Frequency of Premature Infant Engagement and Disengagement Behaviors During Two Maternally Administered Interventions ☆

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Although sensitive maternal behaviors improve later quality of mother-infant interaction and subsequently infant development, little is known regarding how an intervention might promote early premature infant social interactive behavior. This study compared the frequency of premature infant engagement and disengagement behaviors during two maternally administered interventions, the multisensory auditory, tactile, visual, and vestibular intervention (ATVV) and kangaroo care for 26 infants between 31 and 46 weeks postmenstrual age. The ATVV intervention elicited more disengagement (M = 24 vs 12, P = .0003), trended toward more engagement (M = 21 vs 15.7, P = .06) and more potent engagement (M = 24 vs 12, P = .0003), subtle disengagement (M = 25 vs 11.9, P < .0001), and potent disengagement (M = 22.9 vs 14, P = .006) behaviors than did kangaroo care. The ATVV intervention may be an intervention to promote the infant's learning how to regulate engagement and disengagement behaviors.

Keywords: VLBW infant; Premature infant; Infant behavior; Social interaction; ATVV intervention; Kangaroo care; Social competence; Mother-infant interaction

Although sensitive maternal behaviors and mother-infant synchrony are known to improve later quality of mother-infant interactions and, subsequently, infant development,[1] little is known about how interventions might promote emerging premature infant social interactive behavior, thus facilitating the infant's role in the developing pattern of mother-infant interaction.[2] Two maternally administered interventions—the multisensory auditory, tactile, visual, and vestibular intervention (ATVV) and kangaroo care (KC)—have been shown to support sleep and alert states in preterm infants as well as early growth and development.[3-7] However, few studies have examined the effects of these interventions on early infant social interactive behaviors that are likely to affect subsequent mother-infant interactions. This study compared the frequency of infant engagement and disengagement behavioral cues during two maternally administered interventions, the ATVV intervention and KC, among very-low-birth-weight (VLBW) premature infants.

Social interactive behaviors start emerging around 32 weeks postmenstrual age (PMA) for infants born prematurely.[8] One of the benefits of social interactive behaviors is that they reinforce the mother's social actions and encourage her during early interactions.[9] For example, smiling, a potent engagement behavioral cue, emerges out of attentive engagement with an interactive caregiver.[10] In premature infants, early smiling most often occurs during rapid eye movement sleep,[11,12] yet our clinical experience has been that mothers interpret the smile as an engagement cue and are likely to respond by smiling back at their sleeping infants. In older infants, smiling is a potent engagement behavior that indicates the infant's interest in initiating/maintaining social interaction.[13]

The infant's capacity to become actively engaged in a social interaction is linked to his/her ability to regulate behavior by gazing away (disengaging or withdrawing) from their interactive partners and then reengaging.[10] Ultimately, the infant's ability to control attention during social interaction supports the infant's use of smiles to initiate early communication with a partner. This engagement behavior may be an example of the emergence of early social behaviors that support dyadic responsivity and later patterns of social competence.

Early interventions that support development and, theoretically, the emergence of social interactive behaviors include the ATVV intervention and KC. The ATVV intervention (as described in more detail later) modulates infant behavioral state by influencing sleep-wake behaviors and increasing the frequency of alertness in premature infants between 32 and 35

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weeks PMA.[5-7,14-17] The ATVV intervention also has been found to improve patterns of early mother-infant interaction.[2] When performed by the mother, the ATVV intervention improved maternal sensitivity toward her infant's cues and cognitive growth–fostering behaviors. In addition, infant clarity of cues and responsiveness were significantly improved after the ATVV intervention. During the ATVV intervention, the mother provides social interaction (auditory and visual cues) and learns to modify her behavior based on the infant's engagement and disengagement cues.[9] The ATVV also offers infants the opportunity to learn social skills. Past studies have also shown that the ATVV has promising short-term benefits including improved feeding progression leading to reduced length of hospital stay.[6]

