

Standardizing Lactation Education in the Antepartum Period

Naomi O. Hester, BSN, RN

Oregon Health & Science University School of Nursing

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Problem Description

Breastfeeding has many known health benefits for infants and birthing people and is an effective strategy to improve public health (CDC, 2020). The American Academy of Pediatrics (AAP) recommends infants exclusively breastfeed for the first six months of an infant's life, followed by breastfeeding in combination with nutritious complementary foods for at least 1 year (Meek & Noble, 2022). The majority of infants born in the United States in 2019 (83.2%) started out breastfeeding, but only 55.8% of infants were receiving some breast milk at 6 months (CDC, 2022). On the state level, Oregon's 2019 breastfeeding initiation rate (95.0%) was significantly higher than the national average and infants were more likely to be breastfed at 6 months (65.2%) (CDC, 2022). In Multnomah County, Oregon, the 2019 breastfeeding initiation rate was slightly above the state average at 96.4% (CDC, 2021). However, county data on postpartum breastfeeding rates demonstrate an early termination of breastfeeding within the first 6 months of life (Multnomah County Health Department, 2013).

Evidence suggests that a birthing person's stated intention to breastfeed is one of the strongest predictors of breastfeeding initiation (Raissian & Su, 2018). Yet, 60% of lactating parents stop breastfeeding before they intend to (Beauregard et al., 2022). The most recent data aggregated by Multnomah County noted that the most frequently identified reason for breastfeeding cessation at 3 months (33%) and 6 months (39%) postpartum was because the birthing person thought they were not producing enough milk (Multnomah County Health Department, 2013). A faculty midwifery practice in the Pacific Northwest seeks to standardize lactation education in the antepartum period to enhance knowledge, attitude, and self-efficacy of breastfeeding and perceived milk supply in the postpartum period.

Available Knowledge

At the onset of this project, in the midwifery practice for which this project has been devised, lactation education was not standardized in the antepartum period. The AAP, American College of Obstetricians and Gynecologists (ACOG), and World Health Organization (WHO) recommend that breastfeeding be initiated after birth, exclusively continued for the first 6 months, and augmented by the introduction of complementary foods for up to two years of age (ACOG, 2021; Meek & Noble, 2022; CDC, 2022). Despite these recommendations, 83.2% of infants born in the United States initiate breastfeeding before hospital discharge and a mere 24.9% exclusively breastfeed at 6 months (CDC, 2022). As demonstrated by the evidence, early breastfeeding cessation is a pervasive public health issue and inadequate antenatal lactation education serves as a missed opportunity to influence feeding outcomes.

In a study involving 69 obstetric providers (including 36 obstetrics-gynecology residents, 6 nurse-midwives, and 5 nurse practitioners) and 377 patients attending their initial prenatal visits it was found that breastfeeding discussions were infrequent (29% of visits), brief (m=39 seconds), and most often initiated by clinicians in an ambivalent manner (Demirci et al., 2013). Sixty-nine percent of breastfeeding discussions incorporated ACOG breastfeeding recommendations. Nurse-midwives were found to be significantly more likely to discuss breastfeeding compared to obstetrics-gynecology residents (OR 24.54, 95% CI: 3.78-159.06; $p < 0.01$), and nurse-midwives tended to engage patients in more open discussions. As reproductive health experts who work in conjunction with lactation consultants and pediatric health care providers, nurse-midwives are uniquely positioned to help patients achieve their infant feeding goals.

Best Practice Recommendations

The Academy of Breastfeeding Medicine (ABM) clinical protocol on peripartum breastfeeding management states that all pregnant people should receive prenatal education about the benefits and management of breastfeeding to allow for an informed decision about infant feeding (ACM, 2013). The ACOG policy statement on breastfeeding education supports early educational intervention from a healthcare professional during pregnancy (ACOG, 2021). Along with breastfeeding education, the promotion of breastfeeding in the antepartum period also includes the assessment of any medical or physical conditions that could affect a pregnant person's ability to breastfeed their infant (ABM, 2013). When risks are identified, the ABM recommends a prenatal consultation with an International Board Certified Lactation Consultant (IBCLC) and that a postpartum follow-up plan is developed between the birthing person and their provider (ABM, 2013). The American College of Nurse-Midwives (ACNM) position statement on breastfeeding/chestfeeding positions midwives as essential care providers equipped to support patient lactation goals through direct health education and support during the prenatal, immediate postpartum, and ongoing postpartum periods (ACNM, 2022).

