



Development of a Measurement Scale for Maternal Attitudes Toward Breast Milk Provision for Premature Infants

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Received: 20 Dec 2014

Accepted: 30 Oct 2015

Published: 05 Nov 2015



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Competing interests: The author has declared that no competing interests exist.

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ABSTRACT

Purpose: In premature infants, breast milk feedings are associated with a decreased risk of necrotizing enterocolitis, sepsis, and improved neuro-cognitive development. Despite these benefits, not all premature infants receive exclusive breast milk feedings. The Hill and Humenick (H&H) scale has been used to assess maternal confidence and commitment to breastfeeding in term infants. Our goal was to test the validity of a modified H&H scale in premature infants. We examined the effect of maternal postnatal attitudes about providing breast milk using a modified H&H scale to see if maternal attitude affects the amount of breast milk fed to infants.

Subjects: Mothers of infants born ≤ 32 weeks gestation admitted to the Montefiore Weiler Neonatal Intensive Care Unit whose mothers could provide breast milk were eligible.

Design: Within 48 hours of delivery, mothers completed a survey exploring their previous experience regarding breast-feeding, breast milk production, and attitudes towards providing breast milk for their infant.

Methods: Percentage of breast milk enteral feeds was calculated from the electronic medical record. Enteral feeds were calculated until feeding volume equaled a minimum of 120ml/kg/day. Data was analyzed using linear regression.

Main outcome measures: Premature infants and their mothers (n=24) were enrolled. Average birth weight and gestational age were 1067gm (range 520-2000) and 28 weeks (range 24-32). On average, infants initiated enteral feeds by day of life four (range 2-9). The mean percentage of breast milk enteral feeds was 75% (range 13-100).

Principal results: Maternal motivation for providing breast milk, after controlling for education and prior breast-feeding experience, was not associated with increased percentage of breast milk enteral feedings.



Conclusions: In this ethnically diverse urban setting, postnatal maternal motivation, based on a modified H&H scale, was not predictive of percentage breast milk enteral feeds among premature infants. Further study is needed to better delineate the precise factors that lead to increased breast milk provision to premature infants.

Keywords: Breast milk, Premature, Maternal motivation

INTRODUCTION

Premature infants fed breast milk have lower rates of common morbidities of prematurity including late-onset sepsis and necrotizing enterocolitis than those infants fed formula. In addition, infants fed breast milk have improved neurodevelopmental outcomes in a dose dependent relationship.^[1-4] Breast milk feedings for premature infants have been associated with maternal age, maternal motivation, marital status and multiple gestation birth.^[5-7]

Though most premature infants receive initial breast milk feedings, only a fraction are discharged on breast milk feedings.^[8,9] Barriers to providing breast milk to premature infants include maternal illness, socioeconomic status, complications due to operative delivery, and perceptions of insufficient milk supply.^[10-12] While the discrepancy between initiation of breast milk feedings and breastfeeding at discharge is well documented, the amount of breast milk feedings while infants are hospitalized has not been described in relationship to maternal factors.

The Hill and Humenick (H&H) Lactation scale was designed to assess maternal confidence and commitment to breastfeeding, perceived infant satiety, and maternal-infant breast feeding satisfaction in full term infants.^[13] To the best of our knowledge, no comparable validated scale exists for mothers of premature infants.

Given the need to assess and promote maternal confidence in providing breast milk to preterm infants, our goal was to develop a measure for predicting breastfeeding initiation and duration applicable to the preterm population. We modified the H&H scale to reflect the experience of providing breast milk to premature infants. Because this study involved an urban population with limited generalizability and potential logistical and staffing barriers, we designed this project as a feasibility study, acknowledging that generalizability of outcomes might be limited. As a secondary outcome, we examined the modified scale's ability to predict success at providing breast milk to premature infants.

