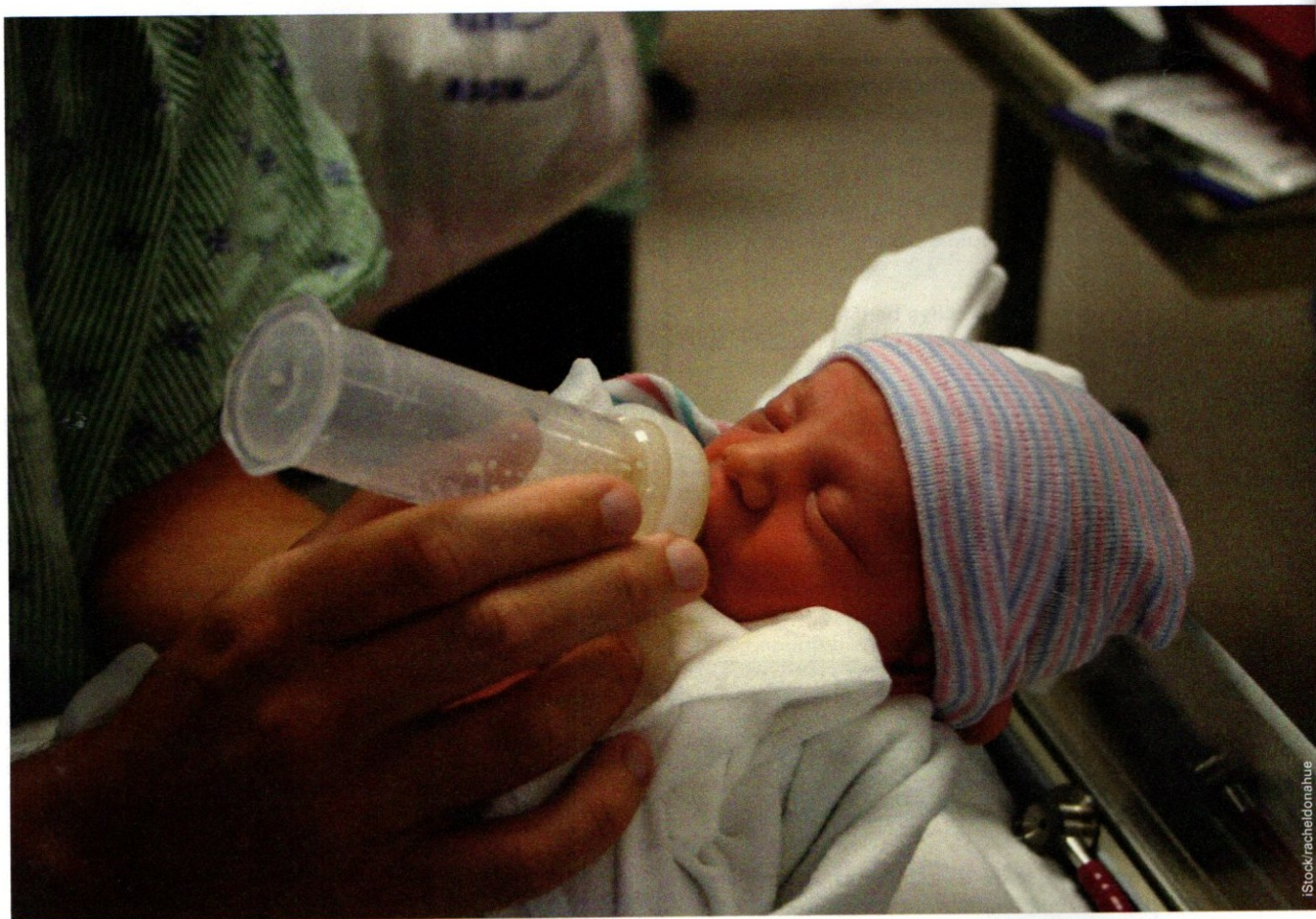




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PARENTAL PARTICIPATION IN PRETERM INFANT FEEDING IN THE NEONATAL INTENSIVE CARE UNIT

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Abstract

Purpose: To identify factors associated with parental participation in the feeding care of hospitalized preterm infants and determine associations between parental participation in feeding and infant neurobehavioral outcomes.

