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How to support fathers of preterm infants in early parenthood – An integrative review

Kristina Garne Holm, RN, PhD^{a,b,*}, Hanne Aagaard^c, Ragnhild Maastrup, RN, PhD^{d,e}, Janne Weis, RN, PhD^e, Maria Monberg Feenstra, RN, MSc^{b,f}, Helle Haslund-Thomsen, RN, PhD^{g,h,i}, Mai-Britt Hägi-Pedersen, RN, PhD^{j,k}, Ingrid Nilsson, RN, PhD^l, Ingeborg Hedegaard Kristensen, RN, Health visitor, MPH, PhD^m, Sabine Dreier, MLISⁿ, Anne Brødsgaard, RN, Health visitor, MPH, PhD^{m,o}, Health Visitor, PhD^{m,o}

^a Hans Christian Andersen Children's Hospital, Odense University Hospital, Denmark

^b Department of Clinical Research, Faculty of Health Sciences, University of Southern Denmark, Denmark

^c Lovisenberg Diaconale University College, Oslo, Norway

^d Knowledge Centre for Breastfeeding Infants with Special Needs, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark

^e Interdisciplinary Research Unit, Department of Neonatology, Rigshospitalet, Copenhagen University Hospital, Copenhagen, Denmark

^f Department of Gynecology and Obstetrics, Odense University Hospital, Denmark

^g Clinical Nursing Research Unit, Aalborg University Hospital, Aalborg, Denmark

^h Department of Pediatrics, Clinic for Anesthesiology, Child Diseases, Circulation and Women, Aalborg University Hospital, Aalborg, Denmark

ⁱ Department of Clinical Medicine, Aalborg University, Aalborg, Denmark

^j The Coherent Healthcare System, Region Sjælland, Denmark

^k University College Absalon, Center for Nursing, Region Sjælland, Denmark

^l Danish Committee for Health Education, Copenhagen, Denmark

^m Department of Nursing and Health, Institute of Public Health, Aarhus University, Aarhus C, Denmark

ⁿ Department of Aalborg University Library, Aalborg University, Aalborg, Denmark

^o Department of Pediatrics and Adolescent Medicine & Department of Gynecology and Obstetrics, Copenhagen University Hospital Amager Hvidovre, Capital Region of Denmark, Denmark

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ABSTRACT

Problem: Preterm birth is a stressful event. Paternal experiences of having a preterm infant indicate a need for tailored support. However, it is unclear which interventions work best. This review presents the evidence on existing healthcare interventions to support fathers of preterm infants in early parenthood, how effective they are and paternal experiences with the interventions.

Eligibility criteria: The integrative review process of Whittemore and Knafl was used to guide the study. A structured and comprehensive literature search was conducted in PubMed (MEDLINE), Embase, CINAHL, PsycInfo, Cochrane, Scopus, Web of Science, SweMed+, and Proquest Dissertation & Thesis Global.

Sample: A total of 18 qualitative and quantitative studies were included in the review. The Mixed Methods Appraisal Tool was used to assess quality.

Results: Three overall themes were identified in the analysis: 1) Skin-to-skin contact supported interaction between infant and father, 2) information impacted paternal experiences of stress, anxiety, and development of fatherhood, 3) fathers' relationships with the nurses oscillated between conflict and assistance.

Conclusions: Our findings show that targeted interventions could support father-infant interaction and reduce stress among fathers of preterm infants.

Implications: Fathers of preterm infants rely on nurses to support their engagement in early parenthood, while nurses facilitate the interventions that engage the fathers. It is also essential to develop a culture within the neonatal intensive care unit that encourages the presence of fathers and enhances educational nursing strategies for supporting fathers of preterm infants during early parenthood.

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* Corresponding author at: Hans Christian Andersen Children's Hospital, Odense University Hospital, Klovevænget 23C, 5000 Odense C, Denmark.

E-mail addresses: kristina.holm@rsyd.dk (K.G. Holm), hane.aagaard@ldh.no (H. Aagaard), ragnhild.maastrup@regionh.dk (R. Maastrup), janne.weis@regionh.dk (J. Weis), maria.monberg.feenstra@regionsyd.dk (M.M. Feenstra), hht@rm.dk (H. Haslund-Thomsen), maiha@regionsjaelland.dk (M.-B. Hägi-Pedersen), ln@sundkom.dk (I. Nilsson), sd@aub.aau.dk (S. Dreier), anne.broedsgaard.madsen@regionh.dk (A. Brødsgaard).

Introduction

During recent decades, fathers have become increasingly involved in pregnancy, birth, and childcare (Deave & Johnson, 2008; Genesoni, 2009; Xue et al., 2018). Having a child is acknowledged as one of the greatest transitions in adult life and is expected to be a joyful and memorable time. However, time with a newborn is also known to be stressful and full of mixed emotions (Danbjørg et al., 2014). Modern fathers want to be engaged, attentive, and caring (Madsen, 2008), and their active commitment to fatherhood can benefit the health and well-being of themselves, the mother, and the infant (de Montigny & Lacharité, 2004; Persson et al., 2007; World Health Organization, 2007).

Interventions to support parents before and after birth are diverse and vary across health care systems, knowledge, and culture. Antenatal parental education is offered in many countries to prepare parents for childbirth, parenthood, and childcare (Pålsson et al., 2019; Shorey et al., 2019). For mothers, antenatal parental education programs have been shown to reduce levels of stress (Maimburg et al., 2013) and prepare them for birth (Brixval et al., 2016). Conversely, expectant or new fathers from Sweden, Australia, and United Kingdom report that antenatal parental education programs do not meet their needs (Lau & Hutchinson, 2020). Overall, first-time fathers lack tailored information and acknowledgment from health professionals (Baldwin et al., 2018). Thus, developing a sense of paternal efficacy and engaging in the paternal role is pivotal to a man's transition to fatherhood. Usually, antenatal parental education takes place during the third trimester of pregnancy; therefore, many parents of preterm infants miss out on this preparation. In reflection, the content of antenatal parental education mainly focus on aspects related to healthy termborn infants. Hence, if the parents had attended parental education prior to birth, the content would not have prepared them for a preterm infant.

