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Context Matters: Evaluating the Influence of Patient Demographics and In-Patient Care Parameters on Breastfeeding Outcomes Associated with the Baby Friendly Hospital Initiative

Sarah Vivian Martin
Seattle University

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Sarah Vivian Martin, B.A., RN

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Approved by: _____ Date: 06-10-2021
DNP Faculty Mentor: Danuta Wojnar, PhD, RN, MED, IBCLC, FAAN

Approved by: _____ Date: 06-10-2021
DNP Project Reader: Patrick Murphy, PhD

Abstract

Objective: Evaluate the effectiveness of the global Baby Friendly Hospital Initiative (BFHI) as an intervention to improve breastfeeding outcomes and to explore factors that are most supportive and predictive of exclusive breastfeeding.

Design: Program evaluation of the BFHI using a retrospective pre and post implementation electronic health record chart review.

Setting: A tertiary level hospital in WA. BFHI designation was achieved in November 2017.

Participants: Patients with a low-risk pregnancy, who gave birth (vaginal or cesarean) to a healthy term infant in Quarter one of 2015 (N=145) and Quarter four of 2018 (N=131). Patient and infant must have been discharged home together.

Methods: Descriptive statistics were generated to retrospectively describe a cohort of patients who gave birth in Quarter one of 2015, before BFHI implementation, and another retrospective cohort of patients who gave birth in Quarter four 2018, after BFHI implementation. Analysis of the differences between the groups were conducted to determine significant differences between the cohorts and explore the potential causative factors between selected BFHI variables and breastfeeding outcomes.

Results: Exclusive breastfeeding rates did not increase from 2015 to 2018 after implementation of the BFHI. The contextual factors of low parity, vaginal birth, and shorter hospital stay were predictive of exclusive breastfeeding at discharge. Exposure to the midwifery model of care during inpatient postpartum recovery and being Caucasian were potentially predictive of exclusive breastfeeding at discharge.

Conclusion: Increased rates of exclusive breastfeeding at discharge were not observed after the implementation of the BFHI at the study site. Variables that were predictive of higher rates of

exclusive breastfeeding at discharge were: shorter length of hospital stay post-partum, lower parity, vaginal birth, having a CNM as care provider. Maternal age, race/ethnicity and insurance type did not influence rates of exclusive breastfeeding at discharge in statistically significant ways; however, Caucasian patients were most likely to breastfeed exclusively at discharge.

Keywords: Breastfeeding, Baby-Friendly Hospital Initiative, lactation, postpartum, pregnancy, evidence-based practice, hospital program evaluation

Callouts

1) Rates of exclusive breastfeeding at discharge decreased from 2015 to 2018 after the implementation of the BFHI and, although the decrease was not statistically significant, the decrease is clinically relevant. Contextual factors – like patient demographics, unit culture, and hospital care parameters – are important factors in the successful implementation of the BFHI.
2) Lower parity, having a midwife, shorter hospital stays, and vaginal birth were found to be statistically significant contextual factors that contributed to exclusive breastfeeding.

Introduction

For as long as human beings have reproduced, women have breastfed their babies. Breastfeeding is an inseparable biological component of the reproductive cycle and provides profound benefits to mothers, babies and communities. Research has shown that babies who are breastfed have lower morbidity and mortality rates, fewer dental problems, lower infections rates, end to have higher IQ later in life, and suggests that rates of obesity and diabetes are lower in adults who were breastfed as infants (Victoria et al. 2016). With the many benefits of breastfeeding, it is no wonder that immunologists are calling breastmilk a personalized medicine for babies that only their mothers can give (Victoria et al. 2016). Mothers, too, glean profound

benefits from breastfeeding their babies, with associated reduced rates of breast cancer, improved birth spacing, likely decrease in incidence of diabetes and ovarian cancer, and decreased incidence of postpartum depression (Figueiredo et al., 2014; Victoria et al. 2016). To put these breastfeeding benefits into perspective, the scaling up of breastfeeding can prevent an estimated 823,000 child deaths and 20,000 breast cancer deaths every year worldwide (Victoria et al. 2016). Additionally, there are significant global environmental and economic benefits to breastfeeding (Rollins et al., 2016). It has been estimated that "if 90% of U.S. families followed the recommended guidelines to breastfeed exclusively for at least 6 months, the United States would save 13 billion dollars annually on associated morbidity and mortality" (Munn et al., 2016).

Background and Significance

Exclusive breastfeeding has been declared the official recommended diet for all newborn babies by the United States surgeon general, and exclusive breastfeeding for the first 6 months of life with continued breastfeeding for 1 year or longer is the recommendation by the American Academy of Pediatrics (AAP) (DHHS, 2011; Munn et al., 2016; Centers for Disease Control (CDC), 2020). Even still, although the majority of mothers in the United States initiated breastfeeding at birth, approximately one in six infants born in 2019 still did not receive any breast milk (Chiang et al., 2021). The CDC's 2020 Breastfeeding Report Card found that the United States did not meet two of the seven Healthy People 2020 objectives: rates of breastfeeding infants through six months of age (goal: 60.6%, actual = 58.3%) and the number of newborns that receive formula within first two days of life (goal = 14.2%, actual = 19.2%) (CDC, 2020). In response, the Healthy People 2030 outlines two breastfeeding objectives for the current decade, including an increase in the proportion of infants who are breastfed exclusively

through 6 months of age from 24.9% to the target of 42.4%, and to increase the proportion of infants who are breastfed at 1 year from 35.9% to 54.1% (CDC, 2020).

Early hospital and community support are essential for breastfeeding success as they often have a direct impact on a mother's ability to establish and maintain breastfeeding (CDC, 2020). Most U.S. births occur in hospitals, naming these institutions as the locus around which important evidence-based practice improvement must occur in order to target the first critical hours and days after birth to help mothers meet their breastfeeding goals (CDC, 2020). While improved care policies and practices supportive of breastfeeding are reflected in our nation's improving breastfeeding outcomes over time, the fact that 84.1% of 2017 infants were breastfed at birth, with only 58.3% still breastfeeding at six months, highlights that there is still much work to be done to ensure that all women have access to the support that they need to ensure breastfeeding success (CDC, 2020).