Study Design and Methods: Secondary analysis of data collected during a larger study of preterm infants. Parental participation in gavage and oral feeding was measured as a proportion of all feeding opportunities. Neurobehavioral outcomes were measured using a neurobehavioral assessment and feeding milestones. Other data were collected from the electronic health record.

Results: Parental participation in feeding was low. There were associations between parental participation in gavage feeding and infant sex, insurance type, maternal race, infant gestational age at birth,

and birthweight. There were associations between parental participation in oral feeding and infant sex, insurance type, maternal race, and study group. Greater parental participation in feeding was associated with earlier achievement of some feeding milestones.

Clinical Implications: Parental participation in feeding can decrease the time required for infants to achieve feeding milestones, possibly leading to decreased length of hospitalization. Nurses should encourage parents to participate in caregiving for their preterm infants. Interventions are needed to remove barriers to parental participation in caregiving.

Key words: Bottle feeding; Infant care; Intensive care; Neonatal; Parents; Premature infant.

Very preterm infants, infants born ≤ 32 weeks gestational age (GA), spend the first weeks or months of their lives in the neonatal intensive care unit (NICU). Although neurodevelopment is influenced by many factors, extended NICU stays negatively affect neurodevelopment beyond that predicted by birth gestation and medical complications (Kellner et al., 2022). Thus, timely, safe discharge of preterm infants from the NICU is important for improving long-term outcomes. Parental presence in the NICU and participation in infant caregiving are much needed components for decreasing length of hospitalization and improving clinical outcomes and neurodevelopment (North et al., 2022; Welch et al., 2015).

In the United States, parental presence in the NICU is limited by many barriers, including unavailability of long-term parental leave and other social determinants that prevent frequent, sustained presence (Powers et al., 2022). Parental stress (Caporali et al., 2020) and clinicians' attitudes (Williams et al., 2018) may deter frequent visitation or cause parents to feel unwelcome. Researchers have reported associations between parental presence in the NICU and GA, birthweight, infant sex, illness severity, length of stay, birth method, room type, availability of parental accommodations, maternal well-being, siblings, socioeconomic status, residential distance from the hospital, parental age, parental marital status, and parental race or ethnicity (Powers et al., 2022). Parental presence may not directly translate to parental participation in caregiving. Skin-to-skin contact is the most commonly measured form of parental participation in caregiving (Klawetter et al., 2019); other forms of caregiving have been studied only minimally. Anecdotally, when parents participate in routine caregiving such as feeding or bathing, they receive guidance from nurses about basic infant care and infant behavioral cues. Through one-on-one bedside teaching and participation in caregiving, parents gain skills to care for their infant at home and demonstrate readiness for discharge (Green et al., 2021).

Identifying important demographic and clinical factors associated with parental participation in NICU caregiving is critical to developing interventions to remove barriers and facilitate parental involvement. Using parental participation in feeding care as the context, an analysis was conducted to increase understanding of factors associated with parental participation in NICU caregiving and the effect of parental participation on infant outcomes. Infant feeding is a routine, life-sustaining caregiving activity that occurs with relative consistency across infants and NICUs. As a necessary and consistent routine part of caregiving that must be mastered by parents prior to NICU discharge (American Academy of Pediatrics [AAP], 2019), infant feeding provided an ideal context for measuring parental participation in NICU caregiving. The specific aims of the analysis were to identify demographic and clinical factors associated with parental participation in the feeding care of hospitalized preterm infants and determine associations between parental participation in feeding and infant neurobehavioral outcomes, including achievement of feeding milestones.

Study Design and Methods

Study Design

Data were collected from March 2012 to September 2015 as part of a randomized controlled trial (RCT) to determine the effect of a patterned tactile experience provided during gavage and oral feeding on infant neurobehavior and clinical outcomes (Pickler et al., 2020; Pickler et al., 2015). For this secondary analysis, parental participation in gavage feeding was defined as hand containment, holding out of the incubator (typically loosely swaddled), or skin-to-skin contact. Parental participation in oral feeding was defined as holding out of the incubator or in skin-to-skin contact while breastfeeding or bottle-feeding.

