

# Fathers providing kangaroo care in neonatal intensive care units: a scoping review

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## Abstract

*Background.* Kangaroo care (KC) has been used widely in neonatal care to promote bonding/attachment and neurodevelopment for preterm and term infants. However, current literature suggests that research mainly focuses on infants' and mothers' experiences. The role of fathers in caring for their infant/child is changing and evolving in many countries around the globe. Yet little is known about fathers' experiences of KC in neonatal units. This review, therefore, aims to scope the current evidence of Father-infant KC (Father KC) in Neonatal Intensive Care Units (NICUs).

*Research question.* What impact does KC have upon fathers when their baby is cared for in NIUCs?

*Search method.* A scoping review was conducted and guided by the framework of Arksey and O'Malley (2005). The data sources consisted of Medline, Embase, America Psychological Association (APA) PsycInfo, Emcare, Cochrane Central, Web of Science, Google Scholar and ProQuest. The study inclusion criteria were: (1) studies involving fathers who had experience of KC with their baby whilst in Neonatal Intensive Care Units (NICUs), and other neonatal care settings, such as Special

Care Baby Nursery (SCBU), delivery/labour room and postnatal ward; (2) literature published from 2000 to 2020; (3) primary studies including qualitative, quantitative, and mixed methods studies; (4) studies published in English.

*Results.* The total number of studies identified were 13. Seven studies were qualitative and six were quantitative. None were mixed methods. Studies reported several positive KC benefits on fathers, such as reduced stress, promotion of paternal role and enhanced father-infant bond. It was highlighted that KC could be time-consuming for fathers and challenging to practise when balancing work and family life commitments.

*Conclusion.* This review provides evidence that KC practice has health and wellbeing benefits for fathers and infants in NICUs and other relevant neonatal care settings, The findings of this review support the justification to promote Father KC in NICU environments, and guide policies to include father involvement. Implementing Father KC in NICU settings will assist fathers to care and connect with their baby. Further research is needed to explore how to facilitate and evaluate KC education for fathers from diverse backgrounds and cultures.

*Keywords:* kangaroo care, skin to skin, fathers, neonatal, NICU

## **Introduction**

Kangaroo care (KC) is often referred to as Skin-to-Skin or Kangaroo Mother Care (KMC). KC refers to a method of holding an infant, naked (except for a diaper/nappy), in an upright and prone position, skin-to-skin, on a caregiver's bared chest (Conde-Agudelo and Díaz-Rossello, 2016; Chan et al, 2017). KC was originally introduced at the Instituto Materno Infantil in Santa Fede Bogotá, Colombia in 1978. The initial reason KC was introduced in this maternity unit was due to a shortage of incubators. The lack of incubators led to a study being undertaken at this hospital and lower neonatal mortality rates, and increased weight gain for Low Birth Weight (LBW) babies\* when compared with newborns in an incubator receiving conventional care was reported by Whitelaw and Liestøl, (1994). World Health Organization (WHO) reported KC to be a cost-effective method to achieve optimised health outcomes for premature and full-term babies (WHO, 2003). It was

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\* LBW babies: Babies with weight less than 2500gms, regardless of their gestational age

acknowledged that KC is a fundamental method of achieving thermal control for preterm and LBW infants (WHO, 2015). Additionally, KC has been shown to reduce neonate infection rates and hospitalisation length and enhance maternal-infant bonding (Conde-Agudelo and Díaz-Rossello, 2016).

It has been reported that babies in Neonatal Intensive Care Units (NICUs) experience stress from the numerous interventions and the separation from their mothers (Stevens et al, 2011). KC has been reported as a primary method for mothers and babies to complete an integral physiological process following childbirth, whilst providing nurturing care (Canguru and Do pai, 2015). Mothers have been recognised as the main KC provider by health professionals in the NICU environment (Canguru and Do pai, 2015). In contrast, fathers are often referred to as 'bystanders' in the engagement of maternal and neonatal care (Steen et al, 2012). However, due to some societal, economic, and cultural changes, there has been a steady increase in the father's role in providing care to their infant/child (Yogman et al, 2016). Research has provided evidence that fathers have an innate biological connection to their infants similar to mothers (Yogman et al, 2016). This intrinsic connection enables a Father - infant KC (Father KC) to be implemented and is beneficial during the separation of mothers and infants (Shorey et al, 2016), thus promoting and increasing KC practice in fathers (Jesus et al, 2015). Additionally, Father KC has been found to be associated with increased paternal involvement (Jesus et al, 2015) and enhanced paternal role (Varela et al, 2018). Moreover, Father KC has been shown to have the same effect as KMC on preterm and term infants' physiological stability (Shorey et al, 2016).

Current literature on KC mainly investigates or explores mother and infant practices and experiences. There seems to be a lack of research exploring Father KC (Martel et al, 2016) and therefore a clear justification to undertake a scoping review of the literature.

A scoping review examines a broad topic to identify its volume, nature, and characteristics by mapping the related evidence with the relevant time, location, and origin, and to detect possible research-based gaps (Peters et al, 2015). This type of review is suited to explore a unique and complex question when research appears limited for a specific topic. Therefore, this review used a scoping review framework to

guide the review approach and identify relevant studies to answer the research question and collect evidence in accordance with the inclusion criteria that incorporated core elements of Population, Concept, Context (PCC) in a wide range of databases (Peters et al, 2020). This framework recommended that findings are mapped, synthesised, and presented narratively and summarised in tables. The clinical implications associated with Father KC will be reported. It is envisaged that this review will provide evidence to support the practice for Father KC in NICUs.

The aim of this review is to examine the literature relating to research exploring the views and experiences of fathers providing KC to their babies whilst cared for in NICUs.

## **Methods**

### *Protocol and registration*

A protocol was developed to guide the undertaking of this scoping review (Dong, Steen and Wepa 2021) and the scoping review framework described by Arksey and O'Malley (2005) was utilised. According to the international prospective register of systematic reviews administered by the University of York's Centre for Reviews and Dissemination (PROSPERO), scoping reviews do not meet the eligibility to be registered in the database (National Institution for Health Research, n.d.). Therefore, there was no registration required for this review.

### *Research question*

What impact does KC have upon fathers when their baby is cared for in NICUs?

### *Eligibility criteria*

In this review, the search strategy approach to finding studies was sought by utilising the core components: Population, Concept, Context (PCC). The inclusion criteria were aligned with the PCC components to guide the undertaking of this review (Peters et al, 2020).

