

REVIEW ARTICLE

Systematic review confirmed the benefits of early skin-to-skin contact but highlighted lack of studies on very and extremely preterm infants

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Abstract

Aim: We systematically reviewed the literature to identify the benefits of early skin-to-skin contact (SSC) for all gestational ages.

Methods: The MEDLINE, Embase and CINAHL databases were searched for papers published in English from 1 January 1975 to 31 March 2020. Early SSC was defined as when the infant was placed directly onto the mother's chest within 180 min of birth. Two authors independently searched the databases, appraised study quality and extracted the study design and outcome data. The primary outcomes were the infants' physiological stability after birth: thermoregulation and stabilisation. The secondary outcomes were exclusive breastfeeding and mother-infant interaction.

Results: We reviewed 30 studies that assessed the benefits of early SSC: 22 comprised term-born healthy infants and eight focused on preterm or ill infants. These included various gestational ages, birth methods and cultural backgrounds. The studies demonstrated that early SSC stabilised neonatal physiological parameters, promoted exclusive breastfeeding and supported bonding. Most of the data were from term and late preterm births.

Conclusion: This systematic review showed that early SSC could be beneficial. Further studies that focus on providing very and extremely preterm infants with SSC, and parental experiences, are needed to enable SSC to be adopted as routine practice.

KEYWORDS

delivery room, family-centred care, neonatal, preterm, skin-to-skin contact

1 | INTRODUCTION

Providing babies with skin-to-skin contact (SSC) has grown in popularity since it was first described more than 40 years ago. It was initially designed to keep babies warm in settings where equipment like incubators was not available.¹ It is now used in both developed and developing countries. The World Health

Organization (WHO) recommends SSC when babies are born weighing 2,000 g or less.² This should start as soon as they are clinically stable, following delivery, to prevent hypothermia.² The United Nations Children's Fund Baby Friendly Hospital Initiative recommends SSC immediately after birth, based on physiological, social and psychological benefits for both the mother and baby.³

Abbreviations: NICU, neonatal intensive care unit; SSC, skin-to-skin contact.

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In practice, extremely preterm infants are separated from their mothers immediately after birth and not placed skin-to-skin in routine neonatal intensive care unit (NICU) settings. Once they are in the NICU, regular and long SSC is recognised as an important part of standard care. The high-tech environment in the NICU, which includes the barrier provided by the incubator, high humidity, respiratory support, central lines and monitoring presents further challenges when it comes to supporting early SSC. Being separated from their infant and lack of physical contact increases parental anxiety and mothers often have to wait several days for their first SSC.^{4,5} It has also been reported that these restrictions have a negative impact on parental health and bonding and lead to toxic stress.⁶ Visual and physical contact in the delivery room can help the process of bonding.⁷ SSC is known to increase oxytocin levels in parents, which facilitates bonding and has an anxiolytic effect. It may also lead to long-term changes in the mother's brain.^{8,9}

SSC has also been recommended as one of the most important aspects of infant and family-centred developmental care.¹⁰ SSC is supported by the European Foundation for the Care of Newborn Infants, the British Association of Perinatal Medicine and other worldwide organisations. Despite this, implementing SSC widely has been difficult, particularly during the COVID-19 pandemic, which has led to restricted parental access to NICUs.

The purpose of this systematic review was to assess the effects of immediate or early SSC on all neonatal gestations, in the delivery or operating room or during the first hours of life in the NICU. We aimed to highlight both the safety issues and the potential benefits.

2 | METHODS

2.1 | Search strategy

The Medline, Embase and CINAHL databases were searched using the following terms: infant, premature birth, preterm, premature, pre-term, delivery room, cuddle, kangaroo mother care method, skin-to-skin, birth or labour, labour and centre, centre and ward from 1 January 1975 to 31 March 2020 (Appendix S1). Two authors independently searched the databases for papers published in English using predefined terms. The abstract seemed relevant in 38 cases and the full papers were reviewed and analysed by two authors (NG, AD). All clinical trials, randomised and non-randomised studies that evaluated the effects of early SSC within 180 min of birth were assessed. This systematic review was conducted in accordance with the preferred reporting items for systematic reviews and meta-analyses guidelines (Figure 1). The reviewers looked for the strengths and weaknesses, validity and biases of each study by using the Risk of Bias In Non-randomised Studies-of Interventions tool.¹¹ Information was manually extracted from the full-text papers (Table S1).

