC upscale according to Walker, Ojha and Mitchell (2023) is noise, crowding and lack of staff support to mothers. UK studies by Coghlan, Mills & Bedwell (2024); Neczypor & Holley (2017) and Stefani *et al.* (2022) took the barriers further by specifying that KMC is a cultural practice mostly applicable in low-income countries, but early KMC is promoted in the East of England Neonatal Guidelines (2022) but is undermined by customary workflow and implementation cost (Neczypor & Holley, 2017). Failure in KMC scale-up in the UK may be attributed to the structure of the healthcare system in the United Kingdom with many independent NHS services. The autonomy of these services means that the neonatal care policy document applicable in the services is not uniformized. For example, there are disparities in East of England Developmental Care Guidelines (2021) and London Neonatal Network Guidelines and Policies (2023). The latter is based on regional needs that revolve around clinical standardization, operational efficiency, and integration with broader healthcare systems. The former deals majorly with holistic developmental care and family involvement as captured under the study of Skene *et al.* (2019). It can be deduced from the above that different approaches mean different neonatal care programmes hence different levels of outcomes. Similarly, there is

inconsistency with national and local policies in line with Fluharty *et al.,* (2021) assertion that Fifty-one policies reviewed showed inconsistencies in the implementation of KMC practices.

Furthermore, the UK has a cultural affinity to technological innovation like infant incubators. Consequently, 1.35 million tech startups emerged in 2023 with mOm and eg clinically testing their neonatal incubators in UK hospitals (UK Research and Innovation, 2021). Healthcare system driven by technology is a policy statement that is consistent with the UK government's medical technology strategy (Department of Health and Social Care, 2023). The implication is two-fold: To tap into the global medical technology market that is growing with Tech startups valued at $5.3 trillion (Statista, 2022). Similarly, the global market for infant incubators was evaluated at about US$ 345.3 million in 2023 and the valuation will continue to rise at about US$ 538 million by 2033 (Allied Market Research, 2022; Global Infant Incubator Market Outlook, 2022). Conversely, KMC costs nothing and has no market valuation other than scientific benefits.

Resources-related factor, for example, the NHS UK being highly a fast-paced environment and highly understaffed, other obligations, and workloads could likely prevent HCP from helping KMC practice in UK hospitals or answering questions raised by parents regarding the intervention. The NHS staffing crisis, especially with healthcare professionals means that the level of awareness in KMC is lower or equal to the number of staff awareness and confidence to practice KMC, leading to impracticable KMC public education that could reach the UK population (Cooksley *et al.,* 2023; Woolf *et al.,* 2023). Similarly, it is nearly impossible that the NHS staffing crisis may lead to more research when most of its frontline healthcare staff are overloaded (Bliss, 2015; Sheard and Peacock, 2020) whereas the converse is true in the Scandinavia health care system because they allocate more human resources to their health care system compare to any OECD nation (Olejaz *et al.,* 2012) but this occurred at a high cost due to Scandinavian (particularly Norway) healthcare system being one of the costly in Europe (Sperre *et al.,* 2020). Nevertheless, with the staffing crisis and work-related burnout in NHS in mind, staff will dismiss KMC technique when the incubator treatment will do the job quickly, competently and with minimal parental interaction (Gemine *et al.,* 2021). Safety concerns were also pointed out as a reason for limited uptake in the UK such as thermoregulation challenges, infection risk, parental anxiety and confidence leading to incubators preference. With underdeveloped immune system the risk of infection is higher in preterm infants, so KMC critics were dismissed with KMC protocol that promotes strict hygiene practices such as proper hand hygiene, wearing protective clothing. Similarly, the infection risk associated with KMC was undermined further by KMC-covid studies in the UK that showed KMC increased the survival rate of infants and preterm (Stuebe, 2020). Hence, this finding as with NICE guidelines-based practice reinforces the safety associated with KMC (Goel *et al.*, 2020; Stuebe, 2020).

7. Conclusion and recommendation

This study investigated the effect of KMC as a neonatal parent support programme. The study provided a synthesized review of KMC, discussed the methodology, themes, findings and answered the research questions raised with definite conclusion that KMC has a positive impact on neonatal care in terms of safety, protection, morbidity and mortality rate reduction. It also showed that from parental perspective, failure in KMC scale-up in the UK is attributed to excess noise, crowd, awareness but institutionally, it comes from cultural, socio-political, technological, and resource-related factors. This is not to say that the national and local policies are not effective, but it needs to address these barriers. The number of research methods that used the randomized clinical trial for KMC study is significantly lower than the Scandinavian study.

For service improvement and optimization of neonatal care practices in hospital settings, the following recommendations were made following the synthesis of the selected papers: The uniformization and harmonization of United Kingdom NHS neonatal care guidelines to include all KMC components, not just the nutrition aspect of breastfeeding and SSC.

Education and training of health professionals should adopt the Team Base Learning (TBL) approach to enhance practice and KMC awareness for nursing students (Alberti *et al.,* 2021; Sookhoo *et al.,* 2019).

Infant incubation technology is good and efficient. However, its use in the UK can be supported by KMC practice with the aim of taking advantage of both interventions.

Lastly, encouragement of further research on KMC and all its components, as the underlying mechanism behind them is yet to be understood. Safe staffing can reduce workload giving significant research time to frontline HCP to research more on KMC gender relationships, cultural preferences, gestational age and medical comorbidities. By incorporating these recommendations into clinical practice and policy development, the United Kingdom NHS is likely to scale up its KMC awareness/process.

Compliance with ethical standards

Disclosure of conflict of interest

The authors have indicated they have no potential conflicts of interest to disclose.

Financial disclosure

The authors have indicated they have no financial relationships relevant to this article to disclose.

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