### *Population*

Fathers including all age groups > 18 years old from all geographical locations and all cultural backgrounds were included. Infants included in this review were referred

to as neonates† from different geographical areas with diverse cultural backgrounds. The babies who were beyond the neonatal period were excluded.

### *Concept*

The core concept examined by this review is the experience of KC.

### *Context*

The context of this review was mainly referred to as NICUs. However, other relevant settings where Father KC might be practised were included, such as Special Care Baby Nursery (SCBU), delivery/labour room and postnatal ward.

### *The types of evidence searched*

Given that little is known about Father KC, and published, the search timeframe was set from 2000 to 2020 (Peters et al, 2020). The core contents and type of papers meeting the aforementioned inclusion criteria associated with the components of PCC were searched. Primary studies using qualitative, quantitative, and mixed methods were included. Only articles in English were selected.

### *Information sources and search strategies*

A wide range of literature searches was performed in databases, registers and some additional sources in October 2020. Databases involved Medline, Embase, America Psychological Association (APA) PsycInfo, Emcare; Registers included Cochrane Central and clinical trials (Creating a PRISMA flow diagram, 2021). The keywords and the Medical Subject Headings (MeSH) terms used in Medline are listed in Table 1. The search strategy in Medline is provided as an example for replicability and auditability (Peters et al, 2020). An additional search of grey literature was conducted. The first 200 articles (Bramer et al, 2017) were selected from Google Scholar under "Father kangaroo care". Theses and dissertations were searched in the ProQuest platform. Other searches included Web of Science, clinical guidelines, conference abstracts, hand-searching through the reference lists, communication with peers or experts via media.

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† Neonates: Infants who are under 28 days of age.

### *Study screen and selection*

All the identified literature (n=1298) was exported into the bibliographic software EndNote X9.0 and duplicates were removed using the same software. The duplicating process was double-checked by an experienced librarian. The initial selection was undertaken by screening titles and abstracts with a second reviewer. The further screening (n=39) was carried out by reading the full text to obtain the articles which meet the inclusion criteria. Clarifications were sought with a third reviewer to achieve consensus to finalise the selected articles for the scoping review (n=13). The search strategy is demonstrated using a PRISMA 2020 flow chart for transparency and reflexivity (Figure 1).

### *Data charting*

**Table 1 Medline Search strategy (literature search)**

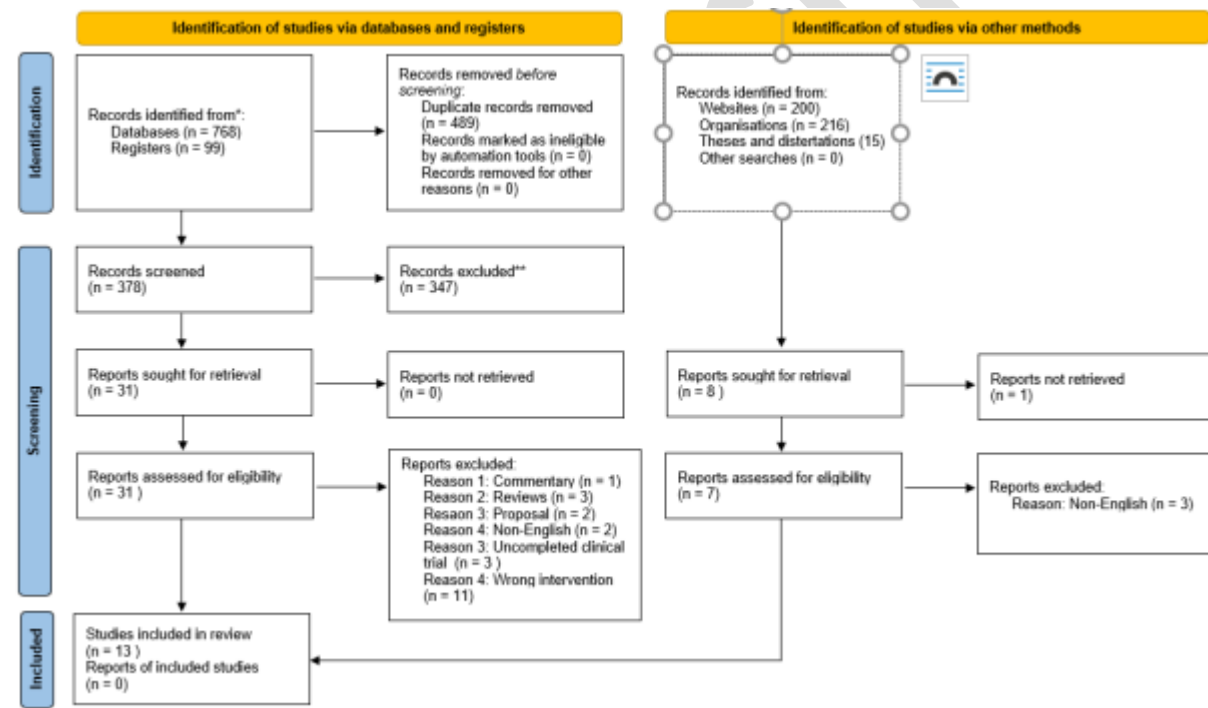
1. Fathers/
2. Father-Child Relations/
3. (father* or dad* or paternal* or parent*).ti,ab,kw.
4. 1 or 2 or 3
5. Infant, Newborn/
6. ((preterm or premature* or term or full term or low birth weight or LBW or postnatal) adj4 (baby or babies or neonatal* or infant\$1)).ti,ab,kw.
7. 5 or 6
8. Kangaroo. Mother Care Method/
9. ((Kangaroo or Skin to Skin) adj5 (care or contact or method)).ti,ab,kw.
10. 8 or 9
11. Intensive Care Units, Neonatal/
12. Postnatal Care/
13. Operating Rooms/
14. Nurseries, Hospital/
15. Delivery Rooms/
16. (NICU* or neonatal intensive care or neonatal care or intensive care units or newborn icus or neonatal or special baby care unit or SCBU or postnatal ward or delivery room or labo?r ward or theatre or operating room or recovery room or parenting room or birthing center).ti,ab,kw.
17. 1 or 12 or 13 or 14 or 15 or 16
18. 4 and 7 and 10 and 17
19. Limit 18 to yr="2000-2020"

Microsoft Excel software was used to record data extracted from the 13 included articles that reported a study aligned with the research question. Data extraction fields include author/s, year of publication, title of publication, country of origin, type of study, aim/objectives, methods, population, and sample size, setting, factors associated with Father KC, impact of Father KC, limitations and strengths, clinical implications. Three reviewers defined the extracted data, which are shown in Table 2.