METHODS

The Montefiore Medical Center Institutional Review Board approved all study protocols. Informed, written consent was obtained from the study subjects' legal guardians. Our prospective survey enrolled infants ≤ 32 weeks gestation admitted to the Montefiore Jack D. Weiler Hospital Neonatal Intensive Care Unit (NICU). In accordance with hospital policy, we excluded infants whose mothers had a contraindication to breastfeeding such as positive human immunodeficiency virus and a positive screen for illicit drug use. Because mothers were expected to complete written surveys, mothers who spoke a language other than English or Spanish were excluded. We chose these gestational ages expecting this cohort to remain hospitalized long enough for their mothers to complete a sufficient number of surveys. Ethnically, roughly 90% of mothers whose infants are admitted to the Montefiore Weiler NICU self-identify as Black or Hispanic. Mothers were approached for consent within 48 hours of delivery.



Mothers completed a written survey with demographic questions and a modified version of the H&H scale appropriate for those who are pumping, not directly breast-feeding their infants (Table 1). Clinical characteristics, feeding and growth parameters at full feeds were recorded from the electronic medical record on enrolled infants in an effort to quantify the fraction of enteral feeds that were breast milk.

Because rates of necrotizing enterocolitis and late onset sepsis peak in the first month of life, we limited our analysis of feeds to 120ml/kg/d which would be attained during this critical time period.^[14] Using SAS software, version 9.2, Spearman correlations were estimated among maternal responses to the three breast-feeding related questions. Multivariate linear regression was used to adjust for maternal education and prior experience breastfeeding.

	Strongly disagree				Strongly agree
20. I feel that pumping breast milk is providing my baby with an ideal food	1	2	3	4	5
21. I made the right decision when i decided I would pump breast milk for my baby	1	2	3	4	5
22. Even though I can pump breast milk, I would rather not be pumping breast milk	1	2	3	4	5
23. I feel a sense of pride from watching my baby grow from my breast milk	1	2	3	4	5
24. I believe I can solve any breast milk feeding problems which come along	1	2	3	4	5
25. Providing breast milk consoles my baby in a special way	1	2	3	4	5
26. I'm so upset abot breast milk problems that I become upset at the thought of pumping breast milk	1	2	3	4	5
27. I arrange my life so that breast milk is almost the only thing my baby gets	1	2	3	4	5
28. Overall, I would describe pumping breast milk as a relaxing activity	1	2	3	4	5
29. I would describe my baby as being fussy after a breast milk feeding	1	2	3	4	5
30. In general, I believe my baby was satisfied with breast milk feedings	1	2	3	4	5
31. In general, I was satisfied with pumping breast milk	1	2	3	4	5
32. My baby appears to enjoy breast milk feedings	1	2	3	4	5
33. In general, I feel succesful at pumping breast milk for my baby	1	2	3	4	5

Table. 01 *Sample survey provided to mothers after delivery.*

RESULTS

Twenty six mothers were enrolled during a 13 month period from January 2013 through January 2014. During this time period, ninety five infants less than or equal to 32 weeks gestation were admitted to the Weiler NICU. Two infants were excluded due to positive HIV status. No patients were excluded due to positive urine drug screens or speaking a language other than English or Spanish. In general, mothers were older with extremely premature infants who received mostly breast milk (Table 2).

	Mean (range)
Gestational age (weeks)	28 (24-32)
Birth weight (grams)	1067 (520-2000)
Maternal age (years)	32 (20-43)
Enteral breast milk feeds(%)	74 (13-100)
Initiation of enteral feeds (day of life)	4 (2-9)
Male infant gender (%)	45

Table. 02 *Baseline demographic maternal and infant data.*

The majority of mothers self-identified as Black (42%) or Hispanic (29%). By report, most mothers had formal education: 50% with a college degree or higher and 46% regular high school diploma or GED (Figure 1).