The Baby Friendly Hospital Initiative (BFHI) is a global intervention program aimed at improving breastfeeding outcomes in a hospital-based environment. The CDC endorses the BFHI as an important player in promoting improved breastfeeding outcomes in the United States. The BFHI was launched in 1991 by the World Health Organization (WHO) and United Nations Children's Fund (UNICEF), an evidence-based global program with aims to promote, protect and support breastfeeding (Martinelli et al., 2019). The goal of the BFHI is to improve breastfeeding outcomes, including increased rates of breastfeeding initiation, breastfeeding exclusivity, and longer breastfeeding duration (Munn et al., 2016). Much of the BFHI interventions are centered around preparing hospitals and hospital staff to educate and support mothers in the early stages of breastfeeding (Friendly USA, 2019). A hospital can achieve official Baby Friendly status through broad-scale implementation of the *Ten Steps to Successful*

Breastfeeding and the *International Code of Marketing of Breastmilk Substitutes*, a codified list of practices which limits the availability of formula in hospital facilities and limits the marketing of formula to new mothers (Baby-friendly Hospital Initiative, 2018).

Literature Review

Twelve studies were included in this literature review including: five systematic review/meta-analyses, one cross-sectional survey, one descriptive survey, two reviews, two quasi-experimental retrospective cohort studies, and one retrospective secondary analysis of birth certificate data. Overall, the studies included in this literature review found a positive correlation between exposure to BFHI interventions and overall rates of initiation of immediate skin-to-skin, early breastfeeding initiation, breastfeeding exclusivity and breastfeeding duration. Some gaps in the literature/areas for growth were also identified and will be discussed.

Skin to Skin - The Golden Hour

Aptly named "The Golden Hour," the first 60 minutes after birth is known to be the most critical time for the mother-baby dyad (Neczypor & Holley, 2017; Sharma et al., 2017). Encouraging immediate and uninterrupted skin-to-skin contact of mother and baby provides unparalleled promotion of neonatal thermoregulation, decreases stress levels in mother and baby, improves attachment and bonding, and is a predictor of early and sustained success with breastfeeding (Neczypor & Holley, 2017). Despite this evidence, hospital policy, lack of education and time constraints on the part of hospital staff often result in the prioritization of a newborn’s bath, weighing and pediatric evaluation which disrupts bonding and successful first latch during those first few hours of infant life (Koopman et al., 2016; Neczypor & Holley, 2017).

Facilitating immediate and uninterrupted skin-to-skin contact between mother and baby

immediately after birth is Step 4 of the BFHI clinical interventions (Friendly USA, 2019). This literature review did not yield a dearth of information about the BFHI's impact on rates of skin-to-skin initiation in the United States. One cross-sectional survey of 786 women in Italy, found that skin to skin contact in group who gave birth in a non-Baby Friendly hospital was initiated 44.3% of the time, while skin to skin contact occurred 90.7% of the time in the patient group that gave birth in a hospital with BFHI designation (Marinelli et al., 2019). Because research findings indicate that immediate skin-to-skin contact between mother and baby is associated with a positive effect on first latch, exclusive breastfeeding, and extended duration of breastfeeding, more research is needed regarding the relationship between rates of immediate skin-to-skin, implementation of the BFHI practices, and overall breastfeeding outcomes (Difrisco et al., 2011).

Breastfeeding Initiation

Breastfeeding initiation shortly after birth is another key clinical deliverable of the BFHI, due to the positive correlation with rates of breastfeeding exclusivity after discharge (Ten Steps to Successful Breastfeeding, 2020). One descriptive survey found that rates of breastfeeding exclusivity at 2-4 weeks post discharge were significantly higher for mothers who initiated breastfeeding within the first hour after birth (Difrisco et al., 2011). This literature review encountered multiple research reports supporting the claim that birth at a Baby Friendly hospital is associated with improved rates of early breastfeeding initiation (Howe-Heyman & Lutenbacher, 2016; Liberty, et al., 2019; Munn et al., 2016). Likewise, a systematic review of 59 studies by Cleminson et al. (2014) found that high rates of compliance with BFHI standards is associated with increased early initiation and continuation of breastfeeding and these findings were consistently confirmed by a systematic review of 58 reports by Perez et al. (2016). These authors found a positive relationship between exposure to early breastfeeding initiation and

improved breastfeeding outcomes overall (Cleminson et al., 2014; Perez et al., 2016). Finally, a systematic review of 14 countries found that the BFHI had a positive effect on rates of breastfeeding initiation (O'Connor, et al., 2018).

One multistate quasi-experimental study did not find marked differences in rates of early breastfeeding initiation between mothers giving birth at Baby Friendly hospitals as compared to those without Baby Friendly designation (Hawkins, et al., 2019). Important to note, however, is that this study did conclude with an increased incidence of early breastfeeding initiation among mothers with lower education levels who delivered at Baby Friendly hospitals, noting that the BFHI may reduce socio-economic disparities in breastfeeding (Hawkins, et al., 2019).

Breastfeeding Exclusivity

Breastfeeding exclusivity is an important marker of the success of any breastfeeding promotion program. This literature review found a positive connection between exposure to Baby Friendly tenants and extended exclusivity rates. In a systematic review involving research findings from 14 countries, BFHI implementation was associated with "an upward trend in both exclusive breastfeeding and breastfeeding overall [as well as] duration rates of exclusive breastfeeding" (O'Connor et al., 2018). A 2016 meta-analysis found that several BFHI interventions were associated with a 49% increase over previous exclusivity rates while a 2014 systematic review of 59 studies found that the additional healthcare support associated with BFHI was associated with a roughly seven-fold increase in breastfeeding exclusivity at three months of age (Cleminson et al., 2014; Rollins et al., 2016). A positive relationship was found between exposure to BFHI tenants and improved breastfeeding exclusivity at discharge and breastfeeding exclusivity duration overall, suggesting that giving birth at a Baby Friendly institution is likely to increase the chances of exclusive breastfeeding for mothers and babies

(Perez et al., 2016). A final systematic review and meta-analysis of randomized controlled trials found that mothers who received any breastfeeding promotion were 2.77 times more likely to continue exclusive breastfeeding to six months after birth, with the BFHI showing the greatest effect among all exclusive breastfeeding interventions studied (Kim et al., 2018).