When an infant is born preterm, many feelings and experiences affect the mother and the father (Provenzi et al., 2016). Parents of infants receiving neonatal intensive care are at increased risk of experiencing adverse mental effects and depressive symptoms. Treatment and care of preterm infants in today's health care setting have acknowledged a family-centered care approach as best practice (Gooding et al., 2011) to ensure that care promotes parent involvement and increases a strong parent-infant relationship (Coyne et al., 2018). A family-centered care approach involves the principles of respect and dignity, shared knowledge, shared responsibility, collaboration, and partnership, with a shared goal between clinicians and parents (Reis et al., 2010). Furthermore, parents' presence during the infant's hospital admission is essential. However, studies have shown that fathers experience the environment in the neonatal unit as complex, challenging, and anxiety-provoking (Prouhet et al., 2018; Sisson et al., 2015). Fathers often perceive a lack of involvement (Feeley et al., 2013) and have to advocate for the right to care for, hold, and make decisions for their infants (Sisson et al., 2015). Clinicians report focusing mainly on the mother and infant. A review of paternal stress in the neonatal intensive care unit (NICU) showed a tendency for fathers to experience less stress than mothers (Gustafson et al., 2016; Prouhet et al., 2018). Seeing their infant surrounded by medical equipment can impact fathers' stress levels, especially for fathers with extremely low birth-weight infants (Prouhet et al., 2018). Conversely, skin-to-skin contact (SSC) with their preterm infant makes fathers feel included in their infants' care and is just as important as mothers (Olsson et al., 2017).

It is well-known that paternal stress changes over time and fathers' stressors are often different from those of mothers (Provenzi et al., 2016). In addition to caring for the preterm infant and supporting the mother, the father must also often maintain everyday life with work, house chores, and care for other children in the family, which can be very stressful (Stefana et al., 2021). A study comparing mothers' and fathers' experiences of becoming a parent of a very preterm infant identified that the parents coped differently. Fathers mainly focused on learning to be a parent, while mothers concentrated on their maternal role and coming home with the infant (Provenzi et al., 2016).

Problem identification

Maternal and paternal differences in experiences and needs when having a preterm infant indicate that a differentiated effort for tailored parental support is needed. Supportive interventions have been identified with both maternal and parental outcomes (Benzies et al., 2013; Puthussery et al., 2018). Interventions provided by the father to preterm infants have previously been subject to a systematic review; (Filippa et al., 2021). However, interventions provided to support early fatherhood remain unclear. The aim of the present study is to synthesize evidence on existing interventions delivered in healthcare settings to support fathers of preterm infants in early parenthood and evaluate their effectiveness regarding paternal well-being. Further, we aimed to synthesize how fathers experience such support.

Methods

Design

As the study aim involves objective and subjective elements of delivered healthcare interventions, we performed an integrative review according to the methodology described by Whittemore and Knaf (Whittemore & Knaf, 2005). It is a mixed-method systematic review including qualitative and quantitative studies and is the broadest type of research review providing the opportunity to fully understand a phenomenon of concern. Further, the integrative review methodology can allow findings to be applied to clinical practice (Whittemore & Knaf, 2005). The integrative review was carried out in five stages: 1) problem identification, 2) literature search, 3) data evaluation, 4) data analysis, 5) presentation (Whittemore & Knaf, 2005).

Literature search

The systematic literature search was based on patient-intervention-comparison-outcome (PICO) and patient, phenomena of interest, and context (PICo) structures and was carried out in collaboration with a research librarian. A preliminary search was conducted in PubMed (MEDLINE) and formed the basis of the generated search strategy, including selecting search terms. The search consisted of 1) a systematic literature search in selected bibliographic databases and 2) a supplementary search for grey literature. The search for grey literature was done to meet the requirements for an integrative review to identify ongoing research and publications that have not been published through traditional publishing channels and, in general, to qualify the search by making it more comprehensive.

The systematic literature search was conducted in June and July 2020 in nine electronic databases, comprising PubMed (MEDLINE), Embase, CINAHL, PsycInfo, Cochrane, Scopus, Web of Science, SweMed+, and ProQuest Dissertation & Thesis Global. The following keywords were used: "father" (father*), "preterm infant" (preterm infant, premature infant, low birth weight, LBT, very low birth weight, VLBW, extremely low birth weight, ELBW), and "intervention" (intervention, consultation, counseling, support, guidance, supervision, education, neonatal intensive care, experience, perceive). The search was adapted to each database, and both controlled thesaurus terms and natural language terms were used. Spelling variations, as well as singular/plural, were considered. The search was limited to literature published from 2010 due to the increased involvement of fathers in infant care during the last decade. Further, the search was limited to English, Danish, Swedish, and Norwegian languages.

The search for grey literature was conducted in July 2020 in Google Scholar, OpenGrey, and Mednar. Due to limited options for combining multiple search terms and search queries in these information sources, each search was adopted separately, using the most predominant search terms from the PICO. Like in the systematic literature search, the search was limited to literature published from 2010 and to English, Danish, Swedish and Norwegian languages when these options were possible.

The searches were updated in December 2021 to identify the latest literature. They were performed in the same way as the initial searches but were limited to literature published from 2020 and onwards.

Data evaluation

Inclusion criteria for studies were interventions targeting fathers of preterm infants (gestational age <37 weeks) during admission and up to six months after the infant's discharge. Exclusion criteria were: no abstract available, no father outcome presented, case studies, protocol studies, review studies, pilot studies, and quality development projects.