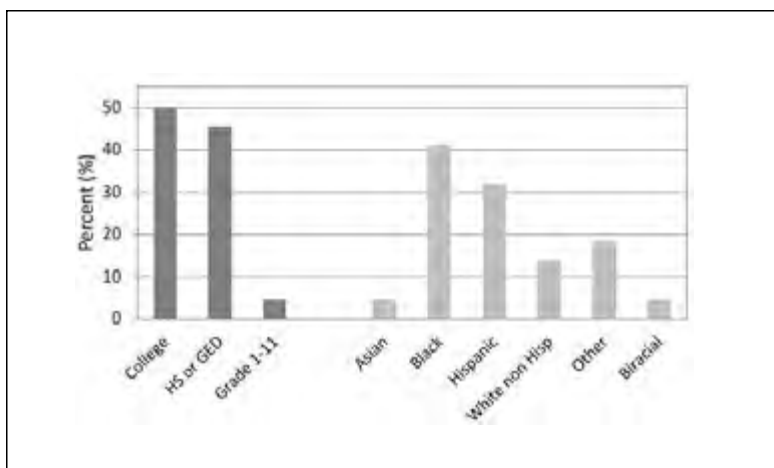


Figure. 01 *Mother reported their highest education and ethnicity using validated scales.*

On average, infants initiated enteral feeds by day of life four (range 2-9). Infants reached 120 ml/kg/day by week 4 of life on average (range 2-8). During the time from initiation of feeds until full feeds were attained, the

percent enteral breast milk feedings varied from 13 to 100 (Figure 2). A majority of infants were discharged with formula feedings (74%) compared to breast milk feedings (26%) (Figure 3).

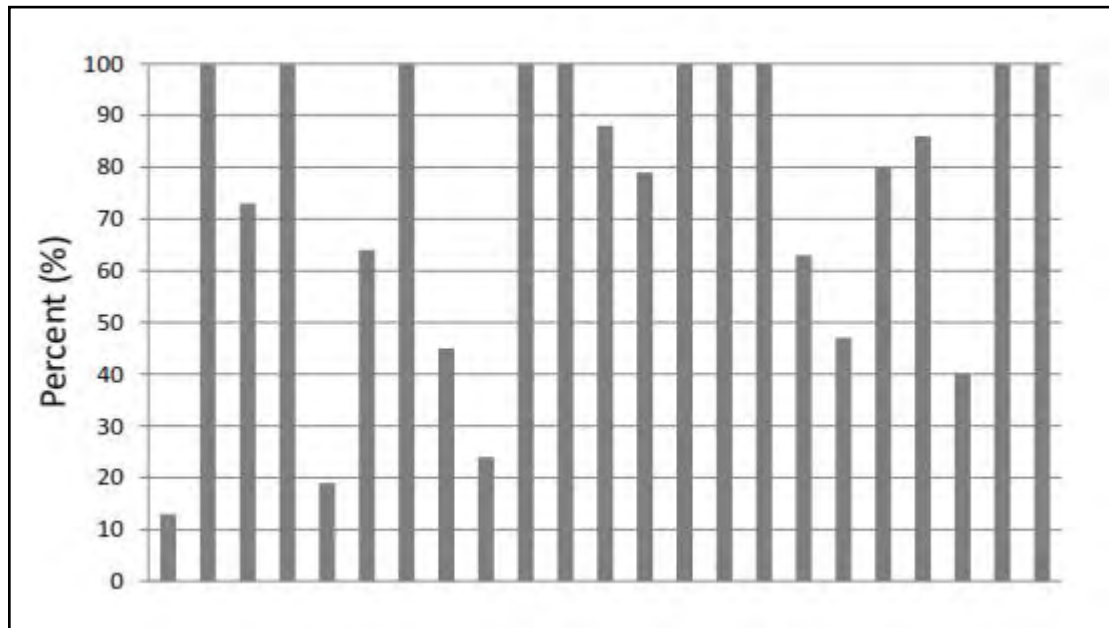


Figure. 02 Distribution of individual infant's percentage of cumulative breast milk enteral feeds up to 120ml/kg/d.