Breastfeeding Duration

One of the goals of Healthy People 2020 was for 60.6% of infants to be breastfed for 6 months, and 34.1% be breastfed for one year because, "duration and exclusivity, although more difficult to measure, are the outcomes that appear to have the greatest influence on health outcomes for women and children" (Howe-Heyman & Lutenbacher, 2016). Overall, this literature review found a positive relationship between exposure to the BFHI interventions and increased breastfeeding duration. The 2014 systematic review of 59 studies found that assistance by trained healthcare workers, and continued support with breastfeeding initiation and continuation, "increased the duration and exclusivity of breastfeeding" (Cleminson et al., 2014). Numerous studies found that, overall, exposure to BFHI interventions increased short- and long-term breastfeeding rates, with one study finding that 72% of mothers not exposed to the BFHI reported any breastfeeding at 2-6 weeks, while those exposed to the BFHI interventions reported a rate of any breastfeeding at 2-6 weeks of 83% (Kivlighan et al., 2020; Marinelli et al., 2019; Munn et al., 2016).

However, these results should be interpreted with caution in the absence of a clear roadmap as post-discharge breastfeeding support and accurate tracking of post-discharge breastfeeding is difficult to achieve, a long-term measure which the BFHI lacks (Munn et al., 2016). Additionally, we are reminded that exposure to in-hospital BFHI interventions are often short-lived post discharge without vigorous community support, lasting an average of only ten

days, making long-term community breastfeeding support a potential and significant weak link the in the BFHI (Kim et al., 2018).

Limitations of BFHI

While this literature review reports improvements in breastfeeding outcomes associated with BFHI interventions in general, it is very important to note that many studies found these results were often not consistent across socioeconomic, racial and ethnic lines. BFHI has been found by numerous studies to be even more effective for racial and ethnic minorities, mothers with lower education, those with lower socioeconomic status, and those living in rural areas (Liberty et al., 2020; Munn et al., 2016). However, these disadvantaged mothers all too often do not have access to the services that they need to be successful in their breastfeeding endeavors. One study conducted a geospatial analysis of the impact of the BFHI on rural regions specifically, finding that access to the initiative differed among rural and metropolitan areas - and thus divided along socioeconomic, racial and ethnic lines - because Baby Friendly Hospitals are more likely to be available in affluent, educated areas (Liberty et al., 2019). Mothers who more frequently had private insurance, were older, identified as non-Hispanic white, and less frequently received WIC assistance, were also more likely to give birth at a Baby Friendly Hospital than were their poorer, Medicaid insured, non-white, younger counterparts (Liberty, et al., 2019). As a result, this same study found that breastfeeding initiation, for example, is much lower in rural counties, and that these lower rates persisted over time due to lack of post-discharge support and lasting barriers like unemployment (Liberty et al., 2019). Likewise, just as women with higher education or private health insurance were more likely to be exclusively breastfeeding at three months, Hispanic women, women of color, and/or the unhoused, were less likely to initiate breastfeeding, breastfeed for shorter duration, and were less likely to exclusively

breastfeed - and were less likely to have access to a hospital with Baby Friendly accreditation (Kivlighan et al., 2020; O'Connor et al., 2018).

While numerous studies have found that the BFHI is the best available multi-step breastfeeding intervention available, the program can be inaccessible and challenging for some communities to implement due to the time, staffing, and the financial resources needed to implement the program. Thus, the communities in most need of support are often less likely to have access to it (Kim et al., 2018). These findings are yet another nod to the crucial need for equity in the way resources are disbursed, ensuring that Baby Friendly interventions are available to those who need them, that they are culturally appropriate, and that culturally appropriate post-discharge breastfeeding support exists as well. This could not be more relevant to the current state of healthcare in the United States, as the documented association between socioeconomic disadvantage and low breastfeeding rates are a direct reflection of the generational healthcare inequality at work in the United States (Cleminson et al., 2014).

Framework

The Donabedian Model for quality improvement in healthcare is a conceptual framework that is intended to be used to assess quality in healthcare (Donabedian, 1988). It includes three measures: structural, process, and outcome: "the structure of the health system creates and constrains the processes of care that the health system delivers. The process of care interacts directly with patients to create outcomes. Structure leads to process, and process leads to outcome (Howell, 2019). The BFHI was implemented by the local tertiary level hospital in an effort to improve patient breastfeeding outcomes. This study is intended to analyze the effect of the BFHI program by assessing breastfeeding support practices and outcomes before and after implementation during selected time periods. Using the Donabedian Model as the framework

through which to assess the BHFI, we can ask: what structures – i.e., hospital administrative priorities and challenges, Birth Center culture, RN and provider roles and satisfaction – are in place within the Birth Center that contributed to the outcomes that we found? What patient care processes – i.e., the effectiveness of patient care protocols implemented by the unit, provider and RN compliance, staffing challenges or nursing shortages – might have acted as barriers to the successful implementation of the BFHI interventions, and what processes positively affected its implementation? From these questions, we can more accurately assess the nuances that have contributed to the outcomes described in this study.

Objectives

The purpose of this project was to evaluate the effectiveness of the global BFHI as an intervention to improve breastfeeding support practices and outcomes at the Birth Center at Valley Medical Center (VMC), in Renton, WA, and to be an exploration of factors that are most supportive and predictive of positive breastfeeding outcomes – particularly rates of exclusive breastfeeding at discharge. In this retrospective quantitative study, we analyzed data related to the following variables directly related to the BFHI: immediate skin-to-skin, early encouragement to breastfeed, latch documentation, lactation consultant visits while inpatient, and whether breastfeeding exclusivity, education and arrangement for further lactation support occurred at hospital discharge. For further context, patient demographic data of age, parity, race/ethnicity and insurance type was also collected. We also analyzed provider type – physician or Certified Nurse Midwife (CNM) – and delivery type – vaginal or cesarean – as potential confounding variables in breastfeeding outcomes.