To address the first aim of this analysis, associations were identified between demographic or clinical predictors and proportion of gavage or oral feedings with parental participation. Selection of clinical (e.g., infant GA) and demographic predictors (e.g., infant sex, maternal race) for this analysis was based on prior research (Powers et al., 2022) and the data available from the primary study. To address the second aim, the effect of parental participation in feeding on neurobehavior was determined using feeding milestones and the alerting/orienting and motor development and vigor subscales of the Neurobehavioral Assessment of the Preterm Infant (NAPI; Korner et al., 2000).

Sample and Setting

Preterm infants ($N = 120$) born between 24- and 32 weeks GA and admitted to one of two NICUs in a Midwest city were enrolled. Infants were excluded if they had known congenital or chromosomal abnormalities; 87 infants enrolled in the RCT provided data for this analysis. These infants were admitted to one NICU built in the 1980s that was comprised of four, 10- to 12-bed open wards. Infants in the RCT who were not included in this analysis included eight who were enrolled from the second NICU where the standard of care differed significantly, 10 who were transferred to other NICUs out of the area before feeding outcome and neurobehavioral data were collected, and 15 who were excluded from neurodevelopmental analysis because of death ($n = 3$) or a late diagnosis affecting neurological outcomes such as brain injury or chromosomal abnormality. One infant had missing data on the proportion of gavage feedings with parental participation, leaving $n = 86$ for analyses of gavage feeding. Two infants had missing discharge NAPI data, leaving $n = 85$ for analyses with discharge NAPI scores.

Measures

Demographic and Clinical Predictors

Demographic data extracted from the electronic health record (EHR) used to address the first aim of this analysis included infant sex and insurance type such as private insurance, public insurance, or no insurance, which was used as a proxy measure of socioeconomic status. Other demographic data including maternal race, marital status, parity, and age, were collected by maternal report found in the EHR. Maternal race was categorized using racial and ethnic categories designated by the National Institutes of Health (NIH, 2015).

Parental participation in caregiving in the neonatal intensive care unit is essential to ensure a safe, timely hospital discharge for preterm infants.

Clinical data extracted from the EHR and used in this analysis included infant GA at birth, infant birthweight, length of hospitalization, and data to calculate the Neonatal Medical Index, a Likert-style score that categorizes infant illness severity from one (low) to five (high) based on infant birthweight, duration and type of respiratory support, and neonatal complications (Korner et al., 1993).

Feeding Milestones

Feeding milestones were collected from the EHR and included days from the first oral feeding to achievement of full oral feedings, days from first oral feeding to NICU discharge, and days from achievement of full oral feeding to discharge.

Neurobehavioral Assessment of the Preterm Infant

Neurobehavior was assessed by a trained examiner using infant performance on the alerting/orienting and motor development and vigor clusters of the NAPI (Korner et al., 2000) at the time of transition from gavage to oral feedings and prior to NICU discharge. The NAPI is a norm-referenced measure, consisting of seven “clusters” (scarf sign, alerting/orienting, motor development and vigor, popliteal angle, cry quality, irritability, percent asleep rating) that define the neurobehavioral maturity of preterm infants. Cluster scores were converted to norm-referenced z-scores based on each infant’s postmenstrual age (GA plus postnatal weeks) at the time of assessment. Scarf sign, popliteal angle, and cry quality cluster scores are each based on one infant response rated on a 3- to 5-point Likert-style scale. Irritability and percent sleep rating cluster scores are each based on two infant responses. NAPI alerting/orienting and motor development and vigor clusters were chosen for this analysis because the alerting/orienting and motor development and vigor cluster scores are based on 10 and 7 infant responses, respectively, that, when averaged, produce continuous scores.

Procedure

Infants in the RCT were randomized to receive either a tactile experience such as hand containment, holding, or skin-to-skin contact during gavage and oral feeding or standard care, which does not routinely include a tactile component in the participating NICUs (Pickler et al., 2015). Randomization was accomplished using a computer-generated randomization scheme. A trained research assistant, bedside nurse, or parent provided the tactile experience. Because it would be unethical to prohibit nurses or parents from holding or touching infants

during feeding, infants randomized to receive standard care may have received hand containment or holding during feeding. The proportion of gavage and oral feeds during which infants received a tactile experience was recorded for both groups.

