Original Article

Factors Impacting Breastfeeding and Milk Expression in the Neonatal Intensive Care Unit

Naylor Lindsay
University of Delaware, Department of Geography, Newark, DE, USA

Clarke-Sather Abigail
University of Minnesota Duluth, Department of Mechanical & Industrial Engineering, MN, USA

Correspondence: Naylor, Lindsay, University of Delaware, Department of Geography, 125 Academy Street, Newark, DE 19716, USA e-mail: lnaylor@udel.edu

Abstract

Background: Breastfeeding holds unique challenges for mothers in the stressful situation of caring for a newborn in a neonatal intensive care unit (NICU). Oftentimes mothers intend to breastfeed, some mothers with no intention to breastfeed make the decision to breastfeed or express milk when infants require NICU care.
Research Aim: This study analyzes the impact of intention to breastfeed and Baby-Friendly Hospital Initiative (BFHI) designation on breastfeeding and milk expression duration when infants require NICU care.
Methods: A 2017 online survey directed at birth mothers whose infants had received NICU care was distributed to U.S. State Breastfeeding Coalitions for social media dissemination.
Results: Mothers with intention to breastfeed (n=113) averaged 15.8 months breastfeeding and 11 months. This statistically significant difference in duration from mothers with no intention to breastfeed (n=5) who averaged 2.2 months breastfeeding and 2.6 months expressing milk. BFHI designation had no significant difference on breastfeeding or milk expression duration.
Conclusion: Mothers' intention to breastfeed significantly impacted breastfeeding and milk expression duration. Remarkably mothers caring for infants in the NICU with no intention to breastfeed did breastfeed or express milk. BFHI designation did not impact breastfeeding or milk expression duration, possibly since NICUs are not explicitly considered in BFHI guidelines. Caring for infants in NICUs may influence mothers' decision making about breastfeeding and milk expression duration. Reaching more mothers who had no intention to breastfeed before birth is needed to determine how infants' NICU care influences their decision-making to breastfeed and express milk.

Keywords: Breastfeeding, human milk, milk expression, neonatal intensive care unit, NICU, Baby-Friendly Hospital Initiative

Background

Infants born before 37 weeks are preterm according to the American College of Obstetricians and Gynecologists (ACOG, 2017). Preterm and critically ill infants are treated in neonatal intensive care, where human milk is increasingly recommended and prescribed to this population as a medical intervention (Briere et al., 2014). However, due to the medical acuity of and complex character of caring for preterm infants, sometimes feeding at the breast is not possible, which may influence mothers' decision to breastfeed. A large body of literature undertakes this analysis (see for example: Boucher et al. 2011; Briere et al. 2016; Brown et al. 2018; Cricco-Lizza 2016; Froh et al. 2016; Hannan et al. 2018), however, many papers rely on databases and on studies that pre-date or neglect the potential influence of the Baby-Friendly Hospital Initiative (BFHI) (as an exception see: Petruskavich et al. 2013) on NICU infant feeding practices or are

focused on only one institution (Boucher et al. 2011; Briere et al. 2016; Cricco-Lizza 2016) or U.S. State (Brown et al. 2018; Hannan et al. 2018). This research surveyed U.S. mothers from 30 states and approximately 120 hospitals about their NICU experiences with infant feeding and BFHI designation, providing a more widely applicable analysis. Although the BFHI does not include NICUs in their guidelines, kangaroo care is recommended in NICUs as early as possible (Baby-Friendly USA, 2016). There is currently a push to adopt the "NICU Ten Steps" (Merewood 2013). This work adds to the debate around NICU adoption of BFHI guidelines.

Initiation: Women who deliver preterm infants have lower rates of breastfeeding initiation and duration than those women who deliver full term infants (Alves et al., 2016; Jayaraman et al., 2017). NICUs often present barriers to breastfeeding (Bower et al., 2017; Kachoria and Oza-Frank, 2015). A number of factors limit initiation of breastfeeding for NICU infants, including but not limited to mothers' choice, inability to create or maintain milk supply, separation of mothers and infants immediately following birth, and infants' inability to feed at the breast (e.g. Bujold et al., 2018). Often mothers' adjust their infant feeding plans due to their infant requiring NICU care (Ikonen et al., 2016; Lucas et al., 2014).

Duration: Mothers' breastfeeding satisfaction indicates overall success with breastfeeding her children (Edwards, 2018). Preterm birth experience and physical and emotional separation between mothers and infants is both an obstacle and incentive for milk expression. Concerns about supply are a limiting factor (Ikonen et al., 2016). Studies show that while many mothers express milk for their infants, the duration of milk expression is short and does not continue post-discharge (Lucas et al. 2014). However, support by NICU staff and through peer counseling for breastfeeding in the NICU encourages breastfeeding post discharge (Briere et al., 2016; Ozza-Frank et al., 2013).