Findings will be compiled into a report and recommendation for the administration at VMC Birth Center for their review, with hopes of informing clinical practice change in the

future.

Methods

Design and Setting

The project is a retrospective program evaluation of the BFHI, which was implemented in November 2017 at the Birth Center at VMC in Renton, WA. Pre and post program implementation outcomes were retrieved from retrospective electronic health record (EPIC) and analyzed review.

Sample and Participants

A retrospective electronic health records review was conducted by collecting data from patients and their newborn charts that met the following inclusion criteria: (1) patient with low-risk pregnancy and birth between 38 and 41 weeks of pregnancy; (2) uncomplicated vaginal or planned cesarean birth; (3) birth to healthy infant with APGAR score for infant 7 or higher at 5 minutes of life; (4) patient and infant were discharged home together. Other demographic information that was collected was: mother's gravida/para, age, race/ethnicity, type of insurance. Provider type was also noted.

We collected data for 92 patients who gave birth with an OB as provider, and 54 patients who gave birth with a CNM as provider in quarter 1 of 2015 for a total sample size of N=146 patients in quarter one of 2015. Likewise, we collected data for 87 patients who gave birth with an OB as provider and 42 patients who gave birth with a CNM in quarter 4 of 2018, for a total sample size of N=131. These timeframes were chosen due to the proximity of BFHI implementation in November of 2017. The first quarter of 2015 (January, February, March) was deliberately chosen to control for any practice changes that may have started to be put into effect as the hospital began preparations to reach Baby Friendly designation but before actual

implementation. Similarly, the fourth quarter of 2018 (October, November, December) was chosen to allow for these practice changes to become established before analyzing them, and to control for the over excitement that sometimes comes with the implementation of new protocols.

Charts reviewed were each assigned a unique participant number and no identifiable patient data was collected or reported. Demographic information about the patients and their infants in the study was reported as aggregate descriptive statistics including means, modes, ranges, and standard deviations. Specifically, the following data was reported as aggregate data: patient age, race/ethnicity and gravida/parity, insurance type, gestational age, length of hospital stay, type of birth, and provider type.

Stakeholders and Significance

This study could be useful for informing further practice change at VMC's Birth Center, as well as acting as an important reflection on the unit's investment in the implementation of the BFHI. Other stakeholders are the practice manager, providers, nurses providing direct patient care, and the hospital's Research Oversight Committee. In addition, future DNP students who may wish to build off this study to conduct further quality improvement research projects may benefit from the findings in this study as a launching point.

Data collection

This study was conducted using patient data collected from Epic EMR at VMC in Renton, WA, with access to data facilitated by management at the hospital's Birth Center. A report from the EMR's report tool was generated with assistance from VMC's IT department using the study inclusion criteria.

Using this report, patient charts were individually accessed and further analyzed to ensure they met inclusion criteria. Further data was then collected by hand to compile the complete data

set that was used for analysis in this study. Data collection was conducted over a period of four weeks, during multiple trips to VMC during January and February of 2021.

The key variables that were assessed are: (1) was immediate skin-to-skin contact initiated between the mother and baby (Y/N), (2) was breastfeeding initiated or attempted within the first 90 minutes after birth (Y/N); (3) was the mother-baby dyad seen by a lactation consultant while in-patient and/or was post-discharge lactation support arranged before discharge (Y/N); (4) was latch score documented at least once per shift (every 12 hours) from birth until discharge; (5) was the mother-baby dyad breastfeeding exclusively at hospital discharge (Y/N); (6) what was the postpartum length of stay; and (7) what provider type oversaw care while inpatient (physician/CNM)?

Data analysis

Use of z-tests and t-tests when appropriate, were used for describing differences among 2015 and 2018 patient groups. The patient parameters from 2015 and 2018 were analyzed as independent populations and asked if there was a statistical likelihood that the two populations were, in fact, different from each other. The questions being asked, using t-tests & z-tests, were: 1) how often did each parameter occur in 2015 and 2018; 2) were there statistically different rates of occurrence; and 3) were there statistically different rates of occurrence among mothers who were exclusive breastfeeding at discharge? Two-sample tests were run to describe how the proportions of variables differed between 2015 and 2018.

Simple and multiple linear regression models were used to identify if individual differences in 2015 and 2018 patient parameters were predictive of exclusive breastfeeding at discharge. Using exclusively breastfeeding at discharge as the dependent variable, we sought to identify which patient parameters might optimally serve as predictors (i.e., independent

variables) of exclusive breastfeeding at discharge. The independent variables were first analyzed alone (i.e., simple linear regression), and then in combination. Questions being asked, using simple & multiple linear regression models were: 1) how often did each parameter occur in 2015 and 2018; 2) were there statistically different rates of occurrence; 3) were there statistically different rates of occurrence among mothers who were exclusive breastfeeding at discharge?

Ethical considerations

This research study was deemed to be "Not Human Subjects Research" (NHSR) and IRB exempt by Seattle University's Valley Institutional Review Board (IRB), and received approval from Valley Medical Center's Research Oversight Committee (ROC).

Because the data collected in this study consisted of anonymous chart review, and did not engage with individuals directly, there was no participant recruitment or informed consent process. Charts reviewed were each assigned a unique participant number and no individual data was reported. Demographic information about the patients and infants in the study were reported as aggregate descriptive statistics with no identifying details revealed.