Key Notes

- We systematically reviewed 30 studies that assessed the benefits of early skin-to-skin care (SSC) within 180 min of birth.
- The studies demonstrated that early SSC stabilised neonatal physiological parameters, promoted exclusive breastfeeding and supported bonding.
- Most of the data were from term and late preterm births and more information is needed on the benefits of SSC for preterm infants with lower gestational ages.

2.2 | Definitions

A 2016 Cochrane review defined SSC as placing a dried, naked baby prone on its mother's bare chest.¹² Our review used a wider definition of early SSC and comprised any physical contact between a naked baby placed on its mother's bare chest within 180 min of birth. This included when the baby was wrapped in a plastic bag and, or, covered with a warm towel, in the delivery room, operating room or NICU.

Term birth was defined as 37 + 0 weeks of gestation or more and preterm as up to 36 + 6 weeks of gestation.

Early SSC was compared with standard care. It covered any gestational age and was defined as when the infant was placed in SSC within 10 min of birth in the delivery or operating room or within 180 min of birth in the NICU at any gestational age.

We excluded any SSC that started three hours after delivery and any SSC that was not related to our defined outcome measures. The primary outcomes were that the infants were physiologically stable after birth, including thermoregulation and neonatal stabilisation. The secondary outcomes were exclusive breastfeeding and mother-infant interaction, which was measured by validated tools.

3 | RESULTS

Figure 1 shows the flow diagram for the studies we reviewed: 787 records were identified by the database and 30 papers were included in this review. These comprised 22 studies of healthy term infants and eight studies of both preterm and ill term infants. However, only four studies were specifically designed for preterm infants (Table S1). The majority of the studies, 24 out of 30, were conducted in high-income countries. The eight studies that included preterm infants comprised four from high-income settings and four from low-resource settings.

3.1 | Effect of early SSC on neonatal temperature

The relationship between early SSC and thermoregulation was studied by a number of papers (Table S2). These found that SSC did not

increase the risk of hypothermia in term and near-term infants.¹³⁻¹⁸ A study of 34 neonates by Gouchon et al.¹⁵ concluded that there was no significant difference between the temperatures of babies who received early SSC or routine care 30 and 120 min after an elective Caesarean delivery. Another prospective study of Caesarean deliveries, by Burke and Morad, found that the average change in temperature after SSC was minimal.¹⁶

A randomised control trial (RCT) of 137 late preterm and term infants by Gabriel et al.¹⁷ reported that better thermoregulation was seen in the SSC group than the control group. Another RCT, by Bergman et al.¹⁸, of infants born with low birth weights from 1,200–2,199 g, reported profound hypothermia more frequently in the control group than in the early SSC group. Nimbalkar et al.¹⁹ randomised neonates with birth weights of at least 800 g to two groups and reported better thermoregulation in the early SSC than conventional care group at 48 h. A study of late-preterm infants, from 32 + 0–34 + 6 weeks of gestation, by Kristoffersen et al.²⁰, showed that there was no difference in the admission temperatures between infants who received early SSC and incubator care.

An RCT of 55 preterm neonates, by Linner et al.²¹, found that the mean body temperature was 0.3°C lower in the SSC group than the control group. However, SSC was mainly provided by the infants' fathers, in contrast to the other studies in this review.

3.2 | Effect of early SSC on cardiorespiratory stability

Studies that demonstrated the effect of early SSC on cardiovascular stability in neonates are summarised in Table S3. An RCT by Bergman et al.¹⁸ found that the Stability of the Cardiorespiratory System in Premature Infants scores was better in their early SSC group than controls. Similar trends were seen in another trial by Luong et al.²², which comprised 100 low birth weight neonates weighing 1,500–2,500 g and used the same measurement tool. The stability scores were better in the infants who received SSC at birth than the control group at both two and six hours. A small study by Ludington-Hoe et al.²³, of six late preterm infants who received early SSC, reported that oxygen saturation and heart rate remained within normal limits. Meanwhile, an RCT by Kollman et al.²⁴ did not find any significant differences when term infants received early or late postoperative SSC after Caesarean deliveries.