Risk Factors for Impaired Lactation

Although breastfeeding is regarded as the optimal form of nutrition for neonates, there are some postpartum people who cannot exclusively breastfeed. Research conducted in the United States suggests that despite a birthing person's motivation, knowledge, support, and appropriate breastfeeding technique, an estimated 1 in 20 birthing people may experience impaired lactation (Farah et al., 2021). Risk factors associated with impaired lactation can result in either delayed lactogenesis or insufficient lactation.

Table 1*Lactation Terminology*

Term	Definition
Impaired lactation	When a postpartum individual is unable to produce sufficient milk supply to meet their baby's growth needs.
Delayed lactogenesis	The initiation of copious milk production more than 72 hours after birth.
Insufficient lactation	When a postpartum individual is unable to achieve an adequate milk supply to exclusively breastfeed their infant, and it is identified when there is absence of postpartum breast engorgement and milk production despite sufficient stimulation and adequate drainage of the breasts.
Delayed initiation of breastfeeding	The failure to initiate breastfeeding within one hour of delivery or within one hour of recovery of post-operative consciousness in case of those who deliver by cesarean section.
Perceived insufficient milk supply	A state in which a postpartum person has or perceives that they have an inadequate supply of breast milk to meet her infant's needs.

(Farah et al., 2021; Pérez-Escamilla et al., 2022; Huang et al., 2022)

Delayed lactogenesis is defined as the initiation of copious milk production more than 72 hours after birth (Farah et al., 2021). The following risk factors are independent predictors of delayed lactogenesis II: age, parity, obesity, prenatal care provider, mode of delivery, prolonged second stage, labor pain medication, oxytocin use, stress during delivery, infant birth weight, excess infant weight loss, Apgar score <8, flat or inverted nipples, supplementation within 48 hours postpartum, and nipple pain when breastfeeding (Brownell et al., 2012). Moreover, research shows postpartum people with diabetes experience up to a 24-hour delay in lactogenesis II compared to postpartum people without diabetes, thereby increasing their infant's risk of receiving infant formula (Forster et al., 2014).

The risk factors for insufficient lactation are categorized into preglandular, glandular, and postglandular. Preglandular causes of impaired lactation involve a disruption in the endocrine

system that results in a hormonal imbalance that causes delayed lactogenesis, along with insufficient milk supply (Farah et al., 2021). Conditions known to have preglandular causes of impaired lactation include: diabetes (type 1, 2, and gestational diabetes), obesity, thyroid dysfunction, retained placental fragments, theca lutein cysts, postpartum pituitary infarction, and polycystic ovarian syndrome (Soltani & Scott, 2012; Farah et al., 2021).

Glandular causes of insufficient lactation are predominantly caused by an anatomic lack of sufficient glandular tissue necessary to produce adequate milk supply (Arbour & Kessler, 2013). This lack of glandular tissue can be the result of underdeveloped mammary gland tissue or breast surgery (Arbour & Kessler, 2013). The relationship between mammary hypoplasia and breastfeeding outcomes is under-researched. Current literature is limited to documented case reports and one prospective study of 34 participants with hypoplastic breasts which found that breast appearance correlated to the adequacy of the participants' milk production (Huggins et al., 2000). Researchers used the classification system developed by von Heimburg et al. (1996), which categorizes breasts into four types based primarily on the degree of breast hypoplasia and deficiency of skin in the subareola. Results from the study found that 85% of the participants with more severe forms of hypoplasia (with Type 2, 3, or 4 breasts) produced $\leq 50\%$ of the milk necessary to sustain their infants (Huggins et al., 2000); whereas, two out of the three participants with less severe forms of hypoplastic breast (Type 1) produced 50-99% of the milk required to feed their infant (Huggins et al., 2000). Breast surgery including biopsy, augmentation, reduction, and gender-affirming top surgery can also destroy breast tissue and impair lactation (Farah et al., 2021). Depending on the procedure, interruptions to the milk ducts, glandular tissue innervation or blood supply, and nipple damage can contribute to these issues (Farah et al., 2021).

Postglandular causes of insufficient milk supply are factors that impair lactation after the infant is born. Contributing infant factors include preterm birth, cleft lip/palate, ankyloglossia, or any condition in which the infant is unable to latch on to the breast and have a strong suck coordinated with swallowing that leads to effective emptying of the breast (Farah et al., 2021). Postglandular maternal factors that impair breastfeeding include maternal consumption of medications or substances that inhibit milk synthesis, along with maternal fatigue and stress (Farah et al., 2021).