The RCT was approved by the institutional review board and registered on ClinicalTrials.gov. Parents provided written informed consent for their infant’s participation following a discussion of study purpose, risks, and benefits.

Data Analysis

Measures of central tendency and variance were used to describe demographic and clinical variables. Linear regressions with robust standard errors were used to identify demographic and clinical variables associated with parental participation in gavage and oral feeding. In addition to the 10 demographic and clinical predictors, we included RCT group (intervention or control) as a predictor. Outcomes in the models included proportion of gavage or oral feedings with parental participation. Linear regressions with robust standard errors were used to determine associations between parental participation in gavage or oral feeding and neurobehavioral outcomes. Outcomes for the proportion of gavage feedings with parental participation included NAPI alerting/orienting and motor development and vigor z-scores at transition from gavage to oral feedings. Outcomes for the proportion of oral feeding with parental participation included NAPI alerting/orienting and motor development and vigor z-scores at NICU discharge and feeding milestones. STATA (version 14) was used to perform all statistical analyses with statistical significance at $\alpha < .05$. Bonferroni correction ($\alpha < .0045$) was used to adjust for multiple comparisons in the models of demographic and clinical variables associated with parental participation.

Results

Approximately half the infants in this analysis were male ($n = 44$, 50.6%) and were born at a mean GA of 30.1 weeks ($SD = 1.9$). Infants were born to mothers who were primarily White ($n = 51$, 58.6%) and had a mean age of 29.2 years ($SD = 5.9$). Table 1 shows other demographic and clinical variables analyzed for associations with parental participation in feeding. Parents participated in a mean of 6.7% ($SD = 5.4$) of their infant’s gavage feedings and a mean of 18.6% ($SD = 16.3$) of their infant’s oral feedings.

Associations with Demographic and Clinical Variables

Parental participation in gavage feeding was higher for male infants compared with female infants ($p = .023$), infants with private insurance compared to infants with public or no insurance ($p = .002$), and infants born to White mothers compared with Black mothers ($p = .008$). Parental participation in gavage feeding was higher for infants born at later GA ($p = .035$) and with higher birthweight ($p = .031$). After adjusting for multiple comparisons, only insurance type was significant. On average, the proportion of gavage feedings with parental participation was 4.1% (95% CI [1.5, 6.6], $p = .002$) higher for infants

with private insurance than for infants with no insurance or public insurance.

The average parental participation in oral feeding was higher for male infants compared with female infants ($p = .008$), infants with private insurance compared to infants with public or no insurance ($p = .027$), infants born to White mothers compared with Black mothers ($p = .003$), and infants assigned to the standard feeding care group compared with the intervention group ($p = .017$). After adjusting for multiple comparisons, only maternal race was significant. On average, parental participation in oral feeding was 9.3% (95% CI [3.2, 15.4], $p = .003$) higher for infants born to White mothers than for infants born to Black mothers.

Parental Participation in Feeding and Infant Outcomes

There was no relationship between parental participation in gavage feeding and NAPI alerting/orienting or motor development and vigor assessed at the time infants began the transition from gavage to oral feedings ($\beta = 0.029$, 95% CI [-0.0025, 0.061], $p = .071$; $\beta = -0.00024$, 95% CI [-0.025, 0.025], $p = .99$, respectively). There was an effect of parental participation in oral feeding on NAPI alerting/orienting ($\beta = -0.0094$, 95% CI [-0.018, -0.00064], $p = .036$) but not motor development and vigor ($\beta = -0.011$, 95% CI [-0.023, 0.0015], $p = .085$) at the time of NICU discharge: greater parental participation was associated with lower alerting/orienting scores.