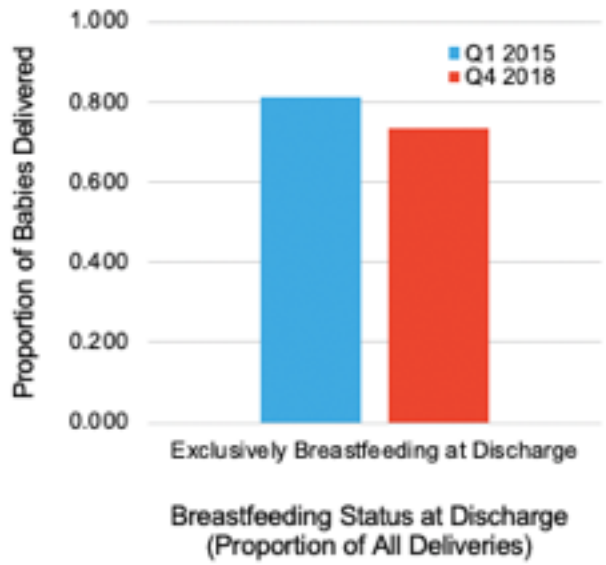
Findings

Using a relatively stringent 2-sample test, the data found that patients in 2018 were slightly less likely to exclusively breastfeed at discharge (73.3%) than were those discharging from the hospital in 2015 (81.4%). Although this finding was not statistically significant ($p=0.143$), it may be clinically relevant that rates actually dropped after BFHI implementation (see Figure 1). The data pertaining to the specific BFHI interventions of immediate skin-to-skin contact, early breastfeeding initiation, frequency of latch score documentation, lactation support – and how they related to rates of exclusive breastfeeding at discharge – are explored in another related paper. The focus of this project is to analyze the contextual variables in which the BFHI

interventions were implemented at the VMC Birth Center, with the hope of shedding a more nuanced light on the findings. To do this, patient demographic information and hospital and care profile parameters were analyzed for their relation to rates of exclusive breastfeeding at discharge in both years.

Figure 1

Rates of exclusive breastfeeding at discharge in 2015 vs. 2018



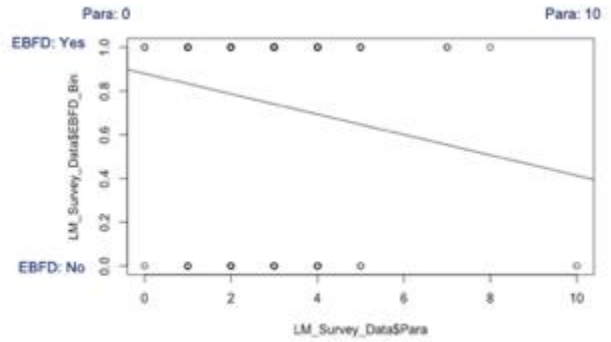
In order to understand what other factors might have contributed to the decrease in exclusive breastfeeding rates post-BFHI implementation the following patient and hospital parameters were analyzed: maternal age, race/ethnicity, parity, patient insurance type, healthcare provider type, postpartum length of stay, and delivery type.

The variables of lower parity, being cared for by a CNM while in-patient, shorter length of postpartum length of stay, and vaginal birth were most predictive of higher rates of exclusive breastfeeding at discharge. Lower parity was found to be a statistically significant ($p<0.05$) predictor of higher rates of exclusive breastfeeding at discharge in both years (see Figure 2). In

other words, the higher the parity, the less likely the patient was to be exclusively breastfeeding upon discharge.

Figure 2

The effect of parity on rates of exclusive breastfeeding at discharge



Simple linear regression, combined 2015 & 2018 data
*EBFD: Exclusive breastfeeding at discharge

Overall, we saw a decrease in exclusive breastfeeding at discharge from 2015 to 2018 in both provider types – from 74% to 69% in the physician group (p=0.634), and from 94% to 81% among the midwifes (p=0.097). However, even though breastfeeding rates dropped overall, and slightly more-so in the CNM group, it is important to note that rates of exclusive breastfeeding at discharge were still higher in the CNM group in both years (see Figure 3). Indeed, having a CNM as provider was a statistically significant (p<0.01) predictor of exclusive breastfeeding at discharge.

The data analysis revealed a statistically significant (p=0.001) correlation between shorter hospital stays and higher rates of exclusive breastfeeding upon discharge (see Figure 4). In other words, the longer a patient stayed in the hospital, the less likely they were to be exclusively breastfeeding when they went home – this was true in both 2015 and 2018.

Figure 3

Rates of exclusive breastfeeding at discharge by provider type

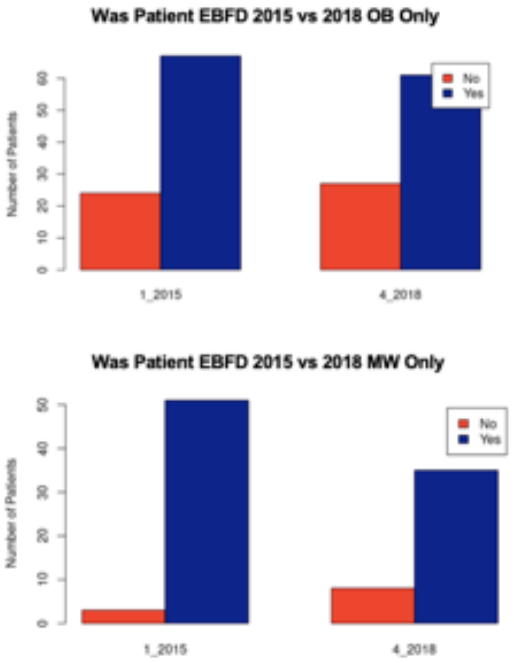
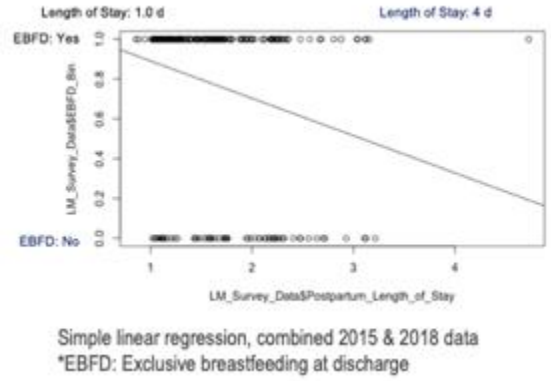


Figure 4

Postpartum length of stay: Effect on rates of exclusive breastfeeding at discharge