## Results

A total of 13 studies met the inclusion criteria. Of these seven studies were reported to undertake qualitative research (Blomqvist et al, 2011; Canguru and Do Pai 2015;

**Figure 1 PRISMA flow chart of the selected articles for scoping review**



Note: Adapted from Page et al (2022).

Fegran et al, 2008; Günay and Coşkun Şimşek 2020; Helth and Jarden 2013; Olsson et al, 2017; Magee and Nurse, 2014). Five of the qualitative studies used a phenomenological research approach (Blomqvist et al, 2011; Canguru and Do Pai 2015; Günay and Coşkun Şimşek 2020; Fegran et al, 2008; Helth and Jarden 2013). One qualitative study reported using a descriptive approach (Olsson et al, 2017) and the remaining study was a case study (Magee and Nurse, 2014).

Six studies were reported to conducted quantitative research (Chen et al, 2017; Cong et al, 2015; Dongre et al, 2020; Morelius et al, 2015; Varela et al, 2014; Varela et al, 2018). Quantitative studies included, five experimental designs, two were Randomised Control Trials (RCTs) (Chen et al, 2017; Morelius et al, 2015), one a crossover study (Cong et al, 2015), one a quasi-experimental study (Varela et al, 2014), and one pre and post observational study (Varela et al, 2018). There were no mixed methods studies identified.

Postprint



	Author(s)/Year/ Country	Type of study	Aim/Objectives	Methods	Population and sample size	Settings	
							<b>Fathers' demographic profile</b>
S1	Blomqvist et al. 2011, Sweden	Qualitative descriptive study - Phenomenology	To describe fathers' experiences of providing KC to their preterm infant	<u>Data collection:</u> Questionnaires completed by fathers while their babies were in hospital; Individual semi- structured interviews at four months ± two weeks post-discharge; <u>Data analysis:</u> Using qualitative content analysis described by Grameheim and Lundman (2004)	<u>Inclusion criteria:</u> Fathers whose babies were born at the gestational age of 28 to 33 + 6 weeks and medically stable  <u>Sample size:</u> x 7	level 3 NICUs at two Swedish hospitals	Age range: 34 to 42 years old, 56.6% first- time fathers
S2	Canguru and Do Pai 2015, Brazil	Qualitative descriptive study - Phenomenology	To identify father's perceptions about KC; To explore how nurses could foster the father- child relationship	<u>Data collection:</u> Semi-structured interviews through open and closed questions; <u>Data analysis:</u> Using content analysis	<u>Inclusion criteria:</u> Fathers who were 1) biological parents of premature infants and/or low birth weight; 2) Fathers over 18 years of age; 3) Experiencing Kangaroo Care; 4) Interest participate <u>Sample size:</u> x6	Maternal Hospitals x 2, Brazil, no wards specified	Not reported
S3	Chen et al. 2017, Taiwan	Quantitative study-RCT	To observe the effects of KC on	<u>Pilot study performed:</u> intervention group ( $n = 3$ ) control group ( $n = 3$ ); <u>Data collection:</u> Computer program generated a random stratified	<u>Inclusion Criteria:</u> (1) new fathers; (2) older than 20 years old; (3) at the hospital daily until discharge; (4)	Postnatal ward in a teaching hospital,	Age range: 34 to 42 years old, 56.6% first- time fathers, 50.6% college education,

			father-child attachment	<p>allocation. Intervention group: KC provided for at least 15 minutes/ for the first three days of life; Control group: received standard care, KC provided at fathers' request; Both groups received KC information on admission. <u>Data collection</u>: Instruments used: Demographic Information Survey; Early Childcare for Fathers, Nursing Pamphlet; Father-Child Attachment Scale (FCAS) developed by Yang (1999): self-reported by fathers; <u>Data analysis</u>: SPSS and Windows 20.0</p>	<p>non-smokers; (5) not have an alcohol addiction or be diagnosed with a psychological disorder; (6) signed an informed consent agreement; (7) babies of gestational age <math>\geq</math> 37 weeks, stable vital signs and no congenital abnormalities or diseases. <u>Sample size</u>: Total n=83 participants: intervention group (n = 41) and control group (n = 42)</p>	maternal clinic in Taiwan	85.5% antenatal class attendance
S4	Cong et al. 2015, USA	Quantitative study- Crossover study	To examine oxytocin mechanism in modulating parental stress and anxiety during M-KC and paternal KC (P-KC) with their preterm infants	<p><u>Data collection</u>: The mother-father-infant triad was assigned randomly by a computer-program to study sequences: M-KC on day 1 and P-KC on day 2 or vice versa. Process: Parents' saliva collected using a standard unstimulated passive drool method and a validated visual-analog scale (VAS) measuring anxiety and self-reported at the end of the period of pre-KC (10mins), during-KC (30 mins) and post-KC (30 mins) phases. <u>Data Collection</u>: Measurements: Salivary oxytocin assay, salivary cortisol,</p>	<p>Used a convenience sampling approach. Power analysis to determine the sample size. <u>Inclusion criteria</u>: Parents were &gt; 18 years old, with no depression history, whose babies were the gestational age of 30-34+6 weeks @ the age of 3-10days, cared for in an incubator, NPO or on bolus feeds. <u>Sample size</u>: 26 triads. Sequence 1 (M-KC on day -1 and P - KC</p>	A level IV NICU in Connecticut, USA	68% of fathers were white, 79% with higher education, 53% had KC experience before study participation

				parental anxiety; <u>Data analysis:</u> Using IBM SPSS 20.0 (Armonk, NY)	on day - 2), n=14; Sequence 2 (P-KC on day -1 and M - KC on day - 2), n=12; Mothers: n = 26; Fathers: n = 19.		
S5	Dongre et al. 2020, India	Quantitative Study - prospective observational study	To study stress in fathers after initiation of KC	<u>Data collection:</u> Total study period: 6 months. Demographic details collected. Likert type scale was rated by participants before KC, Parental Stressor Scale: neonatal intensive unit (PSS NICU) were used to assess fathers' stress level in 5 aspects after KC X 3 on the consecutive days; <u>Data analysis:</u> SPSS software version 16, Wilcoxon signed rank-sum test	<u>Inclusion criteria:</u> Fathers with no major medical and surgical illnesses, whose babies were at the gestational age of 28-35 weeks, birth weight < 1500 grams, not ventilated, no congenital abnormalities. Sample Size: n =30	A tertiary level neonatal unit, India	Mean age: 28.5 years old; 63.2% of fathers were lower-middle socioeconomic class