The papers from the literature search were evaluated in a three-step process using Covidence online software for managing and streamlining systematic reviews (Covidence). All titles and abstracts from the online databases were merged into Covidence, and duplicates were removed. The title and abstract of each paper were individually assessed by two authors. Next, full-text versions of all eligible papers were individually assessed by two authors. If there was disagreement between the authors, a third author had to resolve the disagreement in Covidence by either excluding or including the paper for the next step. The literature search in online databases yielded 921 records after duplicates were removed (Fig. 1). The search for grey literature yielded 236 records. The papers included for the review were critically appraised using the standardized Mixed Methods Appraisal Tool (MMAT) version 2018, which covers studies that use quantitative, qualitative, or mixed methods

designs to assess quality (Hong, 2018). The efficacy and reliability of the MMAT checklists have been reported elsewhere (Pace et al., 2012). Qualitative papers were assessed by AB and HA, and quantitative papers by JW, RM, and KGH. All authors participated in the entire data evaluation process through monthly online meetings. The updated search from December 2021 identified 578 records from online databases. After removal of duplicates there were 214 records for the title and abstract screening. Thereafter 10 papers were full-text screened, and one paper included. The updated search for grey literature yielded 52 records and resulted in no included papers.

Data analysis

Qualitative studies were analyzed using a method inspired by Graneheim & Lundman's inductive, eight-phased approach to qualitative content analysis (Graneheim & Lundman, 2004). For this integrative review we condensed the eight phases into five stages: 1) the papers were read several times, 2) findings relevant to the study's research questions were identified 3) coding was performed, labeling findings into sub-categories, not necessarily mutually exclusive, 4) findings were labeled into categories, and 5) findings were labeled into overall themes. The overall themes were thought to identify the latent meaning of the context. Qualitative data were analyzed in NVivo version 12, a software program for de- and re-contextualization of qualitative data, and merged with quantitative narratives in a thematic order.

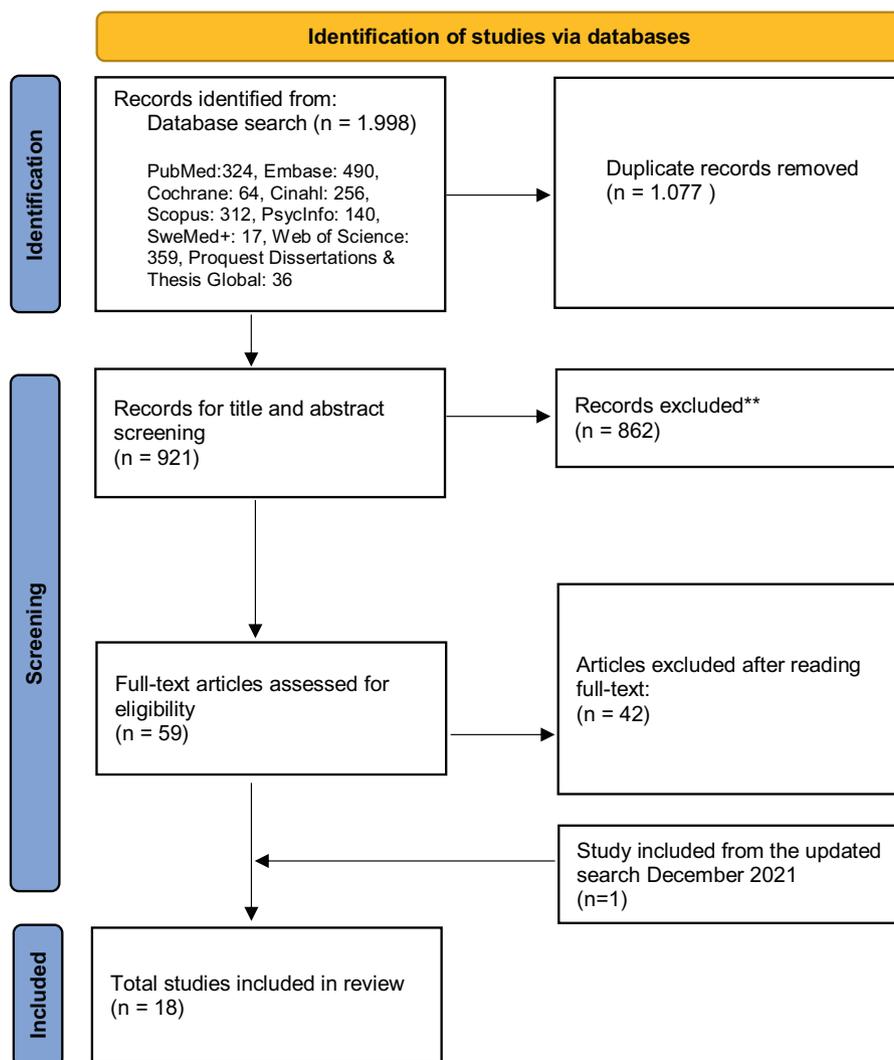


Fig. 1. Flowchart of included studies.

Data in the quantitative studies were extracted based on the type of intervention and outcome and integrated into narratives. Due to the heterogeneity of the included quantitative studies, no meta-analysis was conducted. All authors participated in the discussion process of identifying the themes.

Results

A total of 18 studies were included in the review: one mixed-method study, six qualitative studies, and 11 quantitative (Table 1). Forty-eight fathers participated in the mixed-method study, 59 in the qualitative studies, and 762 in the quantitative studies. The included studies were conducted in Asia, Europe, and North America. All interventions began during infant admission to NICU and were primarily carried out by nurses. The nature of the interventions were SSC, information, and education, except for one study where the intervention was single-family rooms.

One study applied multiple interventions (Noergaard et al., 2018), and because of the study's complexity it was not possible to determine which, if any, of the interventions were actually helpful. The study was therefore not included in the following analysis.

Three overall themes were identified in the analysis: 1) *Skin-to-skin contact supported the interaction between infant and father*, 2) *Environment and information impacted paternal experiences of stress, anxiety, and development of fatherhood*, 3) *Fathers' relation to the nurses oscillated between conflict and assistance*.