Kangaroo care, or holding the infant between the mother's breasts in skin-to-skin contact, is another popular neonatal intensive care unit (NICU) intervention.[18] Kangaroo care is a safe intervention[19-23] and results in better head growth, more positive parenting, less distress, and negative physiological responses to painful procedures and, possibly, better development than hospital care.[24-30] In developed countries, KC is used as an intervention for sicker and smaller preterm infants, which offers parents increased contact during visits. Kangaroo care has been shown to have immediate behavioral benefits for the infant, including more sleep (especially quiet sleep) and less crying, as well as greater respiratory regularity than when the infant was in the incubator[4,21,31-33] although these effects were not maintained after the end of KC.[34] Thus, KC has an immediate effect of promoting sleep but does not appear to affect overall sleep-wake patterns. When KC was used throughout hospitalization, mothers were more likely to breastfeed.[35,36]

The ATVV intervention provides infants with a greater variety of stimuli than does KC and promotes alertness, the optimal sleep-wake state for social interaction; whereas KC promotes sleep. Thus, the ATVV intervention provides more opportunities for infants to practice responding and communicating with their mothers and, potentially, to improve their neurologic development.[9] Considering the effects of ATVV and KC, it was hypothesized that the ATVV intervention would elicit more engagement and disengagement behavioral cues in the infants, whereas KC would elicit fewer of these behaviors. Therefore, the purpose of this study was to compare the frequency of premature infant engagement and disengagement behavioral cues during two maternally administered interventions, the ATVV intervention and KC.

Methods

Design

This report is part of a larger study that tested the effects of two maternally administered interventions for VLBW preterm infants on infant health and development, maternal psychological well-being, and the maternal-infant relationship. Infants and mothers were enrolled from the time the infant was no longer critically ill until the infant was 12 months of age corrected for prematurity. Mothers and infants were randomly assigned to the ATVV intervention, KC, or an attention control group. Mothers in the ATVV intervention or KC groups administered the intervention a minimum of three times weekly and were video recorded weekly during intervention sessions. Mothers in the attention control group (education about supplies needed for home care) were not included in this secondary analysis because their infants did not experience an intervention.

Setting and Sample

The research was conducted at the neonatal intensive care and intermediate care units of four hospitals: Brenner Children's Hospital in Winston-Salem, NC; Duke University Health System in Durham, NC; Mt Sinai Hospital in Chicago, IL; and Stroger Hospital in Chicago, IL. These sites were selected because they serve different populations: Brenner and Duke are southern and serve urban, suburban, and rural populations of diverse socioeconomic status, whereas Mt Sinai and Stroger Medical Centers serve a northern, urban, and low-socioeconomic-status population. Three of the hospitals have inborn infants, and all of the nurseries received infants by transport. The physical settings of the four nurseries were similar. The intensive care rooms held between 10 and 18 infants in an open room design. The convalescent rooms were also open rooms and designed to care for 6 to 8 in one room.

Infants were enrolled when they were no longer critically ill. Gestational age at birth was assessed by mother's dates and examination.[37] If a discrepancy was identified between the mother's dates and the gestational age examination, gestational age was determined by the examination. For this secondary analysis, the first 26 mother-infant pairs were analyzed.

Data from 13 mother-infant dyads from North Carolina (7 KC and 6 ATVV) and 13 mother-infant dyads from Chicago (6 KC and 7 ATVV) participated in this analysis. The participants ranged in age at birth from 21 to 32 weeks' gestation, with a mean of 27 weeks. Birth weight ranged from 490 to 1470 grams, with a mean of 900 grams. Postmenstrual age at the time of the videotapes ranged from 31 to 46 weeks during this pilot study. Weight at entry into the study ranged from 1030 to 2693 grams, with a mean of 1650 grams. Twelve infants were female, and 14 infants were male. Eighteen black, four white, and four "Other" mothers participated in the research. Maternal age ranged from 18 to 41 years, with a mean of 26 years. Seventeen mothers were primiparous, and six were multiparous. Maternal educational level ranged from 11 to 18 years, with a mean of 13 years of completed education. More mothers delivered via cesarean delivery (n = 19) than normal spontaneous vaginal deliveries (n = 7). There were no significant differences between the ATVV and KC groups on these variables (see Table 1).

Developmental Interventions

The ATVV Intervention The ATVV intervention incorporates normal maternal behaviors with standardized stimuli.[38] The