There was no relationship between parental participation and the number of days between an infant's first oral feeding and achievement of full oral feedings ($\beta = -0.013$, 95% CI [-0.081, 0.055], $p = .71$). However, there were significant relationships between parental participation in oral feedings and the number of days from infants' first oral feedings to NICU discharge ($p = .019$) and the number of days between infants' achievement of full oral feedings and NICU discharge ($p = .015$). Although statistically significant, the reduction in time to achieve these milestones was not clinically significant: a 1% increase in parental participation was associated with a <1 day decrease in length of hospitalization from first oral feeding ($\beta = 0.09$ days, 95% CI [0.015, 0.17]) or from time of achievement of full oral feeding ($\beta = 0.077$ days, 95% CI [0.015, 0.14]).

Discussion

In this analysis, parental participation in feeding care was extremely low. Parents participated in less than 7% of their infants' gavage feedings and less than 19% of their infants' oral feedings. These findings are similar to those from a study of neonates admitted to a Canadian NICU in which maternal participation in infant feeding averaged 43.1 minutes per day (approximately 1.5 feedings or 19% of daily feedings) over the infant's first 34 days of life (Kim et al., 2021). The low percentage of parental participation in feeding, a vital caregiving

activity, is concerning, given the feeding difficulties experienced by some preterm infants and the need for parents to demonstrate mastery of infant feeding prior to their infant's NICU discharge (AAP, 2019). Although mothers of preterm infants describe gaps in their knowledge of safe feeding and indicate difficulty interpreting infant cues for feeding readiness and satiation in the first weeks after discharge, those mothers with higher levels of participation in feeding care during their infant's hospitalization are more comfortable feeding their infants at home (Reyna et al., 2006). Missing opportunities to participate in infant feeding during hospitalization may predispose infants and parents to more challenging experiences and increased risk of injury after discharge.

Although the importance of participation in oral feeding may be intuitive, parental participation in gavage feeding is no less critical to the preterm infant's optimal development. Routine, consistent touch during gavage feeding through either hand containment or skin-to-skin contact meets the infant's neurologic expectation for social touch, promotes the development of the neurologic architecture for touch perception (Bales et al., 2018; Pickler et al., 2020), and helps the infant to associate

TABLE 1. DEMOGRAPHIC AND CLINICAL VARIABLES INCLUDED AS PREDICTORS (N = 87)

	n (%)	
Infant sex		
Male	44	(50.6)
Female	43	(49.4)
Insurance type		
Private insurance	27	(31)
Public or no insurance	60	(69)
Maternal marital status		
Married	33	(37.9)
Single or separated	54	(62.1)
Siblings		
None	25	(28.7)
1–2 siblings	38	(43.7)
3 or more siblings	24	(27.6)
Illness severity ^a		
1 (low illness severity)	0	(0)
2	16	(18.4)
3	23	(26.4)
4	18	(20.7)
5 (high illness severity)	30	(34.5)
	Mean (SD)	Minimum-Maximum
Maternal age (years)	29.2 (5.9)	17–45
Infant gestational age (weeks)	30.1 (1.9)	24.9–32.9
Infant birthweight (grams)	1353.4 (373.5)	613–2143
Infant length of hospitalization (days)	46.2 (21.7)	14–106

^aIllness severity was scored using the Neonatal Medical Index (Korner et al., 1993).

CLINICAL IMPLICATIONS

- Nurses should partner with parents in the care of hospitalized preterm infants by encouraging and empowering parents to assume responsibility for caregiving and providing demonstration and support to learn important skills such as infant feeding.
- Parental participation in feeding is low and must be increased to ensure a safe, timely hospital discharge and smooth transition to home. Nurses should encourage parents to participate in infant feeding to prepare families for discharge.
- Sociodemographic factors, especially insurance type and maternal race, are associated with parental participation in feeding care. Studies are needed to determine how these factors influence parental participation in caregiving.
- Interventions are needed to remove the barriers to parental participation in caregiving. Nurses should communicate with parents to determine their specific barriers and connect families with available resources.
- Nurses should educate parents on the importance of parental participation in caregiving to improve outcomes, including earlier achievement of feeding milestones, for preterm infants.

social, comforting touch with feeding. Early physical contact between parent and infant provides the developmental and neurologic foundation for creating social bonds and demonstrating empathy in social relationships, even into adulthood (Ulmer Yaniv et al., 2021).