3.3 | Effect of early SSC on cardiorespiratory stability

The relationship between early SSC and breastfeeding has been explored, both in terms of duration and exclusivity (Table S1). Although most of the studies established a positive association between early SSC and exclusive breastfeeding, these were carried out on term babies^{1,25-33} de Château and Wiberg reported

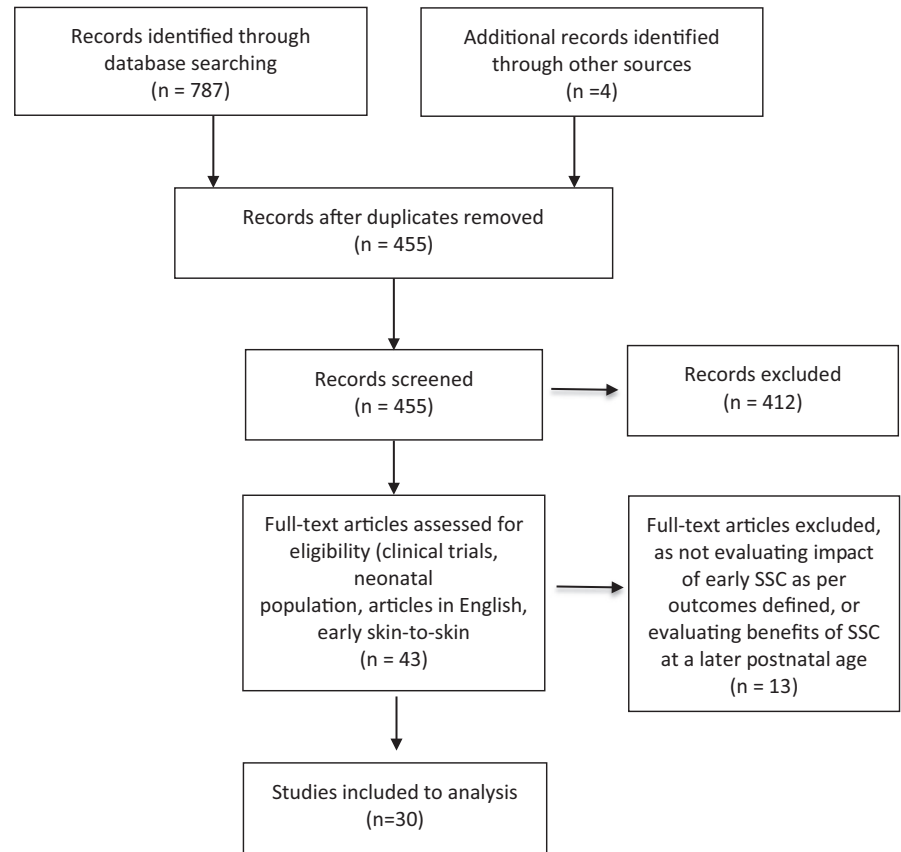
that mothers in their early SSC group breastfed their infants for an average of 2.5 months longer than those in the routine care group.²⁵ In another study by Thomson et al.¹, three times as many mothers in the early SSC group breastfed successfully at two months than the control group, who only received SSC for less than five minutes, followed by standard care (9/15 vs. 3/15). In a larger study of 1,250 term neonates, Kostyra et al.²⁶ demonstrated similar results after early SSC in the delivery room. They reported that the early SSC group received exclusive breastfeeding and overall breastfeeding for 1.43 months longer than the control group. In a large multicentre trial, Bramson et al.²⁷ concluded that a dose-response relationship existed between the duration of early SSC and exclusive breastfeeding. Suzuki noted that a significantly higher proportion of infants in the early SSC group were exclusively breastfed within one month of delivery than in the control group.²⁸ Other studies have also demonstrated similar results.²⁹⁻³⁵