Support: Literature demonstrates that lack of support is a main reason for non-initiation or short duration of breastfeeding in the U.S. (Wray and Garside, 2018). In contrast the NICU is a site of support and advocacy for providing human milk to preterm infants as a life-saving medical intervention. However, Briere et al. (2016) found that an emphasis on attaining earlier discharge of preterm infants reduced support for direct breastfeeding in the NICU. An earlier study demonstrated that lack of support following NICU discharge made it more difficult for mothers to breastfeed (Briere et al., 2014). A small-scale qualitative study of milk expression found that mothers' who received support from nurses and lactation consultants were more likely to express milk in the NICU (Schy et al., 2015). A more recent study suggests that the Baby-Friendly Hospital Initiative is having a positive impact on initiation of milk expression (Petruskavich et al. 2013); however, further research that examines the differences between NICUs, those adopting the Baby-Friendly "Ten Steps" and/or adapting them for NICU use is necessary. Often researchers conclude that knowledge of NICU staff and parents is key to supporting breastfeeding (Alves et al., 2016; Hallowell et al., 2014).

Study Aims: This research analyzed the impact of having an infant in the NICU on breastfeeding and milk expression initiation and duration by surveying a mix of respondents, those who gave birth at centers with the Baby-Friendly designation and those who did not. A better understanding of the contrast between mothers' intention to breastfeed and breastfeeding duration rates creates a foundation for conducting further research on why and how having a preterm infant positively or negatively impacts infant feeding and care and whether BFHI influences NICU infant feeding.

Methods

Design: A survey of mothers on breastfeeding, milk expression, skin-to-skin care, and donor human milk in U.S. NICUs was undertaken with approval from the University of Delaware Institutional Review Board. All participants provided a digital signature for informed consent prior to being re-directed to the online survey. The online survey was conducted September through December 2017 in the United States.

Sample:

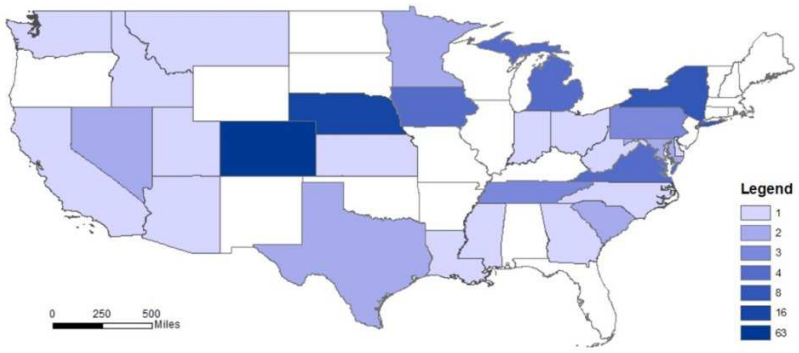

Figure 1: Map of all survey respondents by state, darker color indicates more respondents

The U.S. has lower than average breastfeeding initiation and duration (CDC, 2018). Preterm birth is the number one cause of death in the infant population with a preterm birthrate in 2016 of 9.8% (March of Dimes, 2016). Thus, the target population for the survey was U.S. adult birth-mothers who have had at least one infant who received care in the NICU. Respondents who did not meet this requirement were excluded from the survey. The sample included 148 respondents, 119 of whom completed the entire survey from beginning to end. Thirty-two responses recorded were not analyzed for this segment of the research for the following reasons; 2 respondents did not give birth to their children, 8 did not have or did not respond about whether their children had been in NICUs, and 22 did not provide enough information to be able to calculate breastfeeding duration or duration of expressing human milk. Of the 119 sample responses, 45 respondents reported giving birth at a BFHI location and 12 reported their children's birthplace was not BFHI, and 59 mothers did not respond about BFHI.

Data Collection: The U.S. State Breastfeeding Coalitions were invited via email to share the survey on social media. The survey was developed using the Qualtrics Survey Platform and was made up of both closed, with Likert Scale pre-coded responses, and open-ended questions. Participants gave informed consent to participate in the research. No identifying information was requested in the survey.

Data Analysis: Statistical analysis was performed in MS Excel for descriptive statistics, and JMP 14.0 for other statistical tests. Normality of distributions were tested before analysis using graphical inspection with a Normal Quantile plot and with the Shapiro-Wilk test to evaluate goodness-of-fit. Some statisticians endorse the Shapiro-Wilk test as most appropriate for evaluating data normality (Ghasemi & Zahediasl, 2012). All statistics were described as showing significant difference at a two tailed 95% confidence interval, i.e. $p < 0.05$. The comparison of means between two groups was analyzed using the Wilcoxon Rank Sum test. The Wilcoxon test does not require normal data, however it does require that the two groups compared are independent and have equivalent variance (Ford, 2017). All durations of breastfeeding and pumping are independent by representing different mother-infant dyads. Whether the group variances were equivalent was tested with Brown and Forsythe's test for not normal data (Croarkin & Tobias, 2013). The data of breastfeeding and pumping duration is characteristically skewed since the mothers who

did not breastfeed or pump would have a duration of zero. Brown and Forsythe's test is most effective in not creating a type 1 error, i.e. finding a false difference, for skewed distributions (Croarkin & Tobias, 2013). All groups were confirmed to have equal variance. The comparison of means between groups for more than two groups was analyzed using the Kruskal-Wallis test, a nonparametric test. In order to use the Kruskal-Wallis test all samples must be random, independent, and an ordinal scale must be used for comparison of samples. A Kruskal-Wallis is used when there are means from more than two cohorts to compare with each other with regards to a single dependent variable ("Kruskal-Wallis Test," 2008). The Tukey post hoc test was used to eliminate Type 1 error, i.e. any false positives, or false differences found between the means of different groups. Table 1 shows demographic information from respondents. The data was skewed towards Mothers who were white, wealthier, and/or part of dual parent households. 7 mothers (n=116) cared for multiple children born at different times in the NICU. 15 mothers cared for multiple children born at the same time (i.e. twins, triplets).