	Factors associated with Father KC				Findings of impact of Father KC on fathers					Strengths and limitations	Clinical implications
	KC frequency & duration	KC facilities/aids	Culture and policies	KC education	Forming and strengthening Father-infant bond	Enhancing paternal role	Decreasing paternal emotional and physiological stress	Promoting relationship between fathers and family members	Negative impacts		
S1	Up to 24 hours/day	Cot side beds or recliners plus privacy screen; Co-care rooms containing beds	Parents post-partum allowance - Parental leave up to 480 days/child + NICU temporary parental leave	Nil	✓	✓	✓	Not reported	✓	Adequate sample size used, rigor and trustworthiness achieved, theoretical saturation achieved	Early KC education needed; Father KC could be initiated as early as after birth; Care plan would help in increasing the frequency of Father KC
S2	Not reported	Not reported	Not reported	Nil	✓	✓	✓	Not reported	Not reported	No demographic details of participants; Transparent data collection and analysis	Nurses can promote Father KC by explaining the purpose of KC and the benefits of KC to baby, father, and mother.
S3	Once a day; At least 15 minutes/session	An armchair with a footrest, a pillow and a blanket, private screen provided	Traditional women's confinement after birth; workforce limitations; KC session provided after 2 hours of feeding and a bath.	KC information (pamphlets) provided on admission	✓	Not reported	Not reported	Not reported	Not reported	Workforce limitations stopped the provision of personalised instruction to the participants.	Father KC is recommended when mother is not available; KC education should be started as early as during childbirth education

											and antenatal period.
S4	30mins/session	A La Fuma recliner chair, a footrest, a privacy screen, a hospital gown, a blanket	Study was undertaken at 1-3 pm, between feeds, after parent's lunch, and with consideration of the timing of mother's milk expression	Not reported	Not reported	Not reported	✓	✓	Not reported	Small sample size	Paternal touch will contribute to the parenting development
S5	90 minutes/ KC episode for 3 consecutive days	Not reported	Not reported	The benefits and method of KC were taught by a senior registrar	Not reported	Not reported	✓	✓	✓	Limited KC application length; No consideration about other relevant paternal stress stimuli, e.g., financial, physical, and social factors; Singleton context, small sample size	Not reported

	Author(s)/Year/ Country	Type of study	Aims/Objectives	Methods	Population and sample size	Settings	
							<b>Fathers' demographic profile</b>
S6	Fegran et al. 2008, Norway	Qualitative - descriptive phenomenology - hermeneutic approach	To obtain in-depth knowledge of, and to compare parents' individual experiences of the attachment process immediately after a premature birth.	<u>Data collection:</u> Interviews of mothers and fathers individually. Interview length: 40 minutes. Interview audiotaped. Demographic data collected. <u>Data analysis:</u> NUD*IST computer software ORS used.	A convenience sample of parents. <u>Inclusion criteria:</u> Parents of infants at the gestational age of 27 to 32 weeks, staying at the same hospital with their infants from birth until discharge. <u>Sample size:</u> 6 parents	A 13-bed NICU in a regional Norwegian hospital	Age range: 27 - 59 years old
S7	Günay and Coşkun Şimşek 2020, Turkey	Qualitative descriptive study - Phenomenology	To investigate the emotions and experiences of fathers in Eastern Anatolia Region of Turkey who experienced KC in the NICU.	<u>Data collection:</u> Face-to-face, audio-taped, individual interviews were conducted for 45-50 minutes at two weeks after experiencing KC from January to May 2019. Questions X 2, open-ended. <u>Data analysis:</u> Inductive qualitative content analysis by Graneheim and Lundamn (2004)	<u>Inclusion criteria:</u> Fathers whose babies were at the gestational age of 27 to 36 weeks, Birth Weight ≥1000 grams, who visited their babies regularly and experienced KC. <u>Sample size:</u> Fathers X 12	NICU in a training and research hospital in the Eastern Anatolia Region of Turkey	Mean age: 29.7 years old; First-time fathers x 6; Education: primary to university; Fathers x 5 from village
S8	Helth and Jarden 2013, Denmark	Qualitative - phenomenology Hermeneutic approach	To explore how fathers of premature infant's experience and potentially benefit from experiencing KC during their infants' stay in NICU.	<u>Data collection:</u> Semi-structured interviews for 30-45 mins. <u>Data analysis:</u> Theoretical framework by Kvale and Brinkman (2009).	<u>Inclusion criteria:</u> 1) Danish-speaking fathers, 2) Infants at the gestational age < 35 weeks, @ stable condition, 3) Admission to the NICU > 1 week; <u>Sample size:</u> Purposeful sampling, fathers x 5	Copenhagen University Hospital, Hvidovre Hospital, Denmark.	Age: range: 28-37 years old, university degree x 3, employed x 4, student x1, all first-time fathers, twins X1
S9	Magee and Nurse 2014, UK	Case study - reflective study-qualitative study	To explore the nurse's role acting as an effective advocate for the baby and the role of the father in the neonatal unit	<u>Data collection:</u> A reflective study for a case of a bereaved father who cared for his premature daughter in the NICU; <u>Data analysis:</u> Framework Guiding Reflective Activities by Borton's model (1970)	Father x 1, a bereavement father	NICU x 1 in UK,	A father whose wife passed away nine days after birth as of breast cancer, carried family commitments

S10	Morelius et al. 2015, Sweden	RCT - Quantitative study	To compare the effects of almost continuous KC (CKC) on salivary cortisol, parental stress, parental depression, and breastfeeding with standard KC (SKC)	<u>Data collection:</u> Apr.2008-Apr.2012, A RCT between two groups of parents; one group experiencing KC and the other experiencing SKC. Continuous KC: almost 24 hours a day, baby stayed with parents since birth. Standard KC: separate from parents after the birth of a baby. Measurements were collected at discharge during home-visit at CA of 1 and 4 months. Medical data was collected from the parents' journal. Measurements included: Salivary cortisol, Swedish Parenthood Stress Questionnaire (SPSQ) Edinburgh Postnatal Depression Scale (EPDS), Questions about health and breastfeeding, Ainsworth's Sensitivity scale; <u>Data analysis:</u> Statistical software SPSS 20.0	<u>Inclusion criteria:</u> Mothers-Healthy, proficient in Swedish, give birth to a single child who at the gestation age of 32 to 35 weeks; <u>Sample size:</u> families x 42, CKC: 23, SKC: 19	level-III NICU x 1 and level-II NICU x1 in Sweden	Not reported
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	Factors associated with Father KC				Findings of impact of KC on fathers					Strengths and limitations	Clinical implications
	KC frequency & duration	KC facilities/aids	Culture and policies	KC education	Formatting and strengthening father-child bond	Enhancing paternal role	Decreasing paternal emotional and physiological stress	Promoting relationship between fathers and family members	Negative impacts		
S6	Not reported	Not reported	Not reported	Not reported	✓	✓	✓	Not reported	Not reported	The method to collect demographics was not mentioned. A small sample. Triangulation of data collection	Father KC was promoted by mothers' encouragement