Skin-to-skin contact supported the interaction between infant and father

This theme included eight studies with skin-to-skin interventions. In six of the included studies, SSC was an intervention to support fathers in the NICU (Blomqvist et al., 2012; Cong et al., 2015; Günay & Coşkun, 2021; Helth & Mary, 2013; Olsson et al., 2017; Varela et al., 2018). Two studies tested the effect of SSC on fathers' physiological stress response. SSC interventions of 30 (Cong et al., 2015) and 60, (Varela et al., 2018) minutes significantly decreased fathers' cortisol levels, (Cong et al., 2015; Varela et al., 2018) blood pressure, (Varela et al., 2018) and self-rated visual analog anxiety levels, (Cong et al., 2015) and increased oxytocin levels (Cong et al., 2015).

Four qualitative studies explored paternal experience with SSC (Blomqvist et al., 2012; Günay & Coşkun, 2021; Helth & Mary, 2013; Olsson et al., 2017). Having SSC with a newborn infant was initially a challenge for many fathers, because their first impressions of the infant were related to fragility. It was overwhelming for them to imagine how it would be to take responsibility for an infant. It was the perspective of many fathers that SSC was a task for mothers. At the beginning of NICU admission, the presence of medical equipment strengthened the fathers' feelings of powerlessness and acted as a barrier for the fathers to provide SSC (Olsson et al., 2017). Fathers believed that the infant was more secure in the incubator than on a parent's chest. Some fathers gave suggestions on how to deal with this situation: "a greater amount of information to make them feel more secure and better aware of the benefits of SSC" (Helth & Mary, 2013; Olsson et al., 2017). However, the fathers sometimes experienced conflicts about their roles (Blomqvist et al., 2012) and the amount of SSC they wanted as compared to that permitted by the nurse (Olsson et al., 2017). Later on, when the fathers became more familiar with the NICU environment, developed a better understanding of the medical equipment and the practical aspects of performing SSC and associated tasks of dressing/undressing (Helth & Mary, 2013), and experienced the closeness SSC prompted (Blomqvist et al., 2012), the fathers realized that SSC was a supportive intervention increasing the infant's well-being. It was described as:

"...being skin-to-skin with their infant was the best they could do for her/him, and they also noticed the values on the monitor becoming

more stable during SSC. Some of the fathers observed that the infants benefitted from SSC and were calmer on their chest compared to when they were in the crib or incubator" (Olsson et al., 2017)^{p e6}.

Additionally, it nurtured the fathers' experiences of being significant (Blomqvist et al., 2012) and competent in parenthood (Helth & Mary, 2013). Providing SSC gave fathers an experience of wellbeing (Blomqvist et al., 2012; Helth & Mary, 2013; Olsson et al., 2017). One father stated: "...it was the best. It was the best feeling I ever had when he got to be with me..." (Olsson et al., 2017)^{p e5}

The closeness of SSC was important for making the situation of becoming a father more real and needed (Olsson et al., 2017). One father described it as "[...] So that you feel... that this child also needs me. And that was a really nice feeling" (Helth & Mary, 2013)^{p 118} Another father attested "...I felt that it is my child, that I am the father ... I am very happy ... thanks to kangaroo care, there has been a connection between me and my baby" (Günay & Coşkun, 2021)^{p 843}

Fathers often have to balance work obligations with being present at the hospital. Time in the NICU generated positive experiences for the fathers, stimulated the relationship with the infant, improved the understanding of risks, and supported the infant's development and growth (Blomqvist et al., 2012). One father stated: "I don't know if it has been a good thing to be here so long, but it has been nice to get these experiences with holding him" (Helth & Mary, 2013)^{p 118}

For some fathers, it was difficult to sense paternal feelings immediately after birth. Some felt them within a few days, others after weeks or months (Blomqvist et al., 2012). Taking an active part in care, such as managing feedings or SSC, stimulated attendance and interaction of the fathers with the infant (Blomqvist et al., 2012). Practicing SSC confirmed the fathers' experiences of being a father and that the infant belonged to him and strengthened paternal feelings of happiness, emotions, and confidence (Günay & Coşkun, 2021)^{p 843} It was evident for the fathers, after some time in the NICU, that care of an infant was a full-time job. For others, the stay in the NICU was related to experiences of boredom, restlessness, and time passing slowly (Blomqvist et al., 2012).

Environment and information impacted fathers' experiences of stress, anxiety, and development of fatherhood

Twelve studies were included in this theme. Four studies evaluated early intervention programs based on oral or written information about the preterm infant supported by nursing guidance during the first week after birth. Three of them used a randomized controlled trial design (Beheshtipour et al., 2014; Chen et al., 2019; Lee et al., 2013), and the last one used a quasi-experimental design (Kardaş Özdemir & Küçük, 2017).

Two studies found that written information and nursing guidance within the first week after infant birth reduced paternal stress and increased fathering ability (Chen et al., 2019; Lee et al., 2013). One of the studies identified increased perception of nurse's support and higher ratings of helpfulness of an informational booklet (Lee et al., 2013). Finally, one month post-discharge, there was a significant increase in father-infant interaction and paternal support to the mother in child-rearing (Chen et al., 2019).

A third study evaluated oral information about the infant's condition, NICU equipment, and spouse support during the first four days of infant life. Paternal stress was significantly reduced on day one and seven following the intervention (Beheshtipour et al., 2014). In the fourth study, oral and written information provided upon entry to the NICU, and being allowed to stay with their infants for 30 min, significantly decreased fathers' stress levels from just before to just after the intervention (Kardaş Özdemir & Küçük Alemdar, 2017).

Another study (Tandberg et al., 2019) evaluated emotional distress among parents in single-family rooms vs. an open-bay unit. Fathers

Table 1
Summary and characteristics of included studies with NICU-related interventions for fathers of preterm infants.