3.4 | Effect of early SSC on parent-infant interaction

We explored the effect of SSC on parent-infant interaction (Table S1). A study by de Château and Wiberg reported that mothers in the early SSC group had a significant positive interaction with their infants, compared to those receiving standard care.²⁵ Similar findings have been reported by other studies.^{36,37} Wagner et al.³⁵ found that mothers who did not experience early SSC in the operating room, after undergoing a Caesarean section, were twice as likely to require analgesia or anxiolytics as those in the SSC group. Pain perception following Caesarean section was lower and maternal satisfaction was higher in the early SSC group than the control group in another study by Sundin and Mazak.³⁶ Crenshaw et al.³⁸ also demonstrated higher maternal satisfaction and lower salivary cortisol when they compared early and late SSC groups.

In a longitudinal study, Dumas et al.³⁹ analysed 151 videos of mother-infant interaction during a breastfeeding session on day four. The mothers were divided into four groups and the videos were assessed by perinatal experts. Maternal softness was significantly higher in the groups who received SSC or were cuddled clothed by their mothers for the first two hours after birth than those who were separated after birth. A study by Bystrova et al.⁴⁰ concluded that early SSC had a positive influence on mother-infant interactions at one year of age. Thukral et al.³⁰ reported similar results, with higher satisfaction in mothers who were able to use SSC in the delivery room. Mehler et al.⁴¹ carried out a study on 88 infants born at 25–32 weeks of gestation, who were randomised to early SSC for 60 min or five minutes of visual contact after stabilisation. The mothers in the early SSC group had a lower risk of early postpartum depression and impaired bonding. They concluded that early SSC has a positive influence on the interactions between the mothers and their infants.

FIGURE 1 PRISMA flowchart of the study selection



4 | DISCUSSION

This systematic review demonstrates that early SSC in delivery rooms, operating rooms and NICUs, defined as within 180 min of birth, was beneficial for term and late preterm babies and their parents. However, less is known about very and extremely preterm neonates. The benefits of SSC included better temperature and cardiorespiratory stability, improved lactation and better mother-infant interaction and, in one case, father-infant, interaction.

Despite the benefits, early SSC is still not accepted as routine practice for preterm or extremely preterm neonates. This systematic review showed no potential negative effects on cardiorespiratory stability or patient safety. We believe that safety concerns about hypothermia and respiratory deterioration and delayed admission to NICUs remain the most frequent barriers to not offering early SSC to preterm infants.

The major limitation of this review, and most of the studies we looked at, were the relatively small sample sizes and the bias toward term or late preterm infants.

The Baby Friendly Hospital Initiative Guidelines recommended early and uninterrupted skin-to-skin care after birth.³ In addition, Article Nine of The United Nations Convention on the Rights of the Child states that children must not be separated from their parents.⁴² Initial contact with parents should be made available, even if babies need to be stabilised after delivery and admitted to a NICU.^{42,43}

Infant-centred and family-centred developmental care and Family Integrated Care all originated from different working groups,

but they are based on similar principles and are being widely adopted by NICUs across the world. They all recommend initiating early SSC and not separating infants from their parents.

Being in immediate SSC with their mother is the developmentally expected environment for all mammals after birth. This can be achieved for all infants with cultural shifts and close collaboration between neonatal and obstetric teams. Eliminating separation is one of the core measures of neonatal neurodevelopmental care.^{44,45} The first 1,000 days from conception to two years of age are important for early childhood development. Bergman et al.⁴⁶ also emphasised the importance of the first 1,000 min following birth for neurodevelopment and stated that this first day of life was an essential time-critical period for bonding between infants and mothers.

5 | CONCLUSION

This systematic review showed that early SSC in delivery rooms, operating rooms and NICUs in the 180 min after birth were beneficial for neonates. Further studies are needed that focus on preterm infants of varying gestations, because there are not enough data about the benefits, especially in very and extremely preterm neonates. Empowering and training staff and parents alike can help to overcome the barriers and technical challenges of providing all neonates with early SSC, including those born at very low gestational ages.

CONFLICT OF INTEREST

The authors have no conflicts of interest to declare.

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SUPPORTING INFORMATION

Additional supporting information may be found online in the Supporting Information section.

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