Results

64 (n=119) of mothers were still breastfeeding their infants who had been in the NICU at the time they filled out the survey. 42 (n=119) of mothers were still expressing milk for their infants who had been in the NICU at the time they filled out the survey. Figure 2 shows the length of time in months and years that survey respondent Mothers (n=119) breastfed their children in the NICU. Two mothers reported on multiple times different sets of children had been in the NICU. Thus a total of 118 mother-infant dyads are reported on in Figure 2. Also note that multiple children born at the same time (i.e. twins, triplets) are only considered as a single mother-infant dyad for the purposes of breastfeeding duration in Figure 2 and duration of expression in Figure 3. Infants in the NICU who were born at different dates are considered separately, infants born as multiples (e.g. triplets) are considered as a single data point. Stripes indicate mothers who were still breastfeeding at the date they responded to the survey.

NICU Mothers' Intentions to Breastfeed and Impact on Breastfeeding and Expressing Milk Duration: 111 mothers had the intention to breastfeed their children prior to birth with only 5 Mothers who had no intention to breastfeed and answered about their breastfeeding duration (n=119). It should be noted that the sample limits our analysis as a survey that asks mothers about breastfeeding and that is distributed via breastfeeding coalition social media is skewed to reach mothers who are focused on breastfeeding and are more likely to have breastfed their children. The breastfeeding duration of these two groups, mothers with the intention to breastfeed before birth and mothers who did not plan on breastfeeding before birth, were compared. A Normal Quantile plot was made and a Shapiro-Wilk test statistic, which is a test for normality with significance level of 95% i.e. $p<0.05$, was calculated for each group. The mothers with the intention to breastfeed before birth group was found to not fit a normal distribution ($p=0.0001$). Thus the exact Wilcoxon signed-rank test (also called Wilcoxon sum rank or Wilcoxon Mann-Whiney U-test because only 2 means are compared) was used to compare the two group's means of breastfeeding duration because unlike a t-test the Wilcoxon test does not require that data have a normal distribution. The Wilcoxon test statistic found that a significant difference in breastfeeding duration exists between mothers who intended to breastfeed before birth and those who did not. The two-sided (non-directional) test statistic value was $p=0.0082$. NICU Mothers with the intention to breastfeed, breastfed their children for over a year on average (479 days). Whereas mothers who did not intend to breastfeed breastfed their children for over 2 months on average. It is significant that mothers who had no intention of breastfeeding before birth did breastfeed even for a short period of time. Breastfeeding infants for at least 6 months has health impact benefits for infants later on in life – showing significance in the reduction of breastfed infants' future cholesterol levels, Type II diabetes, and rates of obesity (Allers 2017). Additionally, increasing the rates of breastfeeding infants for 6 months can greatly reduce medical costs nationwide in the U.S. (Bartick et al., 2017a). Breastfeeding an infant for at least 12 months also has significant health

benefits for mothers as well, namely reduced chance of cardiovascular disease, diabetes, and hypertension (Bartick et al. 2017b). Mothers in the NICU who had the intention to breastfeed, breastfed long enough for their babies to experience long-term health benefits and for the mothers themselves to experience long-term health benefits. However, our data show that, on average, mothers who intended to breastfeed did not reach the World Health Organization's recommendation of breastfeeding for at least 2 years (World Health Organization, 2018) and mothers who did not have the intention to breastfeed did not reach the critical 6-month mark of breastfeeding that results in significant later in life health impacts for their infants. It is remarkable to note that some mothers who did not plan on breastfeeding did end up breastfeeding their child treated in the NICU. Regarding expressed milk duration, 106 mothers had the intention to breastfeed their children prior to birth with only 5 mothers who had no intention to breastfeed and responded about the total duration they expressed milk for their infants (N=111). The mothers with the intention to breastfeed before birth group's expressed milk duration was found to not fit a normal distribution (p=0.0001). A significant difference in expressing milk duration as found between mothers who intended to breastfeed and those who did not (p=0.0332). Table 2 shows that on average NICU mothers with an intention to breastfeed, expressed milk for nearly 11 months. Remarkably, NICU mothers with no plan to breastfeed, expressed milk for an average of nearly 3 months. 57 mothers responded about the Baby-Friendly designation of the hospital where they gave birth and their breastfeeding duration. 53 mothers responded about the Baby-Friendly designation of the hospital where they gave birth and their expressed milk duration. The mothers that gave birth in a BFHI hospital and responded about breastfeeding duration was found to not fit a normal distribution ($p<0.0001$). No significant difference for the breastfeeding or milk expression duration was found with BFHI designation with p=0.6246 and p=0.4830 respectively for mothers who gave birth with or without BFHI designation. Some mothers may have given birth and had their child receive NICU care at a different facility. However, these results imply that the Baby-Friendly Hospital designation did not influence breastfeeding or milk expression duration for Mothers of NICU infants. The Baby-Friendly Hospital Initiative, launched in 1991 by the World Health Organization and UNICEF is a global program to promote the implementation of the "Ten Steps to Successful Breastfeeding" and the "International Code of Marketing of Breast-milk Substitutes" (Baby-Friendly USA, 2012). That no significant difference was found between hospitals with and without the designation brings up a cause for concern that this designation does not actually influence duration of human milk consumption by NICU infants. BFHI has not focused on NICU populations.