Our findings revealed associations between parental participation in gavage feeding and infant sex, maternal race, infant GA at birth, infant birthweight, and insurance type, as well as associations between parental participation in oral feeding and infant sex, insurance type, maternal race, and study group. Associations have been previously reported between these factors and parental presence (Powers et al., 2022) or skin-to-skin contact and holding (Pineda et al., 2018; Raiskila et al., 2017). After adjusting for multiple comparisons, only insurance type was significantly associated with parental participation in gavage feeding and only maternal race was significantly associated with parental participation in oral feeding. Because insurance type may be a proxy for socioeconomic status, parents with no insurance or public insurance for their infant may struggle to allocate funds to spend time with their infant in the hospital. Costs associated with hospital visitation, including transportation, parking, local lodging, childcare for siblings, and lack of paid maternity leave are parent-reported barriers to participation in NICU caregiving (Lewis et al., 2019). Parents from racially or ethnically underrepresented groups may feel unwelcome in the NICU; judgmental and neglectful care, particularly toward infants and parents from racially or ethnically underrepresented groups, have been reported and may

contribute to lower levels of parental presence and engagement with nurses and other members of the clinical team (Sigurdson et al., 2018). In a study of parental satisfaction with NICU care, Black mothers reported more dissatisfaction with the nurse–parent relationship than did White mothers, who more commonly reported dissatisfaction with inconsistency in care providers (Martin et al., 2016). Some of the dissatisfaction reported by Black mothers may be related to communication between nurses and parents, which some Black mothers, but not White mothers, describe as demeaning and dismissive (Glazer et al., 2021).

Ultimately, parental presence and participation in caregiving may reduce the length of hospitalization (North et al., 2022) and improve outcomes (North et al., 2022; Welch et al., 2015). Although the effect of parental participation on achievement of feeding milestones was small in this analysis, it suggests that small increases in parental participation in feeding such as one additional feeding per day may reduce the time between the initiation of oral feedings and hospital discharge by 1 day. For most preterm infants, the ability to sustain adequate growth through oral feeding is a prerequisite for NICU discharge (AAP, 2019).

There was a negative association between parental participation in oral feeding and NAPI alerting/orienting scores, although this difference was not clinically significant. Given that there were no other associations between parental participation in feeding and NAPI scores, this could be a spurious finding. Alternatively, there may be important demographic, clinical, or interpersonal factors that affect the quality of parent–infant interactions during feeding and subsequent neurobehavior.

There are several limitations of this analysis. Because this was a secondary analysis, analyses were limited to data that had already been collected. Although much data were collected about maternal demographics, there were no specific data about fathers or other caregivers, and data on parent participation in feeding did not distinguish between mothers and fathers. Due to sample size, analyses controlling for potential confounders were not possible.

Clinical Nursing Implications

Findings reveal that parental participation in infant feeding is extremely low and is associated with important sociodemographic factors, especially insurance type and maternal race. Although the reasons for differences in parental participation in feeding between those with private insurance and those with no insurance or public insurance and between White and Black mothers is not known, these findings deserve further exploration to remove barriers to parental participation in caregiving, decrease length of hospitalization, and improve infant outcomes.

The importance of nurses in encouraging parental participation in caregiving cannot be overstated. Parents learn to care for their infants by taking instruction from nurses and assuming progressively more responsibility for caregiving with the support and guidance of nurses (Green et al., 2021). Parents report the need for encouragement to assume caregiving tasks in the NICU under the supervi-

sion of nurses (Aydon et al., 2018). Thus, nurses must provide opportunities for parents to be involved and educate parents on the importance of parental participation in caregiving to ensure a timely discharge and smooth transition from hospital to home. ✦

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The study was approved by the Cincinnati Children's Hospital Medical Center IRB and the IRBs at the University of Cincinnati and The Ohio State University. The study was registered on ClinicalTrials.gov, NCT01577615.

The authors declare no conflicts of interest.

