



Does parental involvement affect the development of feeding skills in preterm infants? A prospective study

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ABSTRACT

Background: Feeding difficulties frequently occur in preterm infants, thus contributing to delayed growth and hospital discharge.

Aims: To evaluate the effect of Kangaroo mother care implementation and parental involvement in infants' feeding on the timing of achievement of full oral feeding in preterm infants.

Study design.

Prospective, observational, single-centre study.

Subjects: A total of 81 infants born at a gestational age ≤ 32 weeks, consecutively admitted to a tertiary neonatal unit between June 2014 and May 2015.

Outcome measures.

The timing of the achievement of full oral feeding of preterm infants.

Results: Full oral feeding was achieved at a mean postmenstrual age of 35.5 ± 2.1 weeks. A multiple linear regression analysis showed that a low birth weight, the occurrence of bronchopulmonary dysplasia, and the need for gastrointestinal surgical procedures were associated with a higher postmenstrual age at achievement of full oral feedings. By contrast, the earlier that parents fed their infants and the earlier that Kangaroo mother care was started, the lower the postmenstrual age at the achievement of full oral feeding.

Conclusions: These findings indicate that an early start of Kangaroo mother care and early parental involvement in infants' feeding positively affect the achievement of independent oral feeding.

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1. Introduction

Preterm infants, especially infants born at a low gestational age and birth weight and/or those affected by co-morbidities [1], are at a high risk of feeding difficulties because of the immaturity of many physiological functions, including the capacity of coordinating suckling, breathing and swallowing [2]. As a consequence, in early postnatal life, preterm infants often need some degree of tube feeding before transitioning to independent feeding by mouth. However, the use of alternative feeding routes could further hinder the development of adequate feeding skills

[3]. In addition, the sucking patterns of preterm infants, when they reach term-corrected age, could be less coordinated and less vigorous than those of full-term infants [4]. The neonatal intensive care unit (NICU) environment is challenging for the preterm infant because it represents an extremely intrusive setting where he/she is exposed to non-physiological stimuli, such as bright light, noise and painful procedures, which negatively affect the development of the preterm infant brain, including the attainment of postnatal maturation of oral motor skills [5].

The difficulties experienced by preterm infants in attaining independent oral feeding represents a rising concern for neonatologists because these difficulties contribute to the development of postnatal growth retardation, which remains a relatively common universal finding in NICUs, and contribute to delays in hospital discharge [6,7]. According to the American Academy of Pediatrics⁶, the ability to feed exclusively by mouth is a precondition for hospital discharge. Sucking difficulties could persist even beyond term-corrected age and are associated with preterm infants' adverse neurodevelopment outcomes later in life [7].

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Family-centred care (FCC) has been recognized to play an important role within neonatal care because it is associated with better infant outcomes, a reduction of parental stress and enhancement of parental bonding [8]. According to this model of care, parents are involved in the care and in the decision-making about their infant's care. Kangaroo mother care (KMC) is one of the essential tenets of FCC. Its implementation in the NICU has been associated with cardiorespiratory and temperature stability, improved head circumference growth, increased and earlier attainment exclusive breastfeeding and brain maturation [9–11]. The importance of teaching parents to observe and interpret their infant's behaviour is widely acknowledged [10,12]. Specifically, with regard to feeding, the “cue-based” oral feeding, which is the ability of recognizing signs of readiness for feeding and signs of distress that occur during feeding, has been reported to enhance the development of preterm infants' oral skills, allowing the infant to learn to feed efficaciously and safely [13].

Although FCC has been advocated and parents are regarded as critical collaborators in the provision of individualized, developmentally supportive care of their baby, there is a paucity of data on the effect of parental involvement on the timing of achievement of independent oral feeding by preterm infants. The aim of the current study was to evaluate the effect of KMC implementation and parental involvement in feeding their infants on the timing of achievement of full oral feeding in a cohort of preterm infants.

2. Methods

2.1. Study design and participants

We conducted a prospective, observational, single-centre study unit. Approval from the institutional review board of Fondazione Istituto di Ricovero e Cura a Carattere Scientifico Cà Granda Ospedale Maggiore Policlinico and written informed consent from the infants' parents were obtained. All consecutive newborns admitted to the tertiary neonatal unit of the authors' institution between June 2014 and May 2015 were screened for eligibility. Infants were enrolled at birth, and the inclusion criteria were a gestational age of ≤ 32 weeks and Caucasian race. The exclusion criteria were known congenital and/or chromosomal diseases, death during hospitalization, and transfer to another institution.