S7	KC x 2 / day for 15 days, each KC lasted for 15 - 30 minutes	A comfortable chair provided next to an incubator	Turkish culture requires men to return to work early due to the traditional role of the male in this society, i.e. financial support and limited role in caring for children	PowerPoint presentation + A handbook about KC process	✓	✓	✓	Not reported	Not reported	Transparent data collection and analysis process	Health professionals should encourage Father- infant KC. The hospital facilities/aids and policies need to be established to facilitate Father KC.
S8	Not reported	Not reported	Not reported	KC method introduced	Not reported	✓	Not reported	Not reported	✓	Small sample size. Credibility was increased by using direct quotations, Future studies on the importance of the father's presence in the early infant's life	Parents, nurses, midwives, and hospital services need to recognise that fathers can participate equally in parenthood.
S9	KC practised every second day; KC duration not mentioned.	Not reported	Not reported	Not reported	✓	✓	Not reported	Not reported	Not reported	The ethical approval was unclear.	No visiting restriction for NICUs. NICU nurses/midwives should give fathers education in advance about the NICU father's experience.
S10	SSC: 19.6 hours/day; SC: 7.0 hours/day	Single rooms equipped with beds for parents, medical equipment. KC accessories provided such as tube tops,	KC is standard care for both parents in these NICUs; the Swedish health care system allows	KC method was introduced before the study. A lesson was given about noticing and responding to their preterm	Not reported	✓	Not reported	✓	Not reported	No comparison with a baby who has no KC from parents as KC is routine care in their NICU.	If both parents engage after the birth of preterm infants, this can strengthen the relationship between the parents



		scarves, and blouses	parents to stay in the NICU as long as they can	baby's signals.							
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	Author(s)/Year/ Country	Type of study	Aims/Objectives	Methods	Population and sample size	Settings	Fathers' demographic profile
S11	Olsson et al. 2017, Sweden	Qualitative Descriptive study	To describe fathers' experiences of KC with their premature infant.	<u>Data collection</u> : Between January 2014 and June 2015, eligible fathers were interviewed using a semi-structured interview guide. <u>Data analysis</u> : Direct qualitative content analysis by Hsieh and Shannon (2005).	<u>Inclusion criteria</u> : Fathers of preterm infants, had provided KC for their infants on at least one occasion; <u>Sample size</u> : A purposeful sample. Fathers x 20	Neonatal units x 2 (one in a county hospital and the other in a university hospital) in central Sweden	Mean age: 32 years old. 6/20 fathers had more than two children
S12	Varela et al. 2014, India	Quantitative study -quasi-experimental design - a pilot study	To evaluate the impact of KC on the sensitive care that fathers provided to their premature babies in five Kangaroo Mother Care programs in India.	<u>Data collection</u> : Socio-demographic survey completed. The Kangaroo position adherence survey was conducted to assign participants into two groups: intervention group (KC) and control group (non-KC). Paternal sensitive behaviour and perception of paternal role assessed by two people, using a Q-Sort methodology during a 60-minute period of KC. <u>Data analysis</u> : SPSS 17.0 for Windows, a non-parametric statistical test: the Mann-Whitney U, T-tests, and a Cohen's d.	Inclusion criteria: fathers of preterm infants. Intervention group: N = 14; Control group: N = 23	Hospitals X 5 in India; No details of clinical setting/wards	Age range: 25-48 years old. Education level: up to high school. Spouse: the majority were classified as a housewife and related to both families. Not all fathers were proficient in English; for fathers who did not speak English, a local translator served as an interpreter

S13	Varela et al. 2018, Canada	Quantitative Study Pre and Post investigation	To explore the physiological stress responses of fathers during their first KC with their new baby.	<u>Data collection</u> : Salivary cortisol measured from 6 saliva samples and simultaneous blood pressure and heart rate measured on arrival in the room, immediately before starting KC, at 30 minutes and 60 minutes into KC, and 15 and 30 minutes after the end of KC. <u>Data analysis</u> : SPSS statistics version 21.0	<u>Inclusion criteria</u> : Fathers who were in a relationship with the infant's mother, no anxiety or depression, whose babies' GA was up to 33+3 weeks, medically stable. <u>Sample size</u> : Fathers x 49	The NICU of the University Laval Hospital Centre's Pediatric department in Quebec City, Canada	Mean age: 31 years old; Mean education level: 14.1 years of education; Mean working hours/week: 43.3
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Factors associated with KC					Findings of the impact of Father KC on fathers					Strengths and Limitations	Clinical implications
	KC frequency & duration	KC facilities/aids	Culture and policies	KC education	Forming and strengthening Father-infant bond	Enhancing paternal role	Decreasing paternal emotional and physiological stress	Promoting relationship between fathers and family members	Negative impacts		
S11	Median times: 18 (4-80) minutes	Cot side in the intensive care room with a private screen; a bed in the family rooms; television	The Swedish parental allowance system allows fathers and mothers to stay with the infant in the NICU and provide KC to him/her while receiving financial compensation.	Information about the benefits of KC was given by the NICU staff.	✓	✓	✓	Not reported	✓	Trustworthiness (confirmability, credibility, transferability) was achieved. Triangulation of data collection methods (interviewers X 2).	NICU staff need to identify the father's individual KC preference to advocate equal parenthood. Less KC practised in single rooms than in the open intensive care room.