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References

- American Academy of Pediatrics. (2019). Hospital discharge of the high-risk neonate. In *Neonatal care: A compendium of AAP clinical practice guidelines and policies* (pp. 3–10). <https://doi.org/10.1542/59781610023047-part01-hospital>
- Aydon, L., Hauck, Y., Murdoch, J., Siu, D., & Sharp, M. (2018). Transition from hospital to home: Parents' perception of their preparation and readiness for discharge with their preterm infant. *Journal of Clinical Nursing*, 27(1–2), 269–277. <https://doi.org/10.1111/jocn.13883>
- Bales, K. L., Witczak, L. R., Simmons, T. C., Savidge, L. E., Rothwell, E. S., Rogers, F. D., Manning, R. A., Heise, M. J., Englund, M., & Arias Del Razo, R. (2018). Social touch during development: Long-term effects on brain and behavior. *Neuroscience and Biobehavioral Reviews*, 95, 202–219. <https://doi.org/10.1016/j.neubiorev.2018.09.019>
- Caporali, C., Pisoni, C., Gasparini, L., Ballante, E., Zecca, M., Orcesi, S., & Provenzi, L. (2020). A global perspective on parental stress in the neonatal intensive care unit: A meta-analytic study. *Journal of Perinatology*, 40(12), 1739–1752. <https://doi.org/10.1038/s41372-020-00798-6>
- Glazer, K. B., Sofaer, S., Balbierz, A., Wang, E., & Howell, E. A. (2021). Perinatal care experiences among racially and ethnically diverse mothers whose infants required a NICU stay. *Journal of Perinatology*, 41(3), 413–421. <https://doi.org/10.1038/s41372-020-0721-2>
- Green, J., Fowler, C., Petty, J., & Whiting, L. (2021). The transition home of extremely premature babies: An integrative review. *Journal of Neonatal Nursing*, 27, 26–32. <https://doi.org/10.1016/j.jnn.2020.09.011>
- Kellner, P., Kwon, J., Smith, J., & Pineda, R. (2022). Neurodevelopmental outcomes following preterm birth and the association with postmenstrual age at discharge. *American Journal of Perinatology*. Advance online publication. <https://doi.org/10.1055/a-1733-2690>
- Kim, T. H. M., Campbell-Yeo, M., Disher, T., Dol, J., Richardson, B., Bishop, T., Delahunty-Pike, A., Dorling, J., Glover, M., Inglis, D., Johnson, T., Lallan, D., McMillan, D., McGrath, P., Monaghan, J., Orovec, A., Simpson, D. C., Skinner, N., Wozney, L., & Whitehead, L. (2021). Caregiver presence and involvement in a Canadian neonatal intensive care unit: An observational cohort study. *Journal of Pediatric Nursing*, 60, 123–129. <https://doi.org/10.1016/j.pedn.2021.04.023>
- Klawetter, S., Greenfield, J. C., Speer, S. R., Brown, K., & Hwang, S. S. (2019). An integrative review: Maternal engagement in the neonatal intensive care unit and health outcomes for U.S.-born preterm infants and their parents. *AIMS Public Health*, 6(2), 160–183. <https://doi.org/10.3934/publichealth.2019.2.160>
- Korner, A. F., Brown, J. V., Thom, V. A., & Constantinou, J. C. (2000). *The neurobehavioral assessment of the preterm infant* (2nd ed.). Child Development Media.
- Korner, A. F., Stevenson, D. K., Kraemer, H. C., Spiker, D., Scott, D. T., Constantinou, J., & Dimiceli, S. (1993). Prediction of the development of low birth weight preterm infants by a new neonatal medical index. *Journal of Developmental and Behavioral Pediatrics*, 14(2), 106–111.
- Lewis, T. P., Andrews, K. G., Shenberger, E., Betancourt, T. S., Fink, G., Pereira, S., & McConnell, M. (2019). Caregiving can be costly: A qualitative study of barriers and facilitators to conducting kangaroo mother care in a US tertiary hospital neonatal intensive care unit. *BMC Pregnancy and Childbirth*, 19(1), 227. <https://doi.org/10.1186/s12884-019-2363-y>