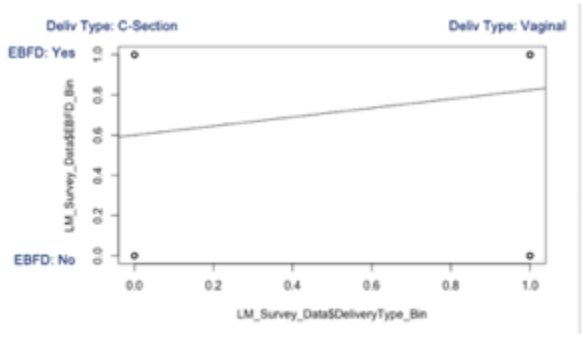


Simple linear regression, combined 2015 & 2018 data
*EBFD: Exclusive breastfeeding at discharge

Finally, the data revealed that vaginal delivery is a very strong statistically significant (p=0.001) predictor of exclusive breastfeeding at discharge, regardless of the year (see Figure 5), while Cesarean births were predictive of lower rates of exclusive breastfeeding.

Figure 5

Effect of delivery type on rates of exclusive breastfeeding at discharge



Simple linear regression, combined 2015 & 2018 data
*EBFD: Exclusive breastfeeding at discharge

The variables of patient insurance type, race/ethnicity, and maternal age at delivery were not found to be a statistically significant predictor of exclusive breastfeeding rate at discharge. However, there were some interesting and potentially clinically significant findings associated with the patient demographic variables that warrant further discussion, such as the finding that Hispanic patients were found to be 1.7 times more likely to give birth via cesarean than Caucasian patients during both study periods, and that Caucasian patients were most likely to breastfeed exclusively at discharge. These findings will be explored further in the discussion section.

Discussion

This study did not observe increased rates of exclusive breastfeeding at discharge after the implementation of the BFHI at the VMC Birth Center as expected, given the findings of prior published reports (Kim et al., 2018; Perez et al., 2016). Of the specific Baby Friendly interventions that were implemented, the only Baby-Friendly variable that underwent a significant increase after BFHI designation was immediate skin-to-skin contact (p=0.004). Immediate skin-to-skin contact (p<0.001), initiating breastfeeding in the first 90 minutes after delivery (p<0.001), and latch score documentation (p<0.01) were positively correlated with a mother exclusively breastfeeding at discharge; however, the only variable that increased in

association with BFHI implementation was immediate skin to skin contact (Jaquish, 2021). In the absence of the expected improvement in post-BFHI breastfeeding outcomes, patient demographics and hospital care parameters were analyzed to explore the contextual environment in which these unexpected phenomena emerged. Specifically, we analyzed the potential impact of race/ethnicity, maternal age, insurance type, parity, postpartum length of stay, provider type and delivery type on rates of exclusive breastfeeding at discharge, as well as any difference in these variables between 2015 and 2018. Consistent with prior reports lower parity, shorter hospital stay, having a CNM as provider type, and vaginal birth, were all strongly correlated with breastfeeding exclusivity at discharge, regardless of the year (Difrisco et al., 2011; Hamlin et al., 2021; Lande et al., 2020; Sutherland et al., 2012). Maternal age, race/ethnicity and insurance type were not found to have a statistically significant bearing on rates of exclusive breastfeeding at discharge, but the racial/ethnic makeup of our patient sample still yielded some notable findings that will be discussed here.

Our data found that higher parity was strongly correlated with decreased rates of exclusive breastfeeding at discharge. This phenomenon is present in both years of data, thus does not appear to be influenced by the implementation of the BFHI. While this seems counterintuitive – one might expect patients who are already parents to have higher success rates – this is consistent with present literature. An 858 subject longitudinal cohort study conducted by Johns Hopkins University concluded that successful breastfeeding initiation decreases as birth order increases, and unsuccessful breastfeeding initiation with a first pregnancy is highly correlated with lower rates of breastfeeding success in subsequent pregnancies (Sutherland et al., 2011). This study builds off the prior findings that associated decreased rates of breastfeeding among multiparas “primarily because women who are unsuccessful with breastfeeding their first

child are less likely to attempt breastfeeding with subsequent deliveries. The overall result is a decrease in the proportion of women breastfeeding across pregnancies" (Sutherland et al., 2011). These phenomena, also supported by our data, suggest that multiparas – particularly those with a history of breastfeeding difficulties – might benefit from especially targeted breastfeeding support antenatally, during the immediate postpartum period, and especially post-discharge via robust community resources. Exposure to the BFHI did not change outcomes for these multiparous patients, indicating that perhaps the global initiative is not effective as a one-size-fits all package for all patients.

A longer postpartum length of stay was significantly correlated with lower rates of exclusive breastfeeding at discharge during both 2015 and 2018 study periods, and there was no significant difference between mean length of stay between years. Most recent research about the relationship between postpartum length of stay and breastfeeding outcomes has been inconclusive. Though one 2017 systematic literature review found that breastfeeding outcomes were not affected by length of postpartum stay, the study specifically explored the impact of early discharge on maternal and neonatal outcomes in the postpartum period, with the assumption being that earlier – not later – discharge might increase risk of adverse breastfeeding outcomes (Benahmed et al., 2017). This review cites an "international trend to shorten the postpartum length of stay in hospitals driven by cost containment, hospital bed availability and a movement toward the 'de-medicalization' of birth," and concluded that not enough definitive research existed to make specific recommendations (Benahmed et al., 2017). One possible explanation for these findings may be a failure to ascertain maternal intent to breastfeed. While successful breastfeeding at discharge is considered a measure of BFHI success, one systematic review and meta-analysis found that some mothers exposed to BFHI interventions initiated

breastfeeding despite lacking intention to breastfeed, or did not have sufficient breastfeeding support upon discharge, resulting in a swift discontinuation of breastfeeding (Kim, et al., 2018). It could be that longer hospital stays in our data simply witness the breakdown of the breastfeeding relationship that would have happened upon discharge anyway. This indicates that more communication and education before birth is vital to creating an immediate postpartum plan, and that robust community support upon discharge is essential. Further study is needed to understand the phenomena behind our findings, and points to an area rich for further study.