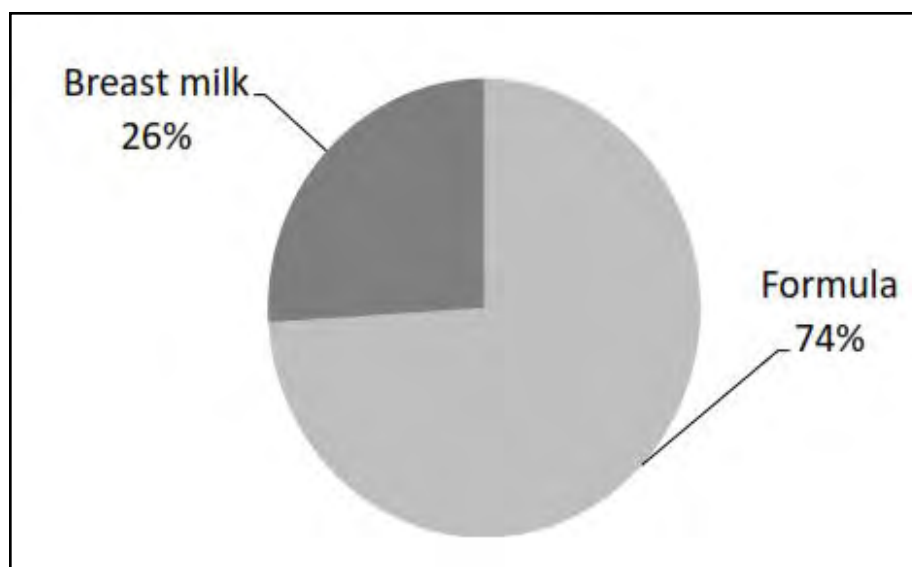


Figure. 03 Feedings at discharge were defined by enteral feeding type greater than or equal to 80% on the day prior to discharge.



Based on initial survey results, mothers were very motivated to provide breast milk to their infants (Table 3). Many of the mothers strongly disagreed (64%) with “Even though I can pump, I would rather not be pumping breast milk.” The mothers either strongly agreed or agreed (69%) with the statement that “I believe I can solve any breastfeeding problems which come along.” A high percentage (57%) of the mothers strongly agreed with “I arrange my life so that breast milk is almost the only thing my baby gets.” However, no significant Spearman correlation was found between maternal responses to the questions listed above and percent breast milk enteral feeds. After controlling for maternal education and prior experience breast feeding with a linear regression model, maternal responses still were not significantly associated with the amount breast milk feedings.

Question	Strongly disagree	Disagree	Neutral	Agree	Strongly agree	P-value
Even though I can pump, I would rather not be pumping breast milk	64	5	9	9	14	0.64
I believe I can solve any breast milk feeding problems which come along	4	13	13	39	30	0.34
I arrange my life so that breast milk is almost the only thing my baby gets	0	4	22	17	57	0.7

Table. 03 *Maternal responses to questions assessing motivation in relation to percent breast milk enteral feeds.*

DISCUSSION

In this study, based on the results of the modified H&H survey, mothers were highly motivated to give breast milk to their premature infants. The majority of infants received breast milk during the first week of life. However, only 26% of infants were still receiving breast milk on discharge. Maternal motivation to provide breast milk based on the modified H&H scale did not correlate with the amount of breast milk that was ultimately fed to the infants.

Our findings of a universal initiation of breast milk feedings and lower percentage of breast milk feeding on discharge correlate well with prior research.^[8,9] Many factors may contribute to decreased breast milk production in mothers of premature infants, including extreme prematurity, maternal illness, and delayed pumping or hand expression.^[12,15-18]

In contrast to prior data, we found no correlation between maternal motivation, education, prior breast feeding experience and successful breast milk provision.^[4,7,16] Due to limitations in enrollment of roughly 25% of the eligible population, this sample also may not be representative of the general Bronx population. Mothers in this study reported college education at higher rates (67%) than is seen the general Bronx population of women of child bearing age (37%).^[19] Despite this finding, we found no relationship between maternal education and provision of breast milk feedings. In addition, maternal commitment and confidence as measured by a modified H&H scale did not correlate with breast milk provision.

It is possible that the lack of relationship between maternal age, education, and prior breast feeding experience is based on the definition of breast feeding as a percentage of enteral feedings. Previous studies have used a dichotomous variable, maternal report or breast milk volumes to define breast feeding rather than the amount



breast milk fed to infants.^[5,8-10] However, this may overestimate the amount of breast milk provided to premature infants. Focusing on breast milk provision in terms of amounts fed in the first month of life may have greater significance toward long term outcomes.^[14,20] Using these definitions of breast milk provision, there may be different predictive factors of successful provision of breast milk feedings to premature infants.