- Martin, A. E., D'Agostino, J. A., Passarella, M., & Lorch, S. A. (2016). Racial differences in parental satisfaction with neonatal intensive care unit nursing care. *Journal of Perinatology*, 36(11), 1001–1007. <https://doi.org/10.1038/jp.2016.142>
- National Institutes of Health. (2015). *Racial and ethnic categories and definitions for NIH diversity programs and for other reporting purposes*. <https://grants.nih.gov/grants/guide/notice-files/not-od-15-089.html>
- North, K., Whelan, R., Folger, L. V., Lawford, H., Olson, I., Driker, S., Bass, M. B., Edmond, K., & Lee, A. C. C. (2022). Family involvement in the routine care of hospitalized preterm or low birth weight infants: A systematic review and meta-analysis. *Pediatrics*, 150(Suppl. 1), e20220570920. <https://doi.org/10.1542/peds.2022-0570920>
- Pickler, R. H., Meinen-Derr, J., Moore, M., Sealschott, S., & Tepe, K. (2020). Effect of tactile experience during preterm infant feeding on clinical outcomes. *Nursing Research*, 69(5S Suppl. 1), S21–S28. <https://doi.org/10.1097/nnr.0000000000000453>
- Pickler, R. H., Wetzel, P. A., Meinen-Derr, J., Tubbs-Cooley, H. L., & Moore, M. (2015). Patterned feeding experience for preterm infants: Study protocol for a randomized controlled trial. *Trials*, 16, 255. <https://doi.org/10.1186/s13063-015-0781-3>
- Pineda, R., Bender, J., Hall, B., Shabosky, L., Annecca, A., & Smith, J. (2018). Parent participation in the neonatal intensive care unit: Predictors and relationships to neurobehavior and developmental outcomes. *Early Human Development*, 117, 32–38. <https://doi.org/10.1016/j.earlhumdev.2017.12.008>
- Powers, S. A., Taylor, K., Tumin, D., & Kohler, J. A., Sr. (2022). Measuring parental presence in the neonatal intensive care unit. *American Journal of Perinatology*, 39(2), 134–143. <https://doi.org/10.1055/s-0040-1715525>
- Raiskila, S., Axelin, A., Toome, L., Caballero, S., Tandberg, B. S., Montrosso, R., Normann, E., Hallberg, B., Westrup, B., Ewald, U., & Lehtonen, L. (2017). Parents' presence and parent-infant closeness in 11 neonatal intensive care units in six European countries vary between and within the countries. *Acta Paediatrica*, 106(6), 878–888. <https://doi.org/10.1111/apa.13798>
- Reyna, B. A., Pickler, R. H., & Thompson, A. (2006). A descriptive study of mothers' experiences feeding their preterm infants after discharge. *Advances in Neonatal Care*, 6(6), 333–340. <https://doi.org/10.1016/j.adnc.2006.08.007>
- Sigurdson, K., Morton, C., Mitchell, B., & Profit, J. (2018). Disparities in NICU quality of care: A qualitative study of family and clinician accounts. *Journal of Perinatology*, 38(5), 600–607. <https://doi.org/10.1038/s41372-018-0057-3>
- Ulmer Yaniv, A., Salomon, R., Waidergoren, S., Shimon-Raz, O., Djalovski, A., & Feldman, R. (2021). Synchronous caregiving from birth to adulthood tunes humans' social brain. *Proceedings of the National Academy of Sciences of the United States of America*, 118(14), e2012900118. <https://doi.org/10.1073/pnas.2012900118>
- Welch, M. G., Firestein, M. R., Austin, J., Hane, A. A., Stark, R. I., Hofer, M. A., Garland, M., Glickstein, S. B., Brunelli, S. A., Ludwig, R. J., & Myers, M. M. (2015). Family nurture intervention in the neonatal intensive care unit improves social-relatedness, attention, and neurodevelopment of preterm infants at 18 months in a randomized controlled trial. *Journal of Child Psychology and Psychiatry*, 56(11), 1202–1211. <https://doi.org/10.1111/jcpp.12405>
- Williams, K. G., Patel, K. T., Stausmire, J. M., Bridges, C., Mathis, M. W., & Barkin, J. L. (2018). The neonatal intensive care unit: Environmental stressors and supports. *International Journal of Environmental Research and Public Health*, 15(1), 60. <https://doi.org/10.3390/ijerph15010060>