S12	1 hour/day for at least 1 week.	Not reported	The father is not the primary carer in India. Fathers do not live with mothers during the first months after giving birth, mothers live with their mothers. Many Indian families have a preference for boys over girls. Well-structured KC programs + a Pediatric follow-up. KC was provided by fathers once premature infants had adapted to extra-uterine life and were able to breastfeed.	Not reported	✓	✓	Not reported	Not reported	Not reported	Small sample. Language interpretation bias existed during data collection due to using a language translator. Triangulation data collection.	Father KC provides opportunities for fathers to increase their paternal role in a culture where this is not recognised. Fathers did not display any gender preference.
S13	1 hour	The room contained less than six incubators equipped with comfortable chairs	Fathers were asked not to consume nicotine, caffeine, food, or drugs for at least one hour before their arrival to the NICU.	Not reported	Not reported	Not reported	✓	Not reported	Not reported	No control group were involved in this study due to the lack of consensus from the clinical team.	Not reported

Table 2: A summary of the included studies

Figure 2 demonstrates an upward trend in the number of studies undertaken on Father KC between 2000 and 2020. Only one study (Fegran et al, 2008) was conducted between 2000 and 2009. Four studies were published during the next 2011-2014 period. (Blomqvist et al, 2011; Helth and Jarden 2013; Magee and Nurse 2014; Varela et al, 2014). Increasingly, eight studies were published in the last five years 2015-2020 (Canguru and Do Pai 2015; Cong et al, 2015; Morelius et al, 2015; Chen et al, 2017; Olsson et al, 2017; Varela et al, 2018; Dongre et al, 2020; Günay and Coşkun Şimşek 2020).

**Figure 2: Publishing years of the selected studies**

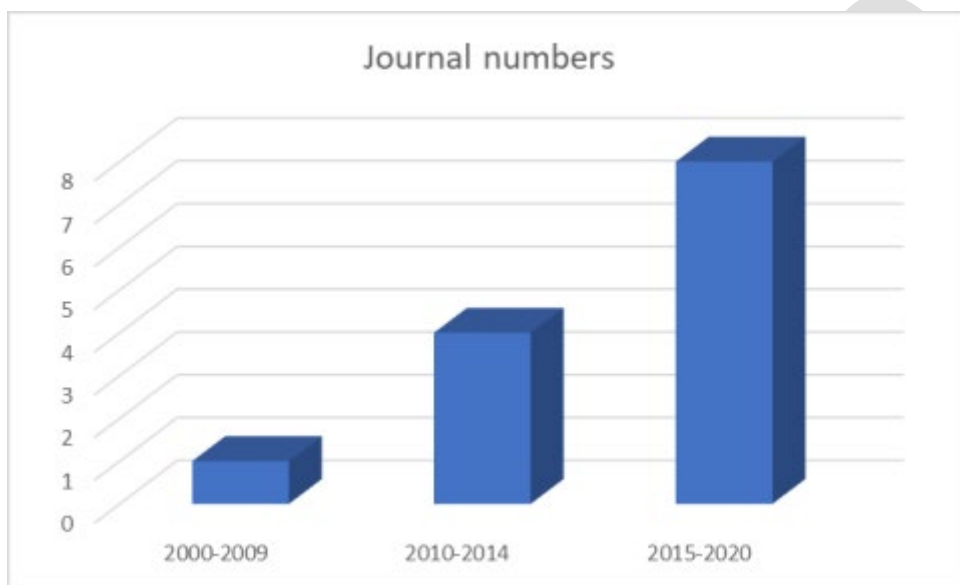
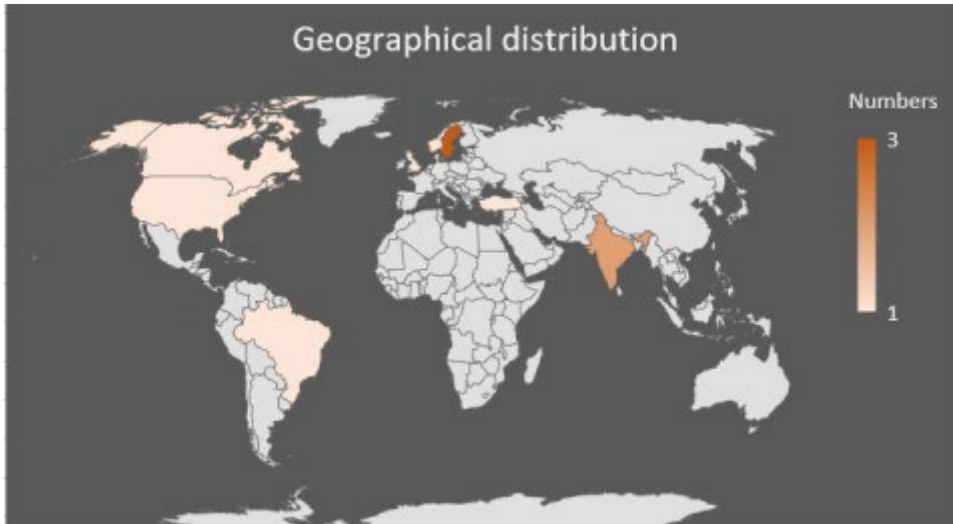


Figure 3 highlights the geographical distribution of studies and demonstrates that Northern European countries conducted more studies for Father KC. Three studies were undertaken in Sweden, one in the UK, one in Norway, and one in Denmark. Fewer studies were conducted in the Mediterranean and Southeast Asian regions, those being two in India, one in Turkey. One study for conducted in a far east country that being Taiwan. Lastly, there was only one study completed in Canada and one in the USA. None have been undertaken in Australia.

**Figure 3: Geographical distribution of the selected studies**



The data relevant to factors associated with Father KC is detailed in **Table 2**, which shows the length of KC, the facilities/aids for KC, and culture and policies background. In Sweden, single-family rooms with beds were available in their NICU settings. Parental leave and allowance enabled fathers to spend more time implementing KC. Blomqvist et al, (2011) study showed fathers had KC with their babies for up to 24 hours a day, and 7-19.6 hours a day was reported in the study by Morelius et al, (2015). In regions where fathers had to manage most of the family's financial responsibilities, KC duration was between 15 minutes and 90 minutes (Chen et al, 2017; Cong et al, 2015; Dongre et al, 2020; Günay and Coşkun Şimşek 2020; Varela et al, 2014; Varela et al, 2018). The cot side chair provided for KC was reported in four studies (Chen et al, 2017; Cong et al, 2015; Günay and Coşkun Şimşek, 2020; Varela et al, 2018). However, three studies did not report on the provision of this aid (Canguru and Do Pai, 2015; Helth and Jarden, 2013; Magee and Nurse, 2014).