In summary, we found a poor correlation between maternal motivation to provide breast milk as measured by a modified H&H scale and provision of enteral breast milk feedings in premature infants. When focusing on the amount and timing of breast milk feedings, predictive factors of success have not been elucidated. Future research will explore the impact of early hand expression and skin to skin care on breast milk enteral feedings to premature infants.

REFERENCES

1. Furman L, Taylor G, Minich N, et al. The effect of maternal milk on neonatal morbidity of very low-birth-weight infants. *Arch Pediatr Adolesc Med*. 2003;157(1):66-71.
2. Vohr BR, Poindexter BB, Dusick AM, et al. Beneficial effects of breast milk in the neonatal intensive care unit on the developmental outcome of extremely low birth weight infants at 18 months of age. *Pediatrics*. 2006;118(1):e115-e123.
3. Lucas A, Cole TJ. Breast milk and neonatal necrotising enterocolitis. *Lancet*. 1990;336(8730):1519-1523.
4. Smith MM, Durkin M, Hinton VJ, et al. Initiation of breastfeeding among mothers of very low birth weight infants. *Pediatrics*. 2003;111(6 Pt 1):1337-1342.
5. Pineda RG. Predictors of breastfeeding and breastmilk feeding among very low birth weight infants. *Breastfeed Med*. 2011;6(1):15-19.
6. Perrella SL, Williams J, Nathan EA, et al. Influences on breastfeeding outcomes for healthy term and preterm/sick infants. *Breastfeed Med*. 2012;7:255-261.
7. Alves E, Rodrigues C, Fraga S, et al. Parents' views on factors that help or hinder breast milk supply in neonatal care units: systematic review. *Arch Dis Child Fetal Neonatal Ed*. 2013;98(6):F511-F517.
8. Kirchner L, Jeitler V, Waldhor T, et al. Long hospitalization is the most important risk factor for early weaning from breast milk in premature babies. *Acta Paediatr*. 2009;98(6):981-984.
9. Lee HC, Gould JB. Factors influencing breast milk versus formula feeding at discharge for very low birth weight infants in California. *J Pediatr*. 2009;155(5):657-62 e1-e2.
10. Hill PD, Aldag JC, Zinaman M, et al. Predictors of preterm infant feeding methods and perceived insufficient milk supply at week 12 postpartum. *J Hum Lact*. 2007;23(1):32-8;quiz 9-43.
11. Gianni ML, Roggero P, Amato O, et al. Intervention for promoting breast milk use in neonatal intensive care unit: a pilot study. *J Matern Fetal Neonatal Med*. 2014;27(5):475-478.
12. Flacking R, Nyqvist KH, Ewald U. Effects of socioeconomic status on breastfeeding duration in mothers of preterm and term infants. *Eur J Public Health*. 2007;17(6):579-584.



13. Hill PD. Development of the H & H Lactation Scale. *Nursing research (New York)*. 1996;45(3):136-140.
14. Meier PP, Engstrom JL, Patel AL, et al. Improving the use of human milk during and after the NICU stay. *Clin Perinatol*. 2010;37(1):217-45.
15. Morton J, Wong RJ, Hall JY, et al. Combining hand techniques with electric pumping increases the caloric content of milk in mothers of preterm infants. *J Perinatol*. 2012;32(10):791-6.
16. Cordero L, Valentine CJ, Samuels P, et al. Breastfeeding in women with severe preeclampsia. *Breastfeed Med*. 2012;7(6):457-63.
17. Sievers E, Haase S, Oldigs HD, et al. The impact of peripartum factors on the onset and duration of lactation. *Biol Neonate*. 2003;83(4):246-252.
18. Maastrup R, Hansen BM, Kronborg H, et al. Factors associated with exclusive breastfeeding of preterm infants. Results from a prospective national cohort study. *PLoS One*. 2014;9(2):e89077.
19. New York City Birth and Infant Mortality Trends. 2011 August 31, 2011 October 1, 2014
20. Bigger HR, Fogg LJ, Patel A, et al. Quality indicators for human milk use in very low-birthweight infants: are we measuring what we should be measuring? *J Perinatol*. 2014;34(4):287-291.