Country, author, year,	Aim/objective	Methods	Sample/Setting/context	Intervention	Results	MMAT Methodological quality
Iran Beheshtipour et al. (2014)	To determine the effect of an educational program on parental stress in NICU.	Randomized controlled trial.	60 pairs of parents with preterm infants born between GA 28–37. Intervention group: 22 fathers and control group: 21 fathers completed the study.	A four-step educational program carried out in the first five days of infant admission using booklets and PowerPoint presentations about NICU, equipment, preterm infants, and emotional reactions in parents.	Parental stress evaluated using the PSS: NICU. The educational program significantly reduced paternal stress on day five of infant admission and one week after the intervention.	****
Sweden Blomqvist et al. (2012)	Describe fathers' experiences of providing their preterm infants with Kangaroo Mother Care.	Individual semi-structured interviews.	7 fathers (4 from hospital A: a level III NICU, 3 from hospital B: NICU). All fathers were first-time fathers aged 25–36 y, married or cohabiting with the infant's mother. During first week of life, both mother and father provided KMC.	Fathers performing KMC.	<ul style="list-style-type: none"> Feelings related to becoming a father. The fathers' experiences of the division of roles between them and the NICU staff. 	*****
Taiwan Chen et al. (2019)	To evaluate the effectiveness of an early intervention program to (1) reduce paternal stress after a preterm infant's admission, (2) increase fathering ability at discharge, and (3) influence paternal support for the mother and attachment to the infant at 1 month after discharge.	Historical comparison.	Fathers of infants, GA: 32–37 weeks with a minimum stay of 5 days in the special care nursery. 41 fathers each in the control and intervention groups.	An early fatherhood intervention program in the special care nursery based on an empowerment strategy including oral and written communication, guidance, and support.	PSS:IH, fathering ability scale, father's report form on their perceptions of their support to the mother in child-rearing after the infant's discharge. MAI used on fathers. The intervention significantly reduced stress and increased fathering ability at discharge, increased paternal support to the mother in child-rearing, and increased father-infant attachment 1 month after discharge.	****
USA Cong et al. (2015)	To examine the role of oxytocin in modulating parental stress and anxiety during maternal and paternal SSC with preterm infants.	Quasi experimental study.	19 fathers with 28 stable infants GA 30–34 weeks and PNA 3–10 days.	30 min SSC.	Parents' saliva samples for oxytocin and cortisol assays and self-rated visual analog anxiety levels collected immediately before SSC, after 30 min SSC, and post-intervention after 30 min beside the incubator. Paternal oxytocin levels were significantly increased from baseline during and after SSC. Paternal cortisol and anxiety levels were significantly reduced from baseline during SSC.	****
Spain Cano Giménez and Sánchez-Luna (2015)	To assess the effectiveness of an individualized intervention to reduce parental stress, anxiety, and depression in NICU.	Quasi experimental study.	Fathers (and mothers) with infants admitted to a NICU for at least 4 weeks. Intervention group: 25 fathers and control group: 29 fathers.	A five-step individualized intervention program delivered by a psychologist which in turn acts as a mediator or a moderator in the relationships between parental anxiety and medical staff.	PSS:NICU, ISRA, BDI, and EPDS. The intervention significantly reduced anxiety and depression after 15 days, and reduced depression at discharge.	****
Turkey Günay and Coşkun (2021)	To investigate the emotions and experiences of fathers who applied kangaroo care in the NICU.	Qualitative descriptive design.	12 fathers in the NICU of a university hospital.	Preparation: about 45 min of training on the benefit of applying kangaroo care, using a PowerPoint presentation and visual materials. Implementation: Kangaroo care by the father for 15–30 min two times a day for 15 days. SSC between father and infant.	<ul style="list-style-type: none"> Emotions of being a father Confidence in fathering roles Happiness in the new parent role. 	*****
Denmark Helth & Mary, 2013	How fathers of premature infants experience and potentially benefit from using SSC during their infants' admission to the NICU.	In-depth, semi-structured interviews.	Purposeful sampling of five first-time fathers of premature infants in the NICU. NICU:22 neonatal beds and infants from GA 28 admitted. All fathers had experiences in using SSC methods.		Fathers reported feeling competent as a parent.	*****

(continued on next page)

Table 1 (continued)

