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Initiation and extent of skin-to-skin care at two Swedish neonatal intensive care units

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ABSTRACT

Aim: To describe initiation and extent of parents' application of skin-to-skin care (SSC) with their preterm infants at two Swedish neonatal intensive care units.

Methods: The duration of SSC was recorded in 104 infants' medical charts during their hospital stay, and the parents answered a questionnaire.

Results: Both parents were involved in the practice of SSC. Three infants experienced SSC directly after birth, 34 within 1 h, 85 within 24 h and the remaining 19 at 24–78 h postbirth. SSC commenced earlier (median age of 50 min) in infants whose first SSC was with their father instead of with their mother (median age of 649 min: $p < 0.001$). The earlier the SSC was initiated, the longer the infant was cared for skin-to-skin per day during his/her hospital stay ($p < 0.001$). The median daily duration of SSC was 403 min.

Conclusion: Early initiation of SSC had positive impact on the extent of parents' application of SSC. Even though the infants in this study were cared for skin-to-skin to a high extent, there is a potential for extended use of SSC in this type of hospital setting for reducing separation between infants and parents.

BACKGROUND

The Kangaroo Mother Care (KMC) method consists of early, prolonged and continuous (or for as long and as often as circumstances permit) skin-to-skin care (SSC) (Photo 1) between the low-birth-weight infant and his/her mother, or a substitute for her, such as the father or a relative. Other components of KMC include ideally exclusive breastfeeding, early discharge and appropriate follow-up (1). SSC between the infant and its parents is the component of KMC that provides an alternative to conventional neonatal care where the infant is placed in an incubator (2) and thus reduces separation between the infant and its parents (3). Separation from the infant is one of the most stressful aspects for parents with infants that need care at a neonatal intensive care unit (NICU) (4,5), and not being able to hold the infant is especially stressful (6).

From a parent perspective, SSC facilitates parent–infant bonding (7,8) and empowers mothers in the breast-feeding process (9). From an infant perspective, KMC is associated with a reduced risk of infant mortality, nosocomial infections, hypothermia and length of hospital stay (10). Studies on both the KMC method and SSC as a separate caregiving procedure differ considerably regarding the time of initia-

Photo 1: Preterm infant cared for with SSC

Key notes

- With early initiation of skin-to-skin care, the infant was cared for longer with skin-to-skin care per day during hospital stay.
- Infants who commenced skin-to-skin care with their fathers experience skin-to-skin care earlier in life and had a longer total duration of skin-to-skin care during hospital stay than those started with their mother.
- There is a potential for extended use of skin-to-skin care in this type of setting for reducing separation between infant and parents.

tion and duration of the SSC. For example, initiation of skin-to-skin contact can start immediately after birth (2) or after stabilization of the infant (11). One Swedish survey of extremely preterm infants (12) found a wide range in age when infants experienced their first skin-to-skin contact, with a median of six post-natal days and a range from 0 to 44 days. There were also significant differences between the hospitals included in terms of infant age at initiation of SSC. Reports of the extent of application of SSC also vary from 20 min/day (13) to 1 h/day (11), up to 24 h/day (8,14).

However, most studies on parents' initiation of SSC and the duration of SSC have been performed in low-income settings, often included as one component in the KMC method, and there is a lack of studies reporting when parents in an affluent Western society initiate SSC and to what extent they choose to perform SSC. Therefore, the aim of this study was to describe when parents initiated SSC and the extent of SSC application during hospital stay in two Swedish NICUs. The research questions addressed were as follows: Who provided the SSC? When was SSC initiated, and what factors influenced the time of initiation? To what extent was SSC practised during the infants' hospital stay, and what factors influenced the extent of SSC?

METHODS

Design

This descriptive and explorative study from two Swedish NICUs is part of a longitudinal project investigating different aspects of KMC.

Study settings

This study was conducted in the level III NICUs at two Swedish university hospitals (NICU A and B). At both units, mothers and fathers were encouraged to spend time with their infant, participate in the infant's care and provide the infant with SSC as much as they wanted to and found possible, even though NICU A had a longer experience of KMC and parental participation.