NICU Mothers' Supplementation of Infant Feeding and Impact on Breastfeeding and Expressing Milk Duration: Mothers were asked about their ability to provide enough human milk for their infants in the NICU. 116 mothers responded about their ability to provide enough human milk for their infants and their breastfeeding duration, 109 mothers responded about their ability to provide enough human milk for their infants and their expressing milk duration. Mothers were divided into three groups by those who stated they provided: enough milk (Enough), enough milk but not the entire time (Enough sometimes), and not enough milk (Not enough). The data for breastfeeding duration distribution for each of these three groups was not normal with the highest p=0.0019. The data for expressing milk duration distribution for the two enough milk groups was not normal with the highest p=0.0037. Since these distributions were not found to be normal and there were more than 2 groups to compare the Kruskal Wallis with Tukey posthoc test was used to compare means between the three groups. A significant difference between mothers who had enough milk and those that did not have enough milk existed for breastfeeding duration and expressing milk duration with p=0.0043 and p=0.0286 respectively. Significant differences did not exist between the enough milk sometimes group and the other two groups. Table 4 shows the descriptive statistics for breastfeeding duration and expressing milk duration for mothers based on whether they produced enough milk or not. The average for breastfeeding duration for mothers who provided enough milk was over 1.5 years whereas

for mothers who did not provide enough milk it was under 6 months. Mothers who had enough milk on average breastfed or expressed milk for time periods long enough to accrue long-term health benefits for their infants (6 months) and themselves (1 year). However, mothers who did not provide enough milk did not breastfeed or express human milk long enough to accrue infant health benefits. In general, expressing milk durations were less than breastfeeding durations. The increased difficulty and time commitment of expressing milk due to cleaning and feeding of the infant as compared to simply feeding the infant for breastfeeding may explain the lower expressing milk durations.

Table 1. Survey Demographics, Income, and Employment	
Age Range	n=
18-24	13
25-30	49
31-34	37
35-40	30
41 and up	11
Race Category	
White	131
Black or African American	4
American Indian or Alaska Native	3
Other	4
Income Range	
$1,000-$20,000	5
$21,000-$40,000	26
$41,000-$60,000	25
$61,000-$80,000	27
$81,000-$100,000	20
over $100,000	39
Employment Status (at survey date)*	
Employed full time in the paid workforce	40
Employed part time in the paid workforce	25
Employed full time as a caregiver (aka stay at home parent)	57
Employed part time as a caregiver (aka stay at home parent and part time in paid workforce)	10
On paid maternity leave	3
On unpaid maternity leave	5
Using vacation time from my job in the paid workforce to be with my infant	25
Parenting Division of Labor	
Single parent, majority responsibility	5
Single parent, shared responsibility	2
Dual-parent household, shared responsibility	130
Other	4
*Respondents were invited to check all that apply	

Table 2: Descriptive Statistics for Breastfeeding and Expressed Milk Duration by NICU Mom's Intention to Breastfeed

	Mean	Median	Standard Deviation	Sample Variance	Minimum	Maximum	n
Intention to BF	479.1	304	508.5	258,537.0	0	2475	113
No intention to BF	68.4	62	74.6	5560.8	0	176	5
Pump Duration YES BF Intention	333.1	200.0	395.6	156535.8	0	2475	106
Pump Duration NO BF Intention	79.4	62.0	84.5	7144.8	0	176	5

Table 3: Descriptive Statistics for Breastfeeding and Expressed Milk Duration by Baby Friendly Hospital Designation

	Mean	Median	SD*	Variance	Minimum	Maximum	n
Breastfeeding duration, YES BFHI designation	410.2	300	378.5	143264.3	0	1313	45
Breastfeeding duration, NO BFHI designation	526.4	346	577.7	333749.4	14	2078.	12
Pump Duration, YES BFHI designation	346.5	274	321.9	103595.2	26	1229	41
Pump Duration, NO BFHI designation	245.4	181	204.1	41646.5	14	608	12

*SD=Standard Deviation

Table 4: Descriptive statistics for Breastfeeding and Expressing Milk duration for Mothers who produced enough, sometimes enough, and not enough milk

Duration		**Mean**	**Median**	**SD**	**Variance**	**Range**	**n**	**Different from?**
Breastfeed	Enough (A)	591	396	562	315,749	0 – 2,475	72	Z
	Enough sometimes(B)	337	266	314	98,493	7-1,208	28	none
	Not Enough (Z)	158	78	279	78,035	0-1,168	16	A
Expression	Enough (A)	395	223	456	207,721	0-2,475	67	Z
	Enough sometimes(B)	282	235	259	67,225	6-912	26	none
	Not Enough (Z)	119	109	87	7,541	26-291	16	A