Country, author, year,	Aim/objective	Methods	Sample/Setting/context	Intervention	Results	MMAT Methodological quality	
Netherlands Hoffenkamp et al. (2015)	To examine the effectiveness of hospital-based Video Interaction Guidance for mothers and fathers of infants born preterm (GA 25–37).	Pragmatic multicenter RCT (7 hospitals).	Parents of preterm infants GA: <37 weeks. Intervention group: 74 fathers and control group: 70 fathers.	Video interaction Guidance to guide parents to reflect on their own successful interactions. VIG consisted of three sessions during the first week after birth.	Observational measures: Coding Interactive Behavior ratings were clustered into three composite scores: Parental Sensitivity, Parental Intrusiveness, and Parental Withdrawal. Self-report measures: The 25-item PBQ; MBI; YIPTA; PSS:NICU, EPDS, 20-item STAI-State, 15-item STAXI2-State. The intervention significantly changed parental levels of sensitivity and detachment during parent–infant interaction with moderate to large effect sizes for fathers. However, the effect faded over time. The intervention had a significantly positive effect on father–infant bonding, but no significant effects on stress, psychological well-being, or emotional state.	*****	
Sweden Hemle Jerntorp et al. (2021)	To describe the fathers' lived experiences of caring for their preterm infant at the NICU and during home care after the introduction of an individualized parental support programme.	Narrative interviews in the fathers' homes approximately 1–2 weeks after discharge.	Fifteen fathers from a level IIb NICU were interviewed but only 7 fathers were included due to their rich narratives. The excluded interviews had the same major content as those included but were less informative.	The parental support program included 4 dialogues provided by nurses. The last dialogue took place in connection with discharge from HHNC. Before the program was introduced the staff received education in FCC and patient-centered care.	Information.	<ul style="list-style-type: none"> • The fathers were occupied by worries and concerns. • The fathers felt that they were an active partner to the professionals. • The fathers felt that they got the opportunity to take responsibility. 	*****
Sweden Ignell Modé et al. (2014)	To explore paternal perceptions of information received during their infants' care at a NICU.	Individual semi-structured interviews.	8 fathers (4 from each NICU), strategic sampled: variation in father–infant pairs to identify a wide range of information related to the aim.	Health care professionals as a source of support in the NICU.	<ul style="list-style-type: none"> • Perception of information. • Perception of the source of information. • Circumstances influencing the perception of information. 	*****	
France Koliouli and Gaudron (2018)	To illustrate how HCPs are a source of social support to fathers of premature infants in the NICU.	A mixed-methods design.	A purposeful theoretical- based sampling including 48 fathers present >3–4 times a week in the NICU of a university hospital.		Family Support Scale. <ul style="list-style-type: none"> • Sources of satisfaction. • Importance of shared information. • Identification as source of social support and reassurance. 	****	
Taiwan Lee et al. (2013)	to evaluate the effectiveness of an intervention to increase fathering ability and reduce paternal stress after a preterm infant's admission to the NICU To evaluate the effectiveness of an intervention to increase fathering ability and reduce paternal stress after a preterm infant's admission to the NICU.	Historical comparison	Fathers of preterm infants, GA: <37 weeks, in the NICU with a minimum stay of two weeks. Intervention group: 34 fathers and historical group: 35 fathers.	A two-part intervention; a one-to-one nursing guidance at the first four days of infant admission and at day 7 and a booklet with information about preterm infants.	PPSS:NICU; FA:NICU and NPST. The intervention significantly reduced paternal stress and resulted in significantly higher fathering ability.	****	
Denmark Noergaard et al. (2018)	To investigate the impact of a more father-friendly NICU on paternal stress and participation in childcare.	Historical comparison	Fathers of infants in the NICU. Intervention group: 54 fathers and control group: 55 fathers.	Principles for father friendly NICU: Encouragement of SSC at admission, and participation in important situations; Information and guidance from HCPs; Scheduled conversations with nurses; Counseling by social worker; Father groups in unit; Support by family members; Opportunity for siblings to stay overnight.	PSS:NICU. The overall stress score increased after the intervention.	****	

Sweden Olsson et al. (2017)	To describe paternal experiences of SSC with their premature infant.	Semi-structured interview.	20 fathers of premature infants in NICU. Two NICUs – a regional hospital and a university hospital.	Fathers provided SSC for their infant on at least one occasion.	****
Turkey Kardaş Özdemir and Küçük (2017)	To determine the effect of supporting and visiting infants in NICUs on stress levels of Turkish fathers	Quasi-experimental study	47 fathers with premature infants the in NICU.	3 days after admission: 30 min of oral and written information upon entry to the NICU followed by being allowed to stay with their infants for 30 min.	****
Iran Rajabzadeh et al. (2020)	To investigate the effect of a family-centered educational, supportive intervention on parental stress	Quasi experimental study	80 pairs of parents with preterm infants (GA 30–37), 40 pairs in each group.	Sixty minutes educational sessions in each of the first five days after infant birth	****
Norway Tandberg et al. (2019)	To compare emotional distress in the form of depression, anxiety, stress, and attachment scores among parents of very preterm infants cared for in a single-family room unit vs. an open bay unit.	Prospective survey	60 parents of 35 neonates in the single-family room unit and 72 parents of 42 neonates in the open bay unit were included. 30 fathers had infants in single-family rooms and 36 fathers had infants in an open bay unit. Infants were GA 28–32 with no major complications.	Single-family rooms comprised flexible folding doors between infant and parent areas, and two beds. Open bay units comprised two large rooms where parents had unlimited access at all hours, but no possibility to sleep by the infant.	****
Canada Varela et al. (2018)	To explore the physiological stress responses of fathers during their first SSC with their new baby.	Quasi experimental study	49 fathers to preterm infants of up to 33 weeks.	The first father-infant SSC, lasting an hour.	****

BDI: The Beck Depression Inventory; EPDS: The Edinburgh Postnatal Depression Scale; FA: NICU; FCC: Family Centered Care; GA: Gestational Age; HCP: Health Care Professionals; HHNC: Hospital Based Neonatal Home Care; ISRA: The Inventory of Situations and Responses of Anxiety; KMC: Kangaroo Mother Care; MBI: My Baby and I questionnaire; MPAC: Maternal Postnatal Attachment Scale; NBAS: Neonatal Behavioral Assessment Scale; NICU: Neonatal Intensive Care Unit; NPST: The nurse-parent support tool; NU: Neonatal Unit; PBQ: Postpartum Bonding Questionnaire; PMA: Post Menstrual Age; PSS: Parental Stress Scale; PSI-SF: Parenting Stress Index Short Form; PSS: NICU: Parents Stressor Scale; Neonatal Intensive Care Unit; PSS:JH: Parental Stressor Scale; Infant Hospitalization: RCT: Randomized Control Trial; SSC: Skin to Skin Contact; STAI-State: State-Trait Anxiety Inventory; STAI-SF: State-Trait Anxiety Inventory, Short Form; YIPTA: Yale Inventory of Parental Thoughts and Actions. MMAT Methodological quality: 5***** = 100% quality criteria met, 4**** = 80% quality criteria met (Hong, 2018).

with infants in single-family rooms reported significantly lower stress levels 14 days after infant birth and at infant’s discharge on both the “Parental Role” and “Sights and Sounds” portions of the Parental Stressor Scale.