Neonatal intensive care unit A was a referral unit that cared for both preterm infants and infants with surgical illness. It had three open-bay intensive care rooms, each with four care spaces with an adult bed and privacy screens to facilitate the parents' presence with their infant 24 h/day. The unit also had nine single-family rooms, where both parents and siblings could stay together with the infant during the infant's entire hospital stay and provide the infant's care with support from the nursing staff. There were no visiting restrictions for parents, siblings or relatives. Thus, NICU A offered 20 care places, of which 12 were for specialized intensive care. NICU B had one open-bay intensive care nursery with care spaces for five infants. Each care space included one or two arm chairs/recliners with footstools, where parents could sit holding their infant. There were three parent rooms, where one or both parents could room in with their infant a few nights before discharge. The parents could spend as much time together with their infants as they wished during daytime. There were no visiting restrictions for parents' visits, but visits by siblings and relatives were restricted. Thus, NICU B had seventeen care places, of which five were for intensive care. Both units applied a care strategy involving early discharge with continued support and follow-up from the NICU: this could occur from a postmenstrual age of about 34–35 weeks.

The parents' presence at the NICUs was facilitated through the Swedish national insurance system; hospital care for all children is free of charge, and both parents can share parental benefit for 480 days per child to take care of their children (15). In addition, both parents of an infant requiring neonatal intensive care are entitled to 'temporary parental benefit' until the infant is formally discharged; this means that during the infant's whole NICU stay, both parents have the legal right to be together with their infant at the NICU.

Participants

The study population consisted of a consecutive sample of singleton infants born at a gestational age (GA) ranging from 28 + 0 to 33 + 6 weeks + days. Their parents were recruited from October 2008 to September 2010. The inclusion criteria were the infant should be cared for at the same NICU from birth to discharge, the parents had mastered the Swedish language and the infant should be a singleton without any life-threatening illness, not having reached the age of 3 days. Of the 244 eligible infants during the study period, 121 infants did not meet the inclusion criteria. Of the 123 infants fulfilling the inclusion criteria, 19 were excluded: one infant died unexpectedly, nine parents were approached for invitation to the study too late, the parents of one infant did not manage to complete the questionnaires and record the SSC time, and the parents of eight infants declined participation. Thus, the final sample consisted of 104 infants and their parents (Fig. 1).

Data collection

The time and initiation (in minutes) of SSC and who provided this care were recorded continuously in the infants' medical charts during the infants' hospital stay, by either the parents or the NICU staff. The reliability of parents' registrations of the time spent with SSC had been assessed prior to the study (16).

Infant data such as GA, birth weight, medical diagnoses, treatment and length of hospital stay were obtained by reviewing the infants' medical charts and the Swedish PeriNatal Quality register (PNQ; MedSciNet AB, Stockholm, Sweden), a national register to which both units continuously report all inpatients. Maternal and paternal socio-demographic factors such as level of education, marital status, siblings and smoking were collected through a questionnaire completed individually by the parents during the infants' stay at the NICU.

Data analysis

Data were analysed with the Statistical Package for the Social Sciences (SPSS) version 20.0 (SPSS Inc., Chicago, IL, USA). Chi-square and Mann–Whitney *U*-tests were used for compar-

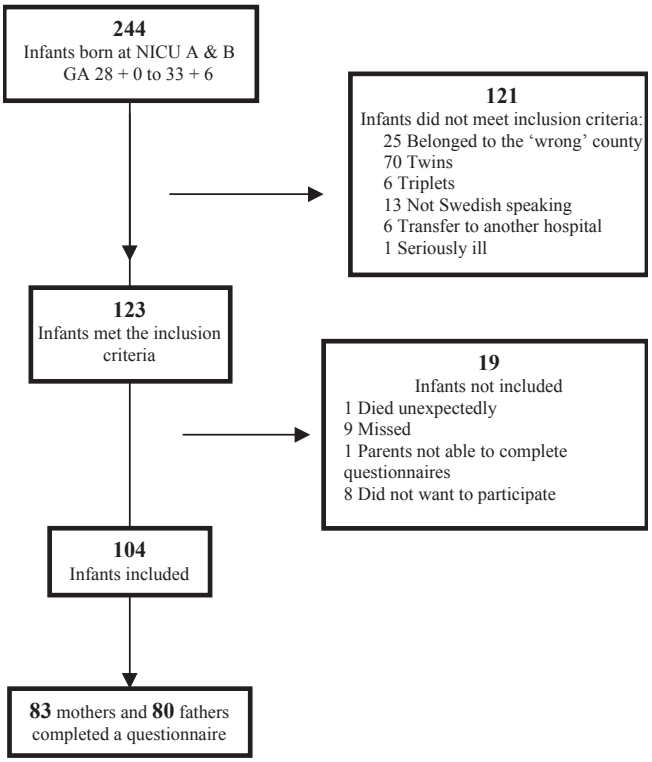

Figure 1 Flow chart of study design: infants (both included and not included) and their parents.

ison of independent samples and Wilcoxon's signed rank test for related samples. Pearson's correlation was used for correlation analyses. A p-value of <0.05 was considered significant.

RESULTS

Infant and parent characteristics

Among the infants that met the inclusion criteria, the infants included had a slightly lower GA at birth than infants not included in the study (Table 1). However, there were no differences in the frequency of caesarean section between included and not included infants, whether the infant had experienced an infection episode or not, or needed ventilator treatment. Infants not included had fewer days with continuous positive airway pressure (CPAP) treatment than the included infants.

Eighty-three mothers (80%) and 80 fathers (77%) completed the questionnaire about socio-economic factors. The majority of the mothers of the infants included had a university education, whereas most of the fathers had high school education (Table 2). Most parents had been born in Sweden and had Swedish as their native language. There were no differences between the parents with infant at NICU A and those at NICU B regarding parent's age, education or country of birth, nor were there any differences in the included infants' GA between the two units.

Factors with and without influence on the use of SSC

Three factors were considered in terms of their possible influence in infants' experience of SSC: the first provider of SSC, the time of initiation of SSC and the time per day spent in SSC. These were compared with sets of variables clustered together as factors related to birth, factors related to the provision of SSC and parental characteristics. A summary of the effect of these influences is provided in Table 3.

Identity of person providing the infant with SSC

Fifty-four infants had their first SSC session with the mother, 48 with the father and one with a maternal aunt; information was missing for one infant. There were no differences between infants starting SSC with their father and those starting with their mother regarding factors relating to the birth, such as mode of delivery, GA at birth, Apgar, infant gender and birth weight. There were also no differences regarding the parents' age, level of education or country of birth, or the presence of siblings in the family. However, there was a difference between the hospitals in terms of which parent first performed SSC: fathers were the first person to provide SSC for more infants at NICU A (33 of 49 infants) than at NICU B (15 of 55 infants; $p < 0.001$).

For all infants, both mothers and fathers were involved in KMC. However, the infants spent more time with SSC per day with their mothers than with their fathers, except during the infants' first 3 days of life, when there was no difference. During the hospital stay, 10 of the 104 infants were occasionally cared for with SSC with a significant

Table 1 Characteristics of infants (both included and not included)

	Included (n = 104)		Not included (n = 19)		
Variables	n	Median (range)	n	Median (range)	p
Gestational age, weeks	104	32.1 (28.4 to 33.9)	19	33 (28.7 to 33.9)	0.037
Birth weight, g	104	1835 (740 to 2920)	19	1865 (936 to 3160)	NS
Birth weight, SDS	104	−0.6 (−4.2 to 2.6)	19	−0.2 (−3.62 to 2.8)	NS
1 min Apgar	104	9 (1 to 10)	19	9 (5 to 10)	NS
5 min Apgar	104	10 (2 to 10)	19	10 (6 to 10)	NS
10 min Apgar	104	10 (5 to 10)	19	10 (8 to 10)	NS
PMA full breastfeeding	53	35 (32.2 to 37.7)	7	34.9 (33.1 to 36.3)	NS
Days in hospital care	104	29 (13 to 76)	19	26 (2 to 165)	NS

SDS = standard deviation score; PMA = postmenstrual age in weeks; NS = non-significant.

Table 2 Parent demographic characteristics

	n	Mother	n	Father
Age, median (range)	83	31.3 (19–42)	80	32 (24–56)
Children at home	37		34	
Smoker, n (%)		3 (3.6)*		4 (5.1)
Snuff user, n (%)		1 (1.2)*		19 (24.4)
Married/cohabiting, n (%)		83 (100)		79 (100)
Level of education	83		80	
Elementary school, n (%)		4 (4.8)		9 (11.3)
High school, n (%)		30 (36.1)		49 (61.3)
College/university, n (%)		49 (59)		22 (27.5)
Occupation	83		78	
Employed, n (%)		52 (62.7)		57 (73.1)
Entrepreneur, n (%)		6 (7.2)		13 (16.7)
Student, n (%)		11 (13.3)		2 (2.6)
Unemployed, n (%)		9 (10.8)		3 (3.8)
Other, n (%)		5 (6)		3 (3.9)
Native language				
Swedish, n (%)	83	68 (81.9)	80	74 (92.5)
Country of birth				
Sweden, n (%)	83	68 (81.9)	79	72 (91.1)

*Recorded during pregnancy.

other, such as the maternal grandmother, the infant's older siblings and the maternal aunt.

Initiation of SSC

Three infants experienced SSC directly after birth, 34 within 1 h and 85 within 24 h; for the remaining 19 infants, KMC was initiated at 24–78 h postbirth. For one infant, the exact time of initiation of SSC was not recorded. The infants' first experience of SSC occurred at a median (range) age of 344 min (0–4680) after birth. Seventy-six of the infants were born during the daytime (6 AM–before 10 PM) and 28 during the night (10 PM–before 6 AM); however, time of birth did not affect the infants' age at initiation of SSC. Similarly, mode of delivery (56 infants were born by caesarean section and 48 vaginally) did not affect the infants' age at initiation of SSC.

Infants whose first SSC was with their father commenced SSC earlier in life (median age of 50, range 0–1823 min) than those who started with their mother (median age of 649, range 0–4680 min; $p < 0.001$).

Infants born preterm (GA 32 + 0–33 + 6, n = 55) commenced SSC earlier (median age of 109, range 0–1833 min) than infants born very preterm (GA 28 + 0–31 + 6, n = 47; median age of 639, range 5–4680 min; $p < 0.002$). A higher gestational age at birth correlated with earlier exposure to SSC ($r = 0.415$, $p < 0.000$; Fig. 2), and higher birth weight correlated with earlier first experience of SSC ($r = 0.376$, $p < 0.001$).

The SSC commenced later for infants with respiratory distress (n = 68; median age of 463, range 0–4680 min) than for infants without this diagnosis (n = 36; median age of 62, range 0–2654 min; $p < 0.014$). Infants with at least one infection episode in hospital (n = 15) had their first skin-to-skin contact later (median age of 825, range 46–4680 min) than those who did not have any infection (median age of 205, range 0–2654 min; $p < 0.008$).

The infants' age at introduction of SSC was dependent on birth hospital. At NICU A, the infants' skin-to-skin care commenced earlier (median age of 55, range 0–2033 min) than at NICU B (median age of 639, range 0–4680 min;

Table 3 The influence and lack of influence of possible influencing factors on infants experience of SSC

Variable	First provider of SSC (mother/father)	Initiation of SSC	Time spent with SSC per day
Factors related to birth			
Time of birth (day or night)	Nd	Nd	Nd
Caesarean (vs. vaginally)	Nd	Nd	Nd
Apgar score	Nd	Nd	Nd
Preterm (vs. very preterm)	Nd	Earlier initiation	Nd
Higher (vs. lower) gestational age	Nd	Earlier initiation	Nd
Infant gender (male/female)	Nd	Nd	Nd
Higher (vs. lower) birth weight	Nd	Earlier initiation	Longer time
No respiratory distress (vs. respiratory distress)	Nd	Earlier initiation	Longer time
No infection (vs. infection episode)	Nd	Earlier initiation	Longer time
Infant received phototherapy	Nd	Nd	Nd
Factors related to provision of SSC			
NICU A (vs. B)	More fathers	Earlier initiation	Longer time
Father first provider of SSC (vs. mother)	—	Earlier initiation	Longer time
Earlier initiation	—	—	Longer time
Parental characteristics			
Parents' age	Nd	Nd	Nd
Parents' level of education	Nd	Nd	Nd
Parents' country of birth	Nd	Nd	Nd
Smoking/snuff use	Nd	Nd	Nd
Siblings at home	Nd	Nd	Nd

SSC = skin-to-skin care; Nd = No difference; NICU = neonatal intensive care unit.

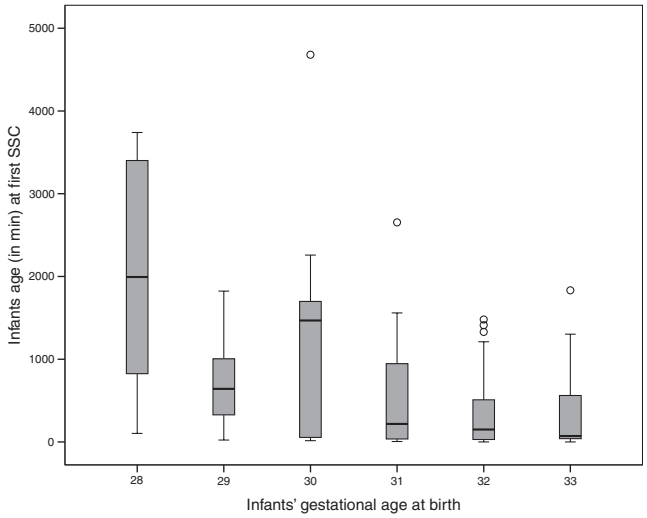

Figure 2 Box plot of the time of initiation of SSC in relation to the infants gestational age at birth.

$p < 0.001$). There were no differences in incidence of respiratory distress or infection episodes between the two hospitals.

SSC during the infants' hospital stay

There was a wide range in the time the infants spent with SSC (Fig. 3). Fourteen infants spent 1440 min skin-to-skin, that is, around the clock, for a few days during their hospital stay. All these infants were cared for at NICU A. The time spent with SSC for all infants was a median of 403 min/day (range 67–1284) during their whole hospital stay.

The earlier the SSC was initiated, the more the infant was cared for with SSC per day during his/her hospital stay ($r = 0.444$, $p < 0.001$). Infants whose first experience of SSC was with their fathers (n = 48) spent more minutes skin-to-skin during their hospital stay (median 697, range 148–1284 min) than infants who started the SSC with their mothers (n = 54: median 346, range 67–1189 min; $p < 0.001$). Infants with higher birth weight were cared for skin-to-skin for longer periods per day during the hospital stay ($p < 0.028$). On the contrary, infants with respiratory distress (n = 68) experienced fewer minutes with skin-to-skin contact per day (median 371, range 67–1228 min) during their hospital stay than infants without this diagnosis (n = 36: median 502, range 174–1284 min; $p < 0.013$).

The infant's GA at birth, the time of the infants' birth (daytime or night-time), phototherapy treatment or an infection period did not affect the extent of time spent skin-to-skin per day in hospital. Similarly, the parents' age, level of education, country of birth, smoking/snuff use or the existence of siblings at home did not affect the amount of SSC per day. Furthermore, infants born at NICU A (n = 49) spent more time skin-to-skin per day (median 894, range 101–1284 min) than those in NICU B (n = 53; median 345 range 67–778 min; $p < 0.001$).

DISCUSSION

This study is one of the first studies describing the initiation and extent of application of the SSC component in the

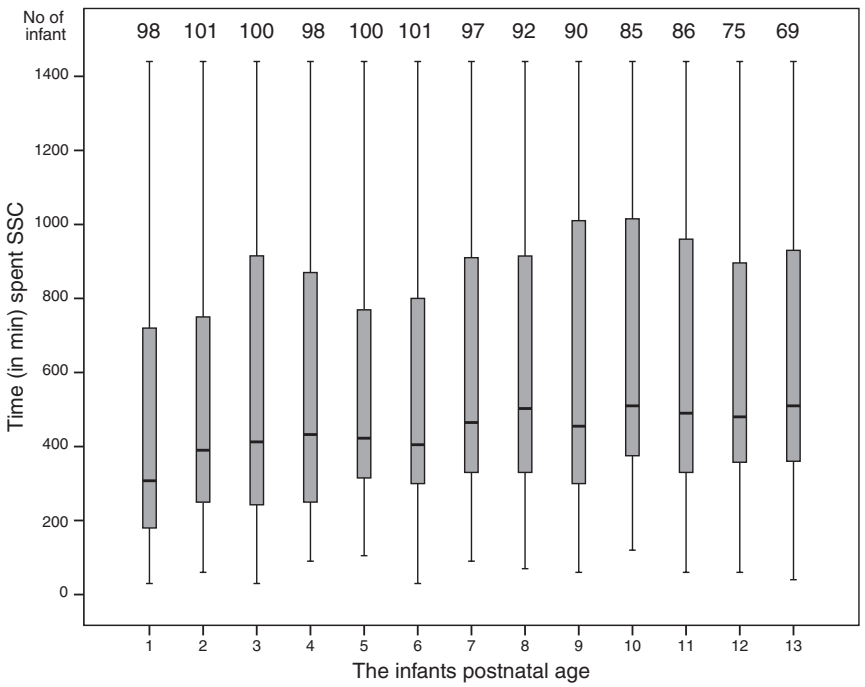

Figure 3 Box plot showing the time in minutes with SSC at the infants postnatal age of 1–13 days.

KMC method during the infants' whole hospital stay at high-tech NICUs in an affluent Western society.

With earlier initiation of SSC, the infant received more SSC per day during his/her hospital stay. Further, we found a difference in both initiation of SSC and time spent with SSC between the two studied NICUs. Similar differences in time of initiation and duration of SSC between the units in our study were also found by Mörelius et al. (12) in their survey of Swedish regional hospitals. The reasons for these differences could only be speculated, but a plausible explanation was the differences between the units in terms of the physical environment, staff attitudes, knowledge and experiences, and routines for SSC initiation. The staff at NICU A had a longer and more frequent experience of SSC, and the NICU had parent beds in each infant's care space, which allowed at least one parent the opportunity of being together with the infant around the clock. This indicates that the physical environment at an NICU may exert a powerful influence on the extent of parents' application of SSC. If the NICU environment, even in a high-tech NICU, emits signals that invite and facilitate parents' unrestricted presence and participation in their infants' care, this will enhance the parents' willingness to use SSC and feel comfortable with this. Further, if NICU staff members experience that SSC improves the well-being of both infant and parents and realize that SSC can be perceived as professionally gratifying, this will influence their attitudes and render staff more open-minded and positive regarding SSC (17,18). Furthermore, many NICU staff members have extensive experience caring for preterm infants in incubators and are comfortable with the capacity of an incubator to maintain an infants' temperature reasonably stable in the thermo-neutral zone (19). However, when staff members gain more experience of SSC for infants, they are likely to feel just as comfortable with this. Thus, a desirable goal is for all NICU staff to acquire the knowledge, motivation and capacity to advocate, promote and assist parents in commencing SSC with their infants early after birth, even in environments with sufficient resources for providing conventional high-tech incubator care. This will reduce the separation time between the preterm infants and their parents.