Table 2, data related to clinical implications demonstrate that five studies reported that staff educated fathers about KC (Blomqvist et al, 2011; Canguru and Do Pai, 2015; Chen et al, 2017; Günay and Coşkun Şimşek, 2020; Magee and Nurse, 2014). One study (Blomqvist et al, 2011) described a care plan to promote and support fathers to provide KC. One study (Fegran et al, 2008) recommended mother's encouragement, and another study (Günay and Coşkun Şimşek, 2020) established policies to support Father KC practice. Interestingly, Varela et al (2014) reported less KC practice in a single room than in the open intensive care room.

Table 3. links the studies that reported an impact of Father KC that includes enhancement of paternal role, initiating and strengthening father-infant bond. An important finding was increasing fathers' competence and affection associated with a reduction of paternal stress and anxiety. Additionally, two studies (Canguru and Do Pai, 2015; Olsson et al, 2017) reported the father's role was promoted as a primary carer in certain circumstances when the mother was not available. Other findings included promoting the relationship between fathers and mothers, and Dongre et al (2020) also showed KC to be an excellent opportunity to establish better communication between fathers and NICU staff.

Collectively, these findings indicate clear benefits associated with Father KC. However, Olsson et al (2017) reported that KC was an energy-draining practice, and sometimes led to guilty feelings from spending less time with other siblings. Helth and Jarden (2013) highlighted fathers' conflict between working and spending time with the infant. However, Canguru and Do Pai (2015) found that KC was a valuable learning experience for fathers, and this was confirmed by Olsson et al (2017).

**Table 3: The selected studies were included according to the categories of the impact of Father KC on fathers**

<b>The impact of Father KC on fathers</b>	<b>Articles</b>
Initiating and strengthening father-infant bond	S1, S2, S3, S6, S7, S9, S11, S12
Enhancement of paternal role	S1, S6, S7, S8, S9, S10, S11, S12, S13
Feeling in control	S9, S10, S11
Improvement of competence as a father	S1, S6, S7, S8, S9, S12, S13
Reduction of paternal stress or anxiety	S1, S5, S6, S7, S11, S13
Affection	S1, S2, S7, S8, S11
Better communication between fathers and NICU Staff	S5
Promotion of family relationship	S2, S4, S5, S10
KC information availability	S2, S11
Acting as a primary carer (motherly role)	S1, S9
Energy-draining, feeling guilty to the other siblings at home	S1, S11
The conflict between working and spending time with their infant	S8

## **Discussion**

As far as the authors are aware, this is the first scoping review undertaken to search current literature relating to fathers' experiences of providing KC to their baby in NICUs.

The included 13 studies for this review were undertaken in various geographical regions. The researchers acknowledge that clinical and cultural neonatal variations in NICUs and other neonatal care settings need to be considered. Fathers being involved in their infant's care will vary throughout the world and generally speaking, most societies continue to recognise mothers as the primary caregiver. However, over the last few decades, there has been increasing involvement and caregiving by fathers (Steen et al, 2012). A specifically designed website provides information on studies undertaken around the globe where fathers and families are being researched and there appear to be several benefits when they are engaged in infant care ([www.familyincluded.com](http://www.familyincluded.com)). There is also a useful website for fathers to access ([www.birthingdads.com.au/](http://www.birthingdads.com.au/)). Reflecting on this review, it highlights there has been a growing interest in fathers' experiences of KC, mostly from Northern European countries but some research has been undertaken in North America, Canada and also in the Mediterranean, South and Far East Asian regions. Nevertheless, it has been recommended that further research and studies are required that involve more diverse backgrounds (Magee and Nurse, 2014).

The collective evidence from this review confirms that there are health and wellbeing benefits when Father KC is undertaken, and this confirms earlier findings reported in an integrative review by Shorey et al (2016). These researchers concluded that Father KC had positive effects on understanding the father's role, promoting improved paternal interaction with infants, and reducing paternal stress.

Over the last few decades, father's involvement in childcare has been increasing and is associated with the dual-income family structure that has evolved from a transformation of the socioeconomic environment (Faris, 2016). The responsibilities pertaining to father's role include the involvement of child care and the influence on a child's physical and mental development (Varela et al, 2014; Yogman et al, 2016). Father KC can provide fathers with an opportunity to gain caregiving skills and connect with their baby, which is supported by Varela et al's

(2014) study conducted in India. These researchers reported fathers with KC experiences showed a more empathetic and emotional connection to their child. Fathers with a baby in NICUs are at increased risk of developing anxiety and depression (Givrad et al, 2021), the practice of KC may assist fathers to manage anxiety and stress when caring for their newborn in NICU (Magee and Nurse, 2014; Morelius et al, 2015; Olsson et al, 2017) and feel competent in being a father (Blomqvist et al, 2011; Fegran et al, 2008; Günay and Coşkun Şimşek, 2020; Helth and Jarden, 2013; Magee and Nurse, 2014; Varela et al, 2014; Varela et al, 2018), which will contribute to fathers' health and wellbeing. Adamsons and Johnson (2013) reported that positive father involvement in a child's upbringing may enhance academic achievement, emotional wellbeing, and social behaviours. Garnica-Torres, Gouveia Jr and da Silva Pedroso J (2021) suggested that the attainment of fatherhood is driven by men's emotions and mental wellbeing. Therefore, Father KC appears to assist fathers to review their views about fatherhood and acts as a lived workshop about becoming a father as described by Olsson et al, (2017).

This review found evidence to suggest that Father KC supported fathers in connecting and bonding with their infants, which positively impacted fathers' confidence and self-esteem when engaging in their baby's care in a NICU environment. These key findings confirm what Logan and Dormine (2018) reported earlier. These researchers conducted semi-structured interviews with seven fathers about the experiences of caring for their premature babies in the first weeks' in NICU and reported that KC played a critical role in connecting to their infant. According to John Bowlby's evolutionary concept of attachment theory, infants seek proximity figures that respond to their stress behaviours, such as crying, to help them survive (McLeod, 2007). By acting as a caregiver, fathers could instinctively enable the father-infant attachment to be established, and then a reciprocal interaction between them might be created. This physiological relationship between fathers and infants was illustrated by Bloch-Salisbury et al, (2014). These researchers reported that premature infants' respiratory stability corresponded to the KC providers' cardiac rhythm during KC sessions and babies were calmer. Interestingly, bonding between fathers and babies often occurs during pregnancy. Genesoni (2009) found that fathers psychologically bonded to



their babies in the first trimester of their partner's pregnancy. However, during the childbirth continuum, fathers are often seen as 'a bystander' and receive education and information 'second-hand' (Steen et al, 2011). Nevertheless, the NICU environment may provide opportunities to promote the father-infant bond and connection by supporting the practice of Father KC.