Three studies reported interventions based on individualized support for both parents using a controlled clinical trial design (Cano Giménez & Sánchez-Luna, 2015), a randomized controlled trial design (Hoffenkamp et al., 2015), and a quasi-experimental design (Rajabzadeh et al., 2020). In the controlled clinical trial study, parents received an individualized, face-to-face intervention mediated by a psychologist in collaboration with nurses. This intervention comprised information about infant conditions and practical issues, as well as education about parental psychological coping strategies (Cano Giménez & Sánchez-Luna, 2015). After fifteen days of the intervention, anxiety and depression symptoms in fathers were significantly reduced, and depression symptoms remained low at discharge. The randomized controlled trial investigated the effect of hospital-based video interaction guidance (VIG) on parental stress and psychological well-being (Hoffenkamp et al., 2015). The VIG intervention prompted parents to reflect on interactions with their infant, and consisted of three video sessions with feedback during the first week after birth. This intervention increased the father-infant relationship but did not influence paternal stress levels or their concerns related to infant health at three months of infant-corrected age (Hoffenkamp et al., 2015). The quasi-experimental study investigated the effect of a family-centered educational intervention, comprising 60-min educational sessions on each of the first five days after infant birth (Rajabzadeh et al., 2020). Fathers in the intervention group presented significantly lower stress levels than fathers in the control group after the intervention.

One study explored paternal perceptions of the oral information they received during their infant’s care and admission (Ignell Modé et al., 2014). Notably, information had been emphasized as important in some of the studies concerning SSC (Blomqvist et al., 2012; Helth & Mary, 2013), as in the mixed-method study by Koliouli (Koliouli & Gaudron, 2018).

The information flow could be regarded as overwhelming and confusing because, in some cases, the information was conflicting or did reach the fathers (Helth & Mary, 2013; Ignell Modé et al., 2014). One father stated:

“Sometimes they lack (healthcare team) in tact [...] For example, B. had to be transferred from intensive care to a more standard one, and we haven’t been notified. Can you imagine what it’s like to arrive in the room and not finding your baby there?” (Koliouli & Gaudron, 2018).^{p. 156}

However, most fathers perceived the information positively and significantly, especially when it was adequate and easy to understand (Helth & Mary, 2013; Ignell Modé et al., 2014; Koliouli & Gaudron, 2018).

Fathers also reported acquiring information in less-direct situations such as medical rounds and general small talk in the ward, using it to establish their role as a parent and facilitate future development of parenthood:

“I pick up all information I can get [...] I absorb it as soon as you say anything [...] I think that information is the best when the round is there...then everybody in the room knows what the physician said and the plan for the care.” (Ignell Modé et al., 2014).^{p.133}

Information to fathers can become a double-edged sword; on one side it quiets the fathers, and on the other side introduces risks that could harm the infant’s development (Helth & Mary, 2013). However, clear, timely, and comprehensive information provided through a positive staff approach helped fathers interact with their infants and become more involved in the caring process (Ignell Modé et al., 2014), thus facilitating paternal competence (Helth & Mary, 2013) and parental development (Blomqvist et al., 2012). Even though fathers were very keen

to receive written information, in some cases it was not updated, which was very stressful and unsatisfactory (Blomqvist et al., 2012).

Fathers experienced the relationships with NICU nurses varied between conflicts and assistance.

Six studies were included in this theme, one mixed method and five qualitative. Jerntorp and colleagues focused on fathers' experiences after participating in a parental support program, including four structured dialogues with the nurses (Hemle Jerntorp et al., 2021). The fathers described feeling worried about their infants and partners, resulting in their own needs being ignored (Hemle Jerntorp et al., 2021). They viewed their absence from the NICU during nighttime as a negative experience that affected their self-identity. One father stated:

"...sometimes I also got the feeling as if he belonged more to the hospital than to us" (Blomqvist et al., 2012).^{p. 1991} In the mixed-method study (Koliouli & Gaudron, 2018) fathers were satisfied with the help provided by nurses. The health care interventions in the five qualitative studies (Blomqvist et al., 2012; Helth & Mary, 2013; Hemle Jerntorp et al., 2021; Ignell Modé et al., 2014; Olsson et al., 2017) all documented the significance of the relationship between nurses and fathers. Given this significance, nurses could also serve as obstacles to the fathers and increase their feelings of isolation and anxiety (Olsson et al., 2017). Conflicting statements and behaviors in particular affected relationships with the nurses, and it was challenging for the fathers to experience nurses with different approaches (Blomqvist et al., 2012; Helth & Mary, 2013; Ignell Modé et al., 2014). Variation in how the staff informed, supported, behaved, and performed caregiving activities contributed to paternal anxiety about which 'rules' would apply during the next shift or what was expected of them as fathers (Blomqvist et al., 2012). Fathers also became upset when they perceived staff ignoring them in favor of the mothers (Helth & Mary, 2013). This confused the fathers, and they became unsure whether they would receive "the desired assistance, and other nights they received no assistance at all" (Blomqvist et al., 2012).^{p. 1993} In other cases, fathers were positive about the assistance (Helth & Mary, 2013) and reported that nurses appeared supportive, professional, and encouraging of fathers, which contributed to paternal feelings of empowerment (Hemle Jerntorp et al., 2021) and control (Ignell Modé et al., 2014; Koliouli & Gaudron, 2018). In particular, fathers appreciated it when the nurses were careful with explaining, answering questions, and informing fathers about the reasoning behind the care (Ignell Modé et al., 2014). This supported the fathers' development into the role of a parent and increased their feelings of being in control.

Discussion

The aim of this integrative review was to synthesize and evaluate the current evidence on healthcare interventions to support fathers of preterm infants in early parenthood. Analysis of the 18 included studies and 821 participating fathers resulted in three themes.

The SSC intervention was found to reduce paternal stress and support early father-infant interaction. SSC interventions were initiated in the late 1970s as kangaroo mother care (Kostandy & Ludington-Hoe, 2019), with positive outcomes on maternal-infant interaction. SSC was later identified to have positive impacts on infant physiological stability, sleeping pattern, pain response, and breastfeeding (Kostandy & Ludington-Hoe, 2019). Continued research saw fathers included in SSC interventions, with outcomes including increased paternal confidence, a sense of belonging and contributing to infant care, and a feeling of being protectors of their infants (Kostandy & Ludington-Hoe, 2019). The implementation of SSC differs internationally, depending on NICU policies, and mothers are more often offered SSC with the infant than fathers (Pallas-Alonso et al., 2012). The present review identified that initially SSC was a challenge for the fathers, because their first impression of their newborn infant was related to fragility and that the infant would be better off in the incubator. However, the findings supported that paternal SSC decreased paternal perceptions of stress (Cong et al., 2015,

cortisol levels (Varela et al., 2018) and systolic blood pressure (Varela et al., 2018). This indicates that paternal SSC is beneficial, and when nurses provide information to fathers they should focus on the advantages of SSC despite fathers' seeing their infants as fragile.