Our findings also supported what is already well known in the literature, that vaginal birth is known to be most supportive of optimal breastfeeding outcomes, while cesarean birth is associated with decreased breastfeeding initiation, continuation, and non-exclusive breastfeeding at discharge (Difrisco et al., 2011; Lande et al., 2020; Sutherland et al., 2012). The data in our study supported vaginal birth as predictive of exclusive breastfeeding at discharge, regardless of the study year. There were more cesarean births in 2018 (24%) at the VMC Birth Center, as opposed to 19% in 2015, and while this was not a statistically significant finding ($p=0.377$) it may be clinically relevant as one potential explanation for the lower rate of exclusive breastfeeding in 2018. However, patients who gave birth after the implementation of the BFHI in 2018 via cesarean were slightly more likely to be discharged with exclusive breastfeeding on board (though not significantly, $p=0.492$), and those who gave birth vaginally were significantly ($p=0.029$) less likely to be exclusively breastfeeding at discharge than were their 2015 counterparts. Interestingly, our study showed that the BFHI was protective of exclusive breastfeeding for those who had cesarean births and predictive of less exclusive breastfeeding for vaginal births. More research with larger sample sizes and longer study periods is needed to better understand these phenomena. Regardless of the decrease in rates of exclusive

breastfeeding at discharge in the 2018 vaginal birth cohort, overall vaginal delivery was still found to be highly predictive of exclusive breastfeeding at discharge in both years. However, it remains clear that patients who give birth via cesarean are up against significantly more complications and challenges in the postpartum period and we find, again, that a standard approach to breastfeeding promotion does not equally serve every patient. The BFHI could benefit from the inclusion of interventions that are more able to be tailored to specific contexts based on individual patient need. Finally, it is important to note that our data saw a 1.7 times higher instance of cesarean births among Hispanic patients as opposed to white patients ($p=0.03$) and, given the relationship that delivery type has with breastfeeding outcomes, feel that this figure warrants further investigation for this population.

Analyzing breastfeeding rates by provider type was a primary goal of this study and, while our data did not observe an explicit increase in exclusive breastfeeding in relation to the BFHI in either provider group, we did find that being cared for by a CNM in either year was highly predictive ($p<0.01$) of exclusive breastfeeding at discharge. Even when controlling for delivery type, CNMs were more likely to elicit higher rates of exclusive breastfeeding at discharge than were patients who gave birth vaginally under the care of a physician. More research is needed to understand this variation, but this does correlate with a few prior studies that recently compared breastfeeding outcomes by provider type. One self-report study of 455 expectant patients found that patients of CNMs were more than twice as likely to intend to exclusively breastfeed than patients of physicians (Balyakin et al., 2016). It is well documented in the literature that breastfeeding intentions are generally established by the third trimester, and that breastfeeding “intention is strongly predictive of initiation and of duration, provided the context is supportive” (Rollins et al., 2016). It is unclear from these results whether patients who

intend to breastfeed are more likely to seek out care by a CNM during their pregnancy, and thus have higher rates of exclusive breastfeeding, or if exposure to the midwifery model of care influences intent and outcomes – or both. One descriptive retrospective study of obstetric outcomes by prover type analyzed records of 136,526 patients in the military health system in 2014, and their findings confirmed that care by CNMs had lower rates of many obstetric interventions and complications – including lower rates of cesarean birth and higher rates of breastfeeding – than did patients who received their care from physicians. To control for the argument that "comparing birth outcomes between provider types without stratifying for women's risk status result in apples to oranges comparisons" the 2014 study examined the characteristics and quality of the vaginal births attended by CNMs and physicians and found that CNMs and physicians cared for patients with comparable ranges of risk (Hamlin et al., 2021). Of note, the CDC's 2020 Breastfeeding Report Card endorsed the impact that provider training has on breastfeeding outcomes and found that many providers feel that they do not possess adequate training to effectively help support those with breastfeeding difficulties (CDC, 2020). Improved provider training was re-enforced as a vital element of the Baby Friendly's *Ten Steps,* which is a potential element of our findings here. Overall, findings from our study are commensurate with emerging findings across the nation that midwives often see improved outcomes across all aspects of patient care, with improved rates of exclusive breastfeeding among them.

Our study did not find the racial or ethnic makeup of patients to be a statistically significant confounding variable when analyzing exclusive breastfeeding rates between years. However, white mothers were more likely to exclusively breastfeed at discharge than non-white mothers during both study periods and, while this finding was not statistically significant ($p<0.01$), it is clinically relevant and warrants more discussion as it is well documented that

breastfeeding outcomes are less favorable among patients who are lower income and non-white (Brand et al., 2011; Kivlighan et al., 2020; Chiang et al., 2021; Hemmingway et al., 2021). A recent focus group that surveyed 38 African American women in the Detroit metro area concluded that, while exposure to the BFHI caused rates of breastfeeding initiation to increase significantly, they were also much less likely to continue breastfeeding while inpatient than were non-Black patients (69.4% versus 84.6%, $p < 0.0001$) and noted that even when controlling for demographic and medical comorbidities, these racial disparities did not disappear (Hemmingway et al., 2021). Likewise, the CDC's 2020 Breastfeeding Report Card found that fewer non-Hispanic Black infants (73.7%) and Hispanic infants (84.1%) are ever breastfed when compared with Asian infants (90%), non-Hispanic White infants (86.7%) (CDC, 2020). The CDC's Morbidity and Mortality Weekly Report recently reported on data from 3,129,646 births certificates from 2019, which found "large racial/ethnic disparities existing both nationally and at state and territorial levels [and that] infants from some racial/ethnic minorities who are already at the highest risk for [adverse health] conditions are often among the least likely to be breastfed" (Chiang et al., 2021). This report found that disparities varied significantly by state and that "states with lower breastfeeding initiation rates generally had a higher prevalence of racial/ethnic breastfeeding disparities than did states with higher initiation rates" furthering the argument that maternal and neonatal interventions, including those specific to breastfeeding, must be made in a culturally specific way on a local level, and that interventions like the BFHI must be able to control for these variations (Chiang et al., 2021). Overall, our findings are not nuanced enough to add much to the conversation around race and healthcare inequity, but the increased rates of exclusive breastfeeding among Caucasian patients in both years does support what is already known in the literature – that current national breastfeeding outcomes reflect the deep racial

disparities at work within our healthcare system.