Prelacteal feeds or the introduction of fluids other than breast milk during the first few days of life is another factor that has been strongly associated with delayed initiation of breastfeeding (Pérez-Escamilla et al., 2022). Perceived insufficient milk supply is thought to be one of the major reasons for early termination of breastfeeding and prelacteal feeds. One systematic review including 27 studies explored the causes of early breastfeeding termination and found that 50% of postpartum people reported perceived insufficient milk supply as the main reason for breastfeeding cessation (Huang et al., 2022). Another longitudinal survey of 2572 lactating postpartum people found that 60% of participants who initiated breastfeeding did not breastfeed their infant for as long as they desired, largely due to postglandular causes (Odom et al., 2013). Yet, studies show that <5% of lactating people are biologically incapable of producing a sufficient quantity of milk or are unable to accomplish appropriate infant weight gain through breastfeeding alone (Odom et al., 2013). Understanding the many causes and etiology of impaired milk supply allows nurse-midwives to appropriately prepare patients antenatally and support the breastfeeding postpartum person-infant dyad in the postpartum period.

Antenatal Lactation Education

Antenatal hand expression is recommended by healthcare providers to improve lactation and newborn outcomes, particularly for patients with diabetes (type 1, 2, and gestational diabetes), who face unique challenges with breastfeeding (Foudil-Bey et al., 2021). Antenatal hand expression involves stimulation of breast/chest tissues and manual expression of colostrum in pregnancy, usually starting between 36 and 37 weeks of gestation (Demirci et al., 2022). Colostrum expressed antenatally may be saved for potential use in the immediate postpartum period. Demirci et al. conducted a randomized controlled trial in the United States, which included 45 low-risk nulliparous non-diabetic birthing people and found that structured weekly intervention involving hands-on guided practice of antenatal hand expression with an IBCLC starting at 37-40 weeks of gestation, along with daily independent practice proved to be a feasible method to help reduce reliance on infant formula when supplementing was advised or desired postpartum. Study participants in the intervention group reported practicing antenatal hand expression on at least 60% of days prior to their infant's birth. The majority of the intervention group was able to express milk antenatally (15/18), more than half collected and froze antenatal milk (11/18), and 39% (7/18) supplemented their infants with antenatal milk in the immediate postpartum period. No problems among the intervention group were noted; however, other studies have found that antenatal hand expression can cause frustration, embarrassment, and anxiety when there is difficulty expressing milk (Demirci et al., 2022; Foudil-Bey et al., 2021; Moorhead et al., 2022). Among the small sample size included in the Demirci et al. study, the majority of participants were low-risk, white, married, possessed at least a Bachelor's degree, and planned to exclusively breastfeed for at least six months postpartum (Demirci et al., 2022). For these reasons, results from the research of Demirci et al. may not be

generalizable to more ethnically or culturally diverse groups or populations at risk for poor lactation outcomes.

Antenatal breastfeeding education has been identified in the literature as an additional factor that influences breastfeeding outcomes (Sayres & Visentin, 2018). An Iranian randomized controlled clinical trial conducted on 108 pregnant people with previous unsuccessful breastfeeding histories found that participants who received the study intervention of four prenatal and one postpartum breastfeeding counseling session from a clinician or IBCLC demonstrated increased rates of breastfeeding self-efficacy and mitigation of lactation issues during the postpartum period (Shafaei et al., 2020). Kehinde et al. (2023) conducted a systematic review of 14 studies from around the world that all examined the effectiveness of prenatal breastfeeding education on breastfeeding uptake postpartum. Studies were included if they reported quantitative and qualitative evaluations of the effectiveness of all forms of prenatal breastfeeding education programs on breastfeeding uptake following birth (Kehinde et al., 2023). The included studies reported a combined 2203 pregnant people and the majority of study participants were in their third trimester ($n = 1190$) (Kehinde et al., 2023). All 14 studies used different types of breastfeeding programs; eight used a combination of curriculum-based breastfeeding education programs, group prenatal breastfeeding counseling, and one-on-one lactation educational programs which were all delivered in person (Kehinde et al., 2023). Four studies utilized web-based learning platforms to deliver online and face-to-face antenatal breastfeeding education and the two quasi-experimental studies included in the review adopted a family-centered breastfeeding education approach to deliver antepartum breastfeeding education (Kehinde et al., 2023). Results from the studies suggest that the success of optimal breastfeeding

uptake is largely dependent on educating pregnant people during the antepartum period on the benefits of breastfeeding for the birthing parent and the baby.