Table 5: Brown Forsythe Homogeneity of Variance Test Results

Factors	Data	p	Groups have:
BF Intention	BF Duration	0.0881	Equal Variance
BF Intention	P Duration	0.2337	Equal Variance
BFHI	BF Duration	0.4104	Equal Variance
BFHI	P Duration	0.6798	Equal Variance

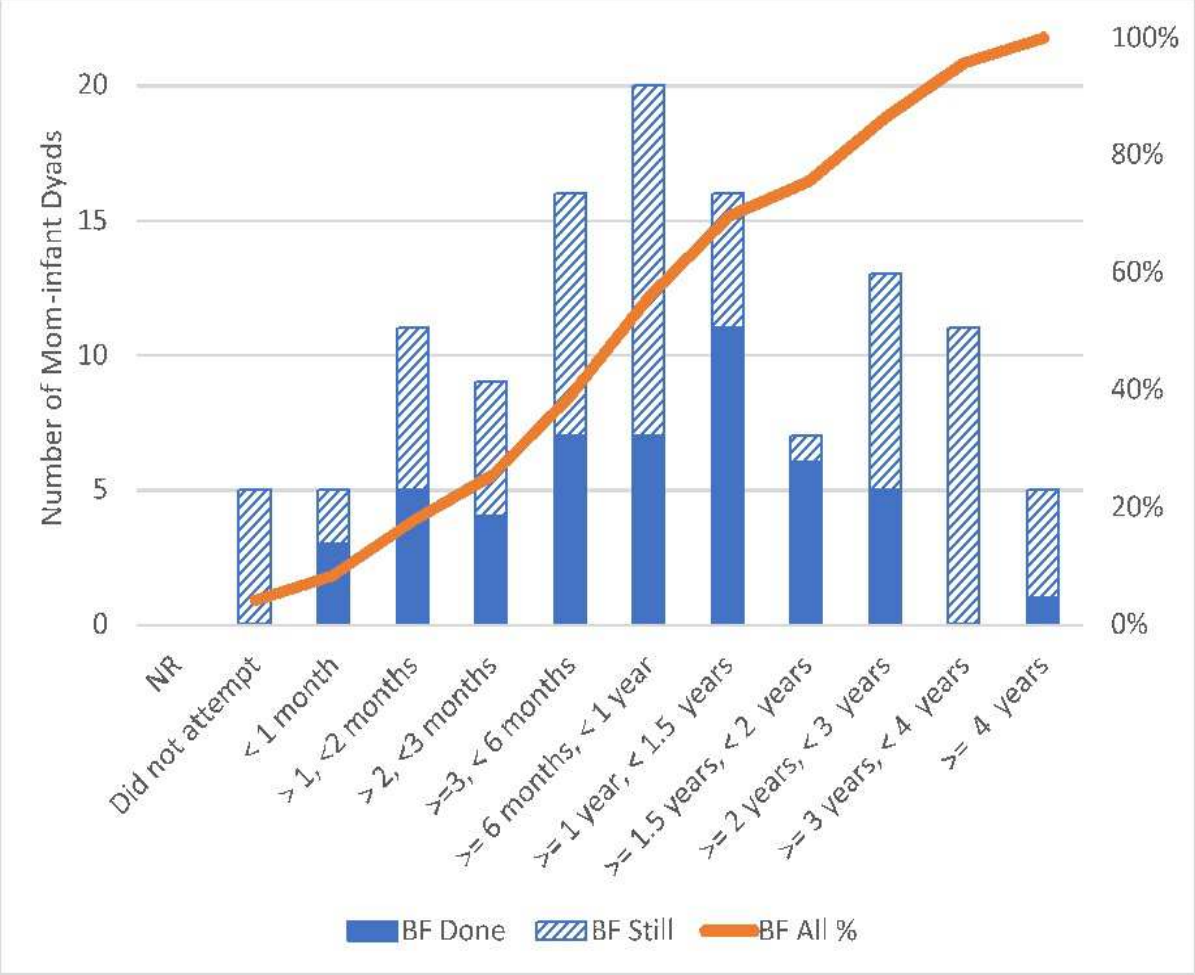

Figure 2: Total breastfeeding duration of NICU Moms, striped line indicates Moms who were actively expressing milk at the time responding to the survey, solid line indicates Moms who had finished, and the line indicates the cumulative percentage of Moms.