Nurses play a significant role in supporting fathers during a preterm infant's NICU admission, building professional partnerships and increasing paternal involvement. The partnership between father and nurse changes over time; in the days immediately following birth, fathers are entirely reliant on nurses to care for the infant and to provide training in paternal responsibilities (Fegran et al., 2008). When nurses are provided with knowledge on how to support fathers in the NICU, the fathers' perceptions of nursing support increased (LeDuff 3rd et al., 2021). Continuous education and training of nurses to support fathers may be essential in clinical practice to adopt a NICU culture in which paternal presence and involvement are imperative.

During recent decades, the importance of family-centered care has been adopted in several countries. Family-centered care in pediatrics has its origin in 1972 (Beatty A, 1972) and in the 1990s, the Institute for Patient- and Family-Centered Care was established (Patient- and Family-Centred Care, 2017). They present four concepts of family-centered care, including respect and dignity, information sharing, participation, and collaboration (Griffin, 2006; partnerships, 2017). The concept of information sharing in particular is of great importance to fathers of preterm infants, as the analysis identified that targeted written and oral information in the first days after birth reduces paternal stress and increase fathering ability (Chen et al., 2019; Lee et al., 2013). However, when written and oral information is not up to date or precise, fathers can become insecure and experience stress, like found in an integrative review on NICU parents' needs (Adama et al., 2021). Participation and collaboration are also important issues for the fathers of preterm infants, as supported by the results of the present review. However, cultural variation limits the opportunities for fathers in some parts of the world, and NICU policies can act as barriers to paternal SSC and participation in infant care. This study illustrates that there are still fathers in Europe that do not feel sufficiently involved in infant care in the NICU (Greisen et al., 2009; SCENE research group, 2016), indicating a need for updated clinical practices with more focus on the father.

Implications for clinical practice

Most of the interventions for supporting fathers of preterm infants presented in this review are low-cost interventions that can be implemented in clinical practice. Especially the advantages of SSC must be broadened to clinical practice, while it can be provided to fathers and infants everywhere regardless of hospital environment and economics. Despite the request for more paternal involvement in the NICU, this review also highlights the challenges of being a new father to a preterm infant. Fathers must manage work, household chores, and possibly other children in addition to supporting the mother and being involved in infant care in the NICU. Noergaard and colleagues (Noergaard et al., 2018) reported that an intervention comprising eight activities to engage the father during NICU admission led to increased paternal stress. Other studies included in this review only tested one such intervention at a time. Given the many tasks that the fathers already are juggling, it makes sense that too many activities can be too demanding. Therefore, strategies to involve fathers in early parenthood must be two-sided: understanding which specific interventions support fathers in early parenthood and then communicating with each father to identify his individual needs. In the clinical setting, nursing management play an essential role in ensuring the education of nursing staff to ensure optimal support to the fathers. To provide optimal support and involvement of fathers by intervention, findings from this review can be a fundament for future studies. However, fathers' needs when having a preterm infant, in combination with the knowledge and needs of nurses caring for the father and infant, must be studied to ensure the optimal evidence-based approach to support fathers of preterm infants in early parenthood.

Limitations

This study included both qualitative and quantitative studies based on recommendations for conducting an integrative review (Whittemore & Knaf, 2005). Further, the included studies were assessed using the Mixed Methods Appraisal Tool recommended for reviews, including original qualitative and quantitative studies (Hong, 2018). However, there are limitations to be considered. The evidence of this review cannot exceed the evidence of the included papers, i.e., one of the studies used a questionnaire for fathers that was validated for new mothers, which for some of the questions could lead to misunderstandings. Furthermore, some of the included quantitative studies lacked sufficient power to detect a real effect of the intervention, and further, the applied statistical methods were unclear. Few limitations were applied to the literature search, with language and publication year yielding studies from both low- and high-income countries.

Conclusion

This review identified the health care interventions that support fathers of preterm infants in early parenthood. Targeted interventions such as skin-to-skin contact, clear and comprehensive information, education, individualized support, video interaction guidance, and single-family rooms can support early father-infant interaction and reduce paternal stress. NICU culture is also essential and should support paternal presence and provide educational nursing strategies to support the fathers of preterm infants during early parenthood.

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CRedit authorship contribution statement

Kristina Garne Holm: Formal analysis, Investigation, Writing – original draft, Project administration. **Hanne Aagaard:** Development of the study idea and design, Methodology, Formal analysis, Writing – review & editing. **Ragnhild Maastrup:** Conceptualization, Methodology, Formal analysis, Writing – review & editing. **Janne Weis:** Formal analysis, Investigation, Contributing to writing original draft, Writing – review & editing. **Maria Monberg Feenstra:** Development of the study idea and design, Discussion of results, and critical reading of the final manuscript. **Helle Haslund-Thomsen:** Development of the study idea and design, Discussion of results, and critical reading of the final manuscript. **Mai-britt Hägi-Petersen:** Development of the study idea and design, Discussion of results, and critical reading of the final manuscript. **Ingrid Nilsson:** Development of the study idea and design, Discussion of results, and critical reading of the final manuscript. **Ingeborg Christensen:** Contribution to idea and design of the work, Revising of the work, Final approval of the work. **Sabine Dreier:** Methodology, Validation, Writing – review & editing. **Anne Brødsgaard:** Development of the study idea and design methodology, Formal analysis, Writing – review & editing, Project administration.

Declaration of Competing Interest

None.

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