While our data did not include a collection of post-discharge rates of exclusive breastfeeding, it is worth mentioning how our findings might interact with post-discharge outcomes. Community based support of breastfeeding in the post-partum period is the final measure in the BFHI's *Ten Steps to Successful Breastfeeding* and is arguably the most difficult to implement and track, but no less important to outcomes. The CDC found that "although most infants born in 2017 started breastfeeding (84.1%), only 58.3% of infants were breastfeeding at 6 months," indicating the postpartum period as a time rife with potential challenges that may signal the end of the breastfeeding journey for a mother and baby (CDC, 2020). Recent studies have found that post-discharge community support is an integral key to ensuring that the BFHI interventions have staying power (Kim et al., 2018; Rollins et al., 2016). Thus, a measure such as exclusive breastfeeding at discharge is only as significant as the support that is in place upon the patient's return to their community. Indeed, one study found that the greatest effect on increased exclusive breastfeeding rates were "postnatal interventions that implemented professional counselling and peer support" further stressing the importance of long-term postpartum community support as an integral component to the success of long-term exclusive breastfeeding (Kim et al., 2018). It appears that this may be a weak area in the staying-power of the BFHI, as the implementation of the final step of community support is more difficult to implement and track. More research and more robust interventions are indicated here.

Summary

This study did not observe increased rates of exclusive breastfeeding at discharge after the implementation of the BFHI at the study site as expected, though we did see an increase in immediate skin-to-skin contact after birth post-BFHI implementation. Demographic and in-

patient hospital care parameters that were predictive of exclusive breastfeeding at discharge were: shorter length of hospital stay post-partum, lower parity, vaginal birth, having a CNM as care provider. We also found higher rates of exclusive breastfeeding at discharge among Caucasian patients and, though this was not a statistically significant finding, is clinically relevant and warrants more study. Maternal age and insurance type did not seem to influence rates of exclusive breastfeeding at discharge. While the literature indicates that the interventions promoted by the BFHI appear to have a positive impact on breastfeeding outcomes, our study did not replicate this. This data does, however, point towards the importance of implementing the BFHI interventions in an individualized, culturally relevant way.

Limitations

Manual extraction of patient outcomes and in-patient activities was time consuming, lacked standardization, and was difficult to automate. This is a known challenge in the pursuit of patient care outcome monitoring and, along with lack of standardization of breastfeeding charting, leaves a gap in breastfeeding outcome tracking and subsequent practice improvement (Munn et al., 2016).

Provider documentation was not consistent between individual providers. We were unable to assess the subjective experience of care providers and patients, and how this might have affected unit compliance and patient desire to breastfeed. A qualitative analysis of shifts in unit culture, nursing culture, or internal challenges that might have affected compliance or implementation of the BFHI interventions between 2015 and 2018 might shed more light on our data.

Originally, one of our inclusion criteria for this study was a patient's expressed desire to

breastfeed. We were not able to identify patient desire or intention to breastfeed, which has been shown to have a significant effect on rates of initiation and breastfeeding at discharge, exclusive or not. A quantitative patient survey analysis for these patients might yield more nuanced results in this important area.

Due to time constraints, we were not able to assess all patient birth records in each quarter, as there were substantially more physician births than CNM births per quarter. Thus, we analyzed every CNM birth per quarter (43 of 436 total births in 2018, for example) and took a random sampling of physician births per quarter. Hence, the current study may not have been an accurate representation of all physician birth practices at the study site during each quarter.

Finally, we were limited in our analysis of the impact of race/ethnicity on rates of exclusive breastfeeding at discharge and were thus not able to draw any robust conclusions in this area. While our findings were clinically relevant, a larger sample size might have enabled more robust, reportable findings to contribute to the literature.

Conclusions

While this study did not conclude with findings of a statistically significant increase in exclusive breastfeeding at discharge after the implementation of the BFHI at the study site, we did gain valuable insight into contextual factors that are predictive of successful breastfeeding outcomes, namely lower parity, vaginal birth, shorter length of hospital stay, and receiving in-patient care from CNMs. It was also observed that Caucasian patients were more likely to exclusively breastfeed at discharge than patients of color and, while this study lacked the sample size needed to make definitive conclusions, we recognize that this finding is troublingly in keeping with national trends and warrants continued study and targeted, culturally appropriate interventions. Lastly, the incidental yet highly relevant finding that Hispanic patients were 1.7

times more likely to give birth via cesarean than are Caucasian patients warrants further research.

Many findings from the current study point to the potential utility of individualizing postpartum education and support to the unique needs of each patient, be it variations in parity, race/ethnicity, mode of birth, or complications related to birth that might compromise the breastfeeding relationship. Perhaps, while large-scale interventions like the BFHI have been found to be effective at reaching many people in most cases, the BFHI's *Ten Steps to Successful Breastfeeding* may not fully equip care providers and institutions to pivot according to individual patient need. Further study into implementing the BFHI in ways that are culturally competent and tailored to individual need might yield interesting results.

Finally, this study contributes to the growing body of knowledge that midwives often see improved outcomes across all aspects of patient care, with improved rates of exclusive breastfeeding among them. Midwives Alliance of North America (MANA) says that "personalized care is essential to midwifery care" and the American College of Nurse Midwives (ACNM) states that midwifery care at its core "includes individualized methods of care and healing guided by the best evidence available...which respects and is inclusive of diverse histories, backgrounds, and identities" (ACNM, 2020; MANA, 2020). Midwives are thus uniquely poised to offer individualized, culturally competent care in the service of improved breastfeeding outcomes and may provide a roadmap for how institutions might approach the optimal implementation of the BFHI and the promotion of breastfeeding overall. This exploration and phenomena point in the direction of rich potential for further study.

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