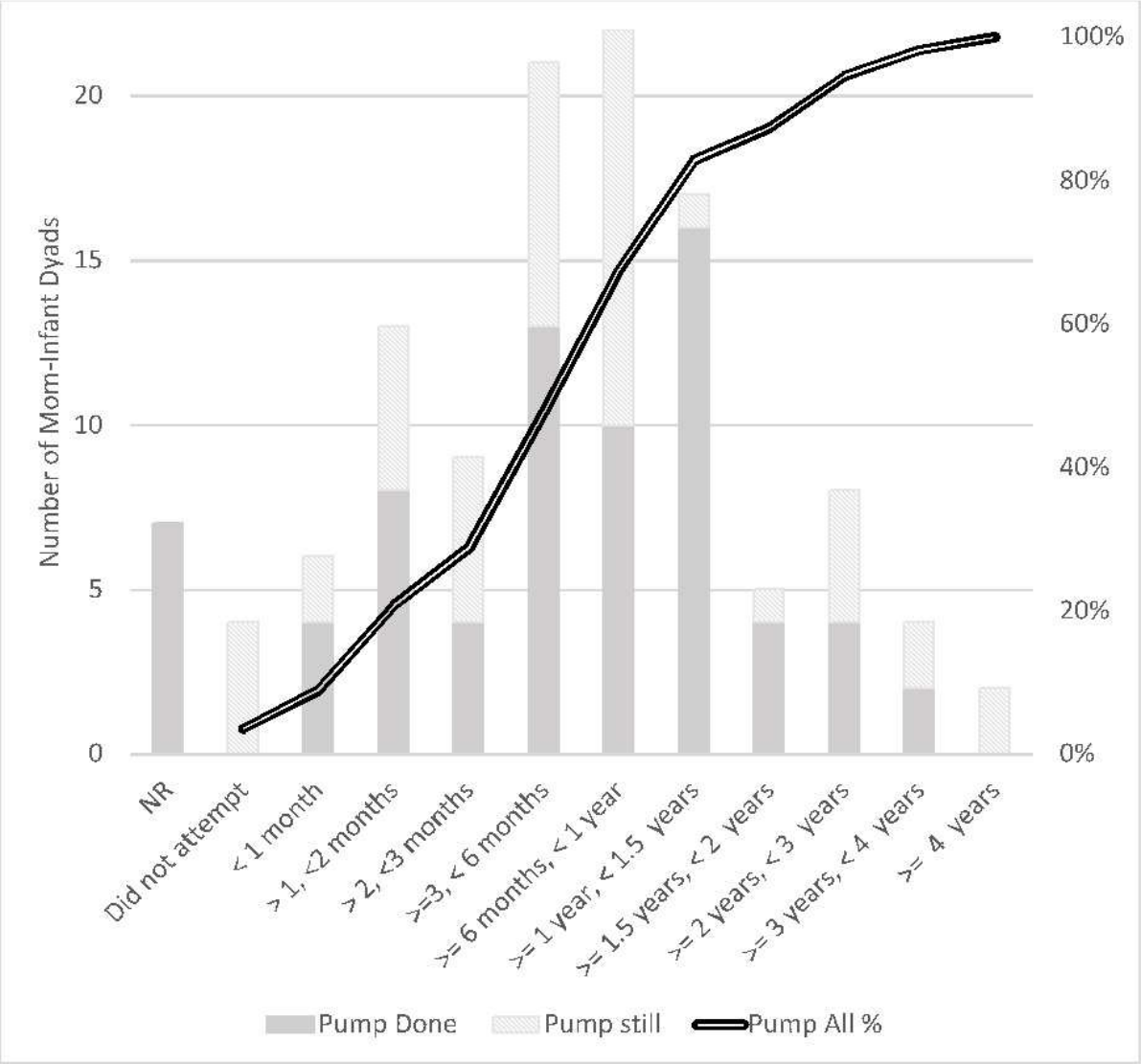

Figure 3: Total expressing milk duration of NICU Moms, striped line indicates Moms who were actively expressing milk at the time responding to the survey, solid line indicates Moms who had finished, and the line indicates the cumulative percentage of Moms.

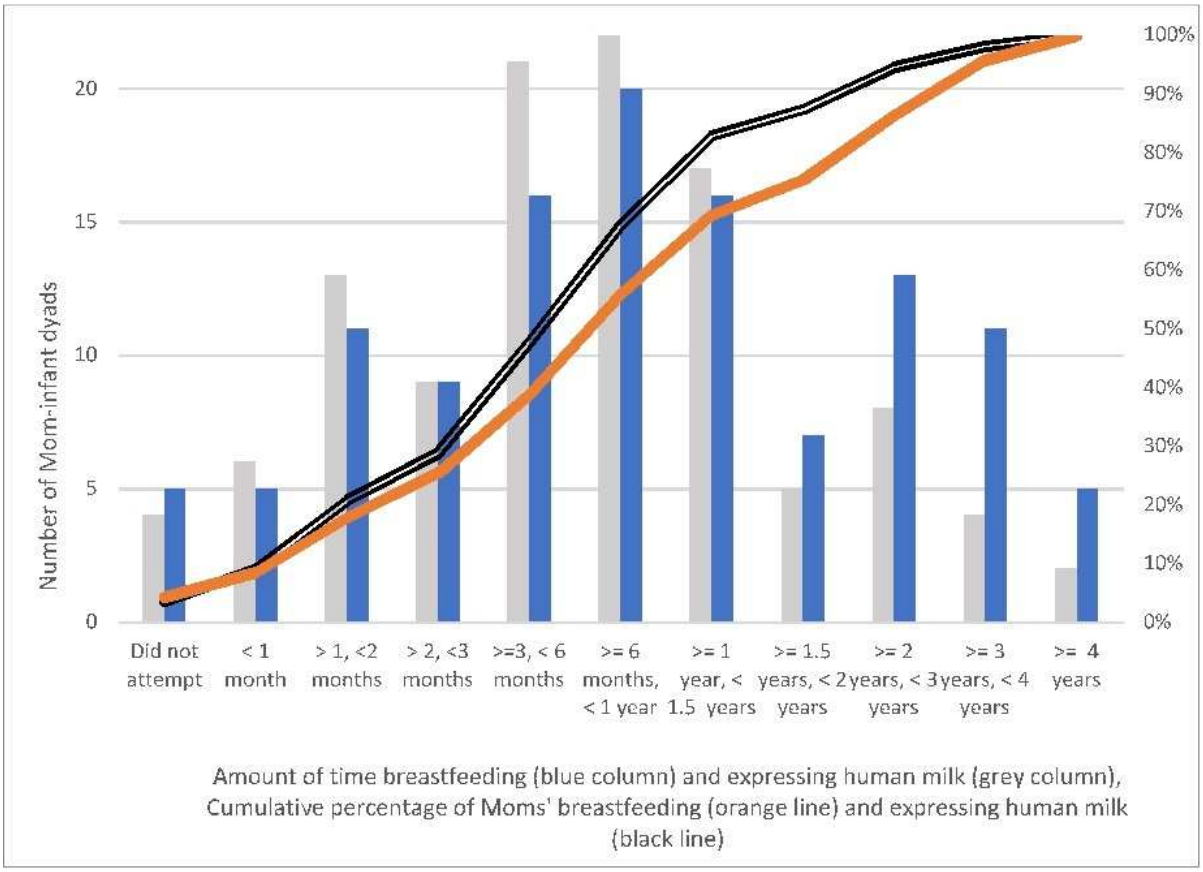

Figure 4: Total expressing milk and breastfeeding duration of NICU Mom-infant dyads (n=118).

Discussion

In this segment of a larger study, mothers of infants who received NICU care were surveyed to determine the initiation and duration of breastfeeding and milk expression. A larger and more diverse sample size is necessary to determine the impact of NICU care on breastfeeding initiation and duration. Future studies should be attentive to the Baby-Friendly Designation and other forms of support indicated by parents. This study correlates well with others that examined breastfeeding initiation and duration for NICU mother-infant dyads and was focused explicitly on self-reporting for mothers who follow breastfeeding coalition social media and their knowledge of the Baby-Friendly designation for the institution where they gave birth. This approach has limits, however, it also allowed for an examination of mothers who were generally supportive of breastfeeding and suggests that the NICU experience influences breastfeeding behaviors despite this support.

Limitations

The primary limitation of this study is the recruitment of respondents. By distributing the survey through breastfeeding coalitions the survey was answered by mothers who were connected to a coalition via social media and who were likely to be receiving or giving breastfeeding-related support. Additionally, the respondents tended to be white and wealthy, which provides a very limited picture of the experiences of women in the United States. Finally, the sample size is small and only reached a very small proportion of the population of parents caring for preterm or critically ill infants.

Conclusions

An online survey of mothers whose infants received NICU care was done in 2017. Mothers' intention to breastfeed significantly impacted breastfeeding and milk expression duration. Remarkably mothers caring for infants in the NICU with no intention to breastfeed did breastfeed or express milk. BFHI designation did not impact breastfeeding or milk expression duration, possibly since NICUs are not explicitly considered in BFHI guidelines. Caring for infants in NICUs may influence mothers' decision making about breastfeeding and milk expression duration. Additional research reaching a larger number of mothers who had no intention to breastfeed before birth is needed to determine if a strong correlation between intention to breastfeed and duration of milk expression exists. Further recruitment of mothers with no intention to breastfeed and mothers from diverse ethnic and socioeconomic background is needed to confirm the results found.

Acknowledgements:

The authors acknowledge equal authorship of this paper. Thank you to the many U.S. State Breastfeeding Coalitions who spread the word about this survey and the mothers who gave their time to answer it. Much appreciation to Catherine Maloney for help with data analysis.

References

Allers, K.S., 2017. The big letdown: How medicine, big business, and feminism undermine breastfeeding. St. Martin's Press.

Alves, E., Magano, R., Amorim, M., Nogueira, C., Silva, S., 2016. Factors Influencing Parent Reports of Facilitators and Barriers to Human Milk Supply in Neonatal Intensive Care Units. J Hum Lact 32, 695–703.

American College of Obstetricians and Gynecologists, 2017. Ob-gyns redefine meaning of "term pregnancy" No. 579.

Baby-Friendly USA, 2016. Guidelines and Evaluation Criteria for Facilities Seeking Baby-Friendly Designation. Baby-Friendly USA, Albany, NY.

Boucher, C.A., Brazal, P.M., Graham-Certosini, C., Carnaghan-Sherrard, K., 2011. Mothers' breastfeeding experiences in the NICU. Neonatal Network 30, 21.

Bower, K., Burnette, T., Lewis, D., Wright, C., Kavanagh, K., 2017. "I Had One Job and That Was To Make Milk": Mothers' Experiences Expressing Milk for Their Very-Low-Birth-Weight Infants. J Hum Lact 33, 188–194.

Briere, C.-E., McGrath, J., Cong, X., Cusson, R., 2014. An integrative review of factors that influence breastfeeding duration for premature infants after NICU hospitalization. Journal of Obstetric, Gynecologic, & Neonatal Nursing 43, 272–281.

Briere, C.-E., McGrath, J.M., Cong, X., Brownell, E., Cusson, R., 2016. Direct-breastfeeding in the neonatal intensive care unit and breastfeeding duration for premature infants. Applied Nursing Research 32, 47–51.

Brown, B., Thompson, A., Defranco, E., 2018. Providing Breastmilk to Infants in the Nicu: Factors Associated With Lack of Breastfeeding [27k]. Obstetrics & Gynecology 131, 127S.

Bujold, M., Feeley, N., Axelin, A., Cinquino, C., 2018. Expressing Human Milk in the NICU: Coping Mechanisms and Challenges Shape the Complex Experience of Closeness and Separation. Advances in Neonatal Care 18, 38–48.

Centers for Disease Control and Prevention, 2018. National Immunization Surveys [WWW Document]. Data, Tables, and Documentation. URL https://www.cdc.gov/vaccines/imz-managers/nis/data-tables.html (accessed 7.12.18).

Cricco-Lizza, R., 2016. Infant feeding beliefs and day-to-day feeding practices of NICU nurses. Journal of Pediatric Nursing: Nursing Care of Children and Families 31, e91–e98.

Croarkin, C., Tobias, P. (Eds.), 2013. Levene Test for Equality of Variances, in: Engineering Statistics Handbook. NIST, Gaithersburg, MD.

Edwards, R., 2018. An Exploration of Maternal Satisfaction With Breastfeeding as a Clinically Relevant Measure of Breastfeeding Success. J Hum Lact 34, 93–96.

Ford, C., 2017. The Wilcoxon Rank Sum Test.

Froh, E.B., Deatrick, J.A., Curley, M.A.Q., Spatz, D.L., 2017. Mothers of Infants With Congenital Diaphragmatic Hernia Describe "Breastfeeding" in the Neonatal Intensive Care Unit: "As Long as It's My Milk, I'm Happy." J Hum Lact 33, 524–532.

Ghasemi, A., Zahediasl, S., 2012. Normality Tests for Statistical Analysis: A Guide for Non-Statisticians. International Journal of Endocrinology and Metabolism 10, 486–489.

Hallowell, S.G., Spatz, D.L., Hanlon, A.L., Rogowski, J.A., Lake, E.T., 2014. Characteristics of the NICU work environment associated with breastfeeding support. Advances in neonatal care: official journal of the National Association of Neonatal Nurses 14, 290.

Hannan, K.E., Juhl, A.L., Hwang, S.S., 2018. Impact of NICU admission on Colorado-born late preterm infants: breastfeeding initiation, continuation and in-hospital breastfeeding practices. Journal of Perinatology 1.

Ikonen, R., Paavilainen, E., Kaunonen, M., 2016. Trying to live with pumping: Expressing milk for preterm or small for gestational age infants. MCN: The American Journal of Maternal/Child Nursing 41, 110–115.

Jayaraman, D., Mukhopadhyay, K., Bhalla, A.K., Dhaliwal, L.K., 2017. Randomized Controlled Trial on Effect of Intermittent Early Versus Late Kangaroo Mother Care on Human Milk Feeding in Low-Birth-Weight Neonates. J Hum Lact 33, 533–539

Kachoria, R., Oza□Frank, R., 2015. Trends in Breastfeeding Initiation in the NICU by Gestational Age in Ohio, 2006–2012. Birth 42, 56–61.

Lucas, R., Paquette, R., Briere, C.-E., McGrath, J.G., 2014. Furthering our understanding of the needs of mothers who are pumping breast milk for infants in the NICU: An integrative review. Advances in Neonatal Care 14, 241–252.

March of Dimes, 2016. 2016 Premature Birth Report Card. March of Dimes Foundation, Perinatal Data Center.

Merewood, A., 2013. Stepping Up the Baby-Friendly NICU. Journal of Human Lactation 29, 287–288.

Nyqvist, K.H., Häggkvist, A.-P., Hansen, M.N., Kylberg, E., Frandsen, A.L., Maastrup, R., Ezeonodo, A., Hannula, L., Haiek, L.N., 2013. Expansion of the Baby-Friendly Hospital Initiative Ten Steps to Successful Breastfeeding into Neonatal Intensive Care: Expert Group Recommendations. J Hum Lact 29, 300–309.

Petruskavich, S., Manikandan, R., Schallers, D., 2013. Leading the Baby Friendly Initiative in a NICU: One Hospital's Journey to Ignite the Change. Newborn and Infant Nursing Reviews 13, 133–136. https://doi.org/10.1053/j.nainr.2013.06.005

Schy, D., Leonardi, N., Kozmic, SarahE., Wiesbrock, J., Sulo, S., 2017. Pumping Practices and Characteristics of Mothers With Preterm Babies Going to the Neonatal Intensive Care Unit. Clinical Lactation 8, 66–73.

World Health Organization, 2018. Breastfeeding [WWW Document]. WHO. URL http://www.who.int/topics/breastfeeding/en/ (accessed 7.5.18).

Wray, A., Garside, J., 2018. Why do mothers stop breastfeeding before 6 months? A literature review. Journal of Health Visiting 6, 240–246.