Complementary to the findings of Kehinde et al., Tseng et al. (2020) conducted a randomized controlled trial in Taiwan that included 93 primiparous pregnant people and their support partners that examined the effectiveness of a 3-week antenatal breastfeeding education intervention based on self-efficacy theory. Self-efficacy theory can be defined as an individual's confidence in their perceived ability to perform a specific task or behavior (Bandura, 1977). Self-efficacy is composed of two parts: (a) outcome expectancy, the belief that a given behavior will produce a specific outcome, and (b) expectancy, an individual's confidence that they can successfully perform certain tasks or behaviors to produce a desired outcome (Bandura, 1977). This distinction is important because the lactating individual may believe that breastfeeding will assist them in accomplishing their feeding goals but have little confidence in personally performing the behaviors necessary to sustainably breastfeed their infant long-term. Therefore, self-efficacy is influenced by a lactating parent's belief in their ability to breastfeed their infant, in addition to their belief in success, both of which are important and modifiable factors for improving breastfeeding outcomes (Tseng et al., 2020; Dennis, 2003). Couples in the intervention group participated in three group-based 2.5-hour sessions at 34-, 35-, and 36 weeks of gestation, along with 4-5 other couples (Tseng et al., 2020). Results from the study found that participants in the intervention group demonstrated significantly improved breastfeeding self-efficacy, infant feeding attitudes, and exclusive breastfeeding rates (Tseng et al., 2020). The strengths of this study lie in the targeting of both the pregnant person and their support partner, coupled with a mindfulness-based approach to empower breastfeeding self-efficacy and skills among new parents. However, the generalizability of the results from this study is limited by the

homogenous nature of the study population, who were drawn from one prenatal clinic in one region of Taiwan. As demonstrated by the evidence, educating pregnant people and their support partners throughout the third trimester with continued support throughout the postpartum period promotes breastfeeding self-efficacy and effectively equips new parents to confidently manage postpartum feeding challenges.

Rationale

Evidence-based practice requires nurse-midwives to incorporate emerging lactation research with clinical proficiency and patient goals to achieve optimal feeding outcomes. However, research has shown that it takes an average of 17 years for best practices to be implemented in clinical practice (Morris et al., 2011), a phenomenon commonly referred to as the ‘knowledge-practice gap’ (Ten Ham-Baloyi, 2022). Knowledge translation has emerged as an important method to reduce knowledge-to-practice gaps by translating clinical science into practice to improve patient care outcomes. The Knowledge-to-Action (KTA) framework provides a structured approach to enhance implementation, composed of two distinct, but related components: (i) Knowledge Creation, and (ii) the Action Cycle (Ten Ham-Baloyi, 2022). The process is iterative, as knowledge creation informs action, and components of the action cycle also feedback and inform the creation of new knowledge.

Complementary to the KTA framework, the Plan–Do–Study–Act (PDSA) is a scientific method that uses action-oriented learning to test change- by planning it, observing the results, and acting on what is learned (Institute for Healthcare Improvement, n.d.). This four-stage problem-solving cycle is an effective model for carrying out change because it allows teams to test changes and gain valuable learning through the continual repetition of cycles as the

individual needs of the practice are identified throughout the process (Institute for Healthcare Improvement, n.d.).

Specific Aims

The purpose of this project was to establish standardized lactation education that nurse-midwives could use during the antenatal period to help identify risk factors for impaired lactation, increase awareness of perceived insufficient milk supply, and promote breastfeeding self-efficacy. The following list of specific aims was developed to provide structure and actionable guidance toward the project objectives:

- By September 25, 80% of midwives will have responded to the survey assessing lactation education clinical practices and preexisting knowledge of antenatal hand expression.
- By October 2, 90% of nurse-midwives involved in antepartum care will view a voice-over presentation describing the project.
- By the end of the first cycle, October 20, 60% of midwives will have charted lactation risk assessment and included relevant lactation resources in the AVS of eligible patients.
- By the end of cycle 3, December 1, 90% of midwives will have charted lactation risk assessment and included relevant lactation resources in the AVS of eligible patients.

Context

The setting for this project was a nurse-midwifery faculty practice located in the Pacific Northwest (PNW). The primary stakeholders in this quality improvement project were the health care providers, who consisted of 13 nurse-midwives, 2 IBCLCs, and two student nurse-midwives. The outpatient reproductive health center provides care predominantly to resourced reproductive-age people, 83.68% of whom are ≥ 35 years of age, 79.0% are non-Hispanic white, and 86.78% have commercial insurance (OHSU, 2022). At the time when this project took place

the average birth rate for the faculty practice was 44 births per month (OHSU, 2022). The faculty practice also provides an active intrapartum and perinatal teaching setting for nurse-midwifery students.

Intervention

Project preparation included aggregation of the following data among patients receiving perinatal care from the faculty nurse-midwifery practice: average patient age