Theoretically, close touch between fathers and infants through KC activates the hypothalamic-pituitary-adrenal axis stress system to produce oxytocin, which leads to decreased levels of cortisone also referred to as a stress predictor. (Cong, 2015). This reduction in stress was clearly shown by Varela et al (2018). These researchers collected saliva samples on fathers and reported a significant reduction in cortisone level one-hour post-KC compared to before and during KC. Interestingly, Cong et al (2015) found similar results in their crossover study and found that fathers' oxytocin level was raised after KC and maintained at the same high level for 30 minutes after KC. Hence, the stress-free advantage produced by KC might act as a catalyst to enhance the paternal role as highlighted by Blomqvist et al, (2011). The evidence to support the promotion of Father KC in NICU settings appears to be emerging over the last decade.

In some circumstances where a mother is unavailable as the result of a critical medical condition, such as following an emergency caesarean section, the father is available and can provide Father KC. The benefits of Father KC were also clearly shown in the case study reported by Magee and Nurse (2014). These researchers discussed how a bereaved father cared for his premature daughter in the NICU when her mother died nine days after giving birth. Therefore, health professionals may advocate KC to fathers to maximise the facilitation of KC.

Nevertheless, this review detected some negative impacts that were associated with Father KC. Some fathers reported that providing KC to their newborn baby was time-consuming and perceived by some as an energy-draining task (Blomqvist et al, 2011; Helth and Jarden, 2013; Olsson et al, 2017). This negativity reported might be related to the prolonged KC events and finding time for KC from the father's multiple responsibilities: being a father and a supporter for mother or an economic provider. Subsequently, one issue surfaced: fathers' involvement in providing KC led to an unbalanced working and family life (Garnica-Torres,

Gouveia Jr and da Silva Pedroso J, 2021; Helth and Jarden, 2013). Another issue emerged: fathers felt guilty about spending less time with the other siblings at home from providing KC for their newborn baby in NICU (Blomqvist et al, 2012; Olsson et al, 2017). These negative impacts might be associated with sociocultural factors and variations in health policies in different geographic areas. In some European countries where NICU facilities/aids included single rooms with a bed and leisure equipment, parents are well supported to offer their infants KC for up to 24 hours a day (Blomqvist et al, 2011). The paternal leave enables fathers to be available for KC provision (Blomqvist et al, 2011; Morelius et al, 2015). In contrast, parental leave was not provided in some countries, which impacted the availability of fathers. This finding is consistent with the studies reported by Garnica-Torres, Gouveia Jr and da Silva Pedroso J (2021) and Günay and Coşkun Şimşek (2020).

Mixed reports of facilities/aids and support for Fathers to provide KC appears to be the current situation. Comfortable chairs and single rooms might help. Paid paternal leave could be advocated by the local government to reduce financial burden and create more opportunities for fathers' to be available. Negative outcomes might be circumvented by designing a Father KC care plan to support fathers who wish to conduct KC with their infant (Blomqvist et al, 2011) and introducing a flexible approach to length of time KC is provided. Care plans for Father KC may promote more positive experiences for fathers whilst their infant is in a NICU setting and address the negative aspects raised by some fathers.

As for clinical implementation, the findings of this review have demonstrated that Father KC enhances couple and family relationships (Canguru and Do Pai 2015; Cong et al, 2015; Dongre et al, 2020; Morelius et al, 2015) and thus is worthy of support for the practice. This positive outcome upon relationships may be explained by a pattern of an interlinked influence circle of mother to child, child to father and father to mother, where the father-child bond that emerges from the involvement in Father KC plays a pivotal role in linking the relationship between family members (Lindsey and Caldera, 2006). The improved interaction reported between fathers and nursing staff associated with Father KC (Dongre et al, 2020), provides an opportunity for nurses and midwives to understand the father's perspective to help them communicate more effectively. Improved communication with a father will promote better engagement in their infant's care whilst NICU

(Cong et al, 2015). Some studies mentioned education for Father KC, and this seems to have had a positive outcome on supporting fathers to undertake the practice (Chen et al, 2017; Günay and Coşkun Şimşek, 2020; Helth and Jarden, 2013; Morelius et al, 2015; Olsson et al, 2017). Therefore, it appears that providing Father KC education to fathers before, or shortly after admission of their infant to NICU would be advantageous. However, further studies on educating and mentoring fathers to provide KC in NICUs are required.

### *Strengths and limitations*

A strength of this review is that a protocol was developed, and rigorous steps were undertaken to identify relevant quantitative and qualitative studies. A scoping of the literature was undertaken and Father KC in NICU settings is a topic currently emerging as an area of interest. However, the included studies were limited to some countries and therefore, may not be generalisable to a global population. A limitation is that the reviewed articles were only written in English, and therefore studies written in other languages may have been missed. Some quantitative studies sample sizes were small and underpowered and further larger studies are required. No longitudinal studies were reported, and this is a limitation. Most qualitative studies used a phenomenological approach and further studies may benefit from using an ethnographic design where the NICU environment, staff and fathers may be considered and participate in the research. Mixed method studies may also contribute to providing further evidence for Father KC in NICU settings.

### **Conclusion**

Research evidence to support Father KC in NICU settings is emerging and this review has provided and consolidated current literature evidence by answering the research question: what impact does KC have upon fathers when their baby is cared for in NICUs? This review has shown that there are health and wellbeing benefits for fathers and their babies when Father KC is undertaken in NICUs and other clinical settings. The findings from this review provide some evidence to support the implementation of Father KC in NICUs and other clinical settings and will inform policies and clinical practices in countries where paternal involvement is evolving. Paid paternal leave may reduce financial burden and create more opportunities for fathers' to be available to provide Father KC.

Adopting a flexible approach strategy for length of time to give KC that will meet individual father's and their baby's needs may enhance the experience. Care plans for Father KC may promote more positive experiences for fathers whilst their infant is in a NICU setting and address the negative aspects raised by some fathers.

Further research is needed about how and what to provide KC education to fathers and evaluation of Father KC care plans. Fathers from a wide range of diverse backgrounds need to be included in further research studies to enable an international perspective to be investigated and explored in more depth.

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The authors declare that they have no conflict of interest.

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