The initiation of the SSC occurred later for infants with respiratory distress than for those without this diagnosis, and they were granted less time with SSC. Other researchers have also found that infants who had at least one infection episode during their hospital stay commenced SSC later than those without any infection. There is also an association between the number of days with ventilator treatment and a delay in infants' first skin-to-skin contact (12). In addition, infants with a birth weight between 1200 and 2199 g and an Apgar score of at least 6 at 5 min, who are cared for skin-to-skin from birth, appear more stable than those in incubator care (2). Currently, there is however insufficient evidence to support this kind of explanation of cause and effect. To investigate the effects of SSC adequately, randomized, controlled studies are required to identify different patterns of SSC application and determine which have optimal effects on infants' health. NICU staff have a crucial role in the initiation of the SSC, as they decide when SSC should take place. As long as there are concerns among NICU staff about the safety and applicability of SSC (20), the differences regarding initiation and duration of SSC among hospitals and infants with various medical diagnoses and treatments will remain.

Infants who commenced SSC with their fathers had their first experience of SSC earlier in life and had a longer total duration of SSC during their hospital stay than infants who started SSC with their mother. Separation from the infant is one of the most significant stressors reported by fathers of preterm infants (4), and their feeling of love for their infants coincided with the time they first held their infant (21). Furthermore, fathers of preterm infants describe a desire to take an active part in their infants' care (22), and SSC increases the fathers' involvement in their infants' daily routine care at home after discharge (23). Our results are in contrast to those of Gloppestad (24), who found that fathers saw their infant earlier than the mothers; nevertheless, they held their infants skin-to-skin significantly later than the mother. In accordance with recommendations by Tessier et al. (23), our findings corroborate the importance of involving both parents in their infant's care immediately after birth. If the mother, for some reason, is unable to have the infant skin-to-skin after the delivery, the father is the best alternative to offer his infant SSC. One explanation for the results could be that through the use of SSC, the fathers felt more involved in their infants' care and gained confidence in their paternal role, as was found in an interview study with a limited number of fathers (25).

In this study, infant or parental characteristics did not influence either the infants' age for initiating SSC or the total time spent with SSC during the infants' hospital stay. However, the hospital in which the infant was born had a strong influence on the early initiation of SSC. The duration of SSC was not affected by the presence of siblings in the family, which was in contrast to the findings of Flacking et al. (9). One possible explanation was that parents shared the task of performing SSC with each other in our study, and thus, the other parent could be with the siblings.

This study was based on data documented in medical charts and from a parental questionnaire. The outcome measure of the time the infants were cared for with SSC was documented by the staff or the parents. Although it could be assumed that parents either over- or underestimated the time they spent with SSC, depending on the circumstances, parents are capable of performing this documentation as well as the staff (16).

The KMC method and SSC are gaining increasing attention in modern Western neonatal intensive care units. Although this study generated new knowledge about SSC, it had several limitations. The parents included in the study practised SSC to the extent they wanted and the circumstances allowed; thus, the results do not permit generalization. Furthermore, the KMC method *per se* is difficult to study in a randomized, controlled trial model, as the different components in KMC (skin-to-skin contact, breast-

feeding and parent participation in the infant's care) are aspects subject to individual preferences that cannot be controlled. Therefore, the use of a randomized, controlled trial design was considered unethical in a setting that encouraged parents' unrestricted practice of SSC.

In conclusion, early initiation of SSC has a positive impact on the time parents care for their infants with SSC during the infants' hospital stay. Even though the infants in this study were cared for skin-to-skin to a high extent (to a median of 403 min/day during their whole hospital stay), there is a potential for extended use of SSC in this type of hospital setting for reducing separation between the infant and his/her parents.

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CONFLICT OF INTEREST

We have no conflict of interest to declare.

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