2.2. Setting

NICU was organized as an open-bay environment, with the bassinets around the perimeter of a large room, with the availability of a comfortable chair for the caregiver next to each bassinet. To promote early parental involvement in their infant's care, NICU access was unlimited. At the infants' admission to NICU, the parents were welcomed and introduced to the basic NICU resources. Efforts were placed by all health care professionals on promoting infant-parent interaction, including postural care, KMC and breastfeeding. The parents were supported in understanding their infant's behaviour, including feeding cues, and in taking part in caregiving activities and feeding. Specifically, KMC was provided every day by the mother or the father as soon as the infant became haemodynamically stable. The infant was placed upright, in a chest-to chest position, clad only in a diaper and hat, with arms and legs adducted and head turned sideways. The session lasted for a minimum of 90–120 min. The mothers were encouraged by the NICU staff to give drops of their milk during KMC. On infants' stable conditions, mothers were encouraged to breastfeed their infants even for a short time. The feeding practices, including lactation counselling, are detailed elsewhere [14,15]. Briefly, nurses, after having provided verbal information regarding the human milk benefits both for preterm newborns and their mothers, instructed mothers on how to initiate milk expression and collection and supported mothers while expressing milk manually or by electric pumping several times a day. Concurrently, parenteral

nutrition and minimal enteral feeding, that is, the provision of a milk feeding volume ≤ 20 ml/kg/day, were started immediately after birth. When enteral feeding reached a volume > 100 ml/kg/day, individually tailored fortification of human milk and/or preterm formula was provided. Oral feeding was started on the basis of infant's feeding-readiness cues, and feeding advancement was performed according to the infants' cardiorespiratory stability and feeding tolerance. Before discharge, if parents were doubtful and scared about taking care of their infants, a 3–5 days stay in the family room available at our NICU was planned to facilitate a full parents' training aimed to support breastfeeding and to provide advice in continuing or starting breastfeeding at home.

2.3. Data collection

A record was made of the following neonatal variables: gestational age at birth, birth weight, gender, singleton pregnancies, mode of delivery, 5-minute APGAR score, length of hospital stay and postmenstrual age (PMA), which is the gestational age plus the time elapsed after birth (chronological age) at the time of discharge. The gestational age was based on the date of the last menstrual period and early ultrasound examination. The infants with a birth weight < 10 th percentile or ≥ 10 th percentile for gestational age on the basis of Fenton's growth chart [16] were classified as being either small for gestational age (SGA) or appropriate for gestational age (AGA), respectively. The use of pre- and post-natal steroids, surfactant therapy and inotropic agents were also recorded.

The presence of the following co-morbidities was collected: haemodynamically significant patent ductus arteriosus (PDA), classified on the basis of the McNamara and Sehgal staging system [17]; necrotising enterocolitis (NEC) of stage 3 or higher [18]; any condition requiring surgery; retinopathy of prematurity (ROP) of stage 3 or higher [19]; intraventricular haemorrhage of stage 3 or higher (IVH) [20]; periventricular leukomalacia of grade 2 or higher, defined as the combined presence of focal necrosis in the periventricular region and diffuse reactive gliosis in the surrounding white matter [21]; sepsis defined as the presence of a positive blood culture; and mild, moderate and severe bronchopulmonary dysplasia (BPD), classified according to Jobe and Bancalari [22].

The day of postnatal life on which KMC was started was recorded. A record was also made of the postmenstrual age when enteral feeding (defined as a milk feeding volume > 20 ml/kg/day) and oral feeding (defined as the consumption of at least 5 ml of milk within 24 h, directly at the breast or by a bottle) were begun and the postmenstrual age at which full oral feeding (defined as the consumption of all the milk feeds, at the breast or by a bottle) was achieved. The length of enteral feeding, which is the number of days during which any milk feeding was given by the enteral route, was also recorded. The nurses were instructed to report in the infants' computerized medical charts the postmenstrual age at which parents started to feed their infants (at least 5 ml of milk within 24 h). The number of times per day that the parents fed their infants was also recorded. The median values of the number of times per day that the parents fed their infants from starting oral feeding to full oral feeding was then calculated. The type of feeding (directly at the breast, exclusively by bottle, or a mixture of both) and the feeding status at discharge (according to the World Health Organization's definition of exclusively human milk, any human milk, or exclusively formula) were also collected.

2.4. Statistical analysis

The data are expressed as the mean values and standard deviations or as the number and percentage of observations.

For the analysis, infants developing intraventricular haemorrhage and/or periventricular leukomalacia and those developing retinopathy of prematurity were pooled together and classified as being affected by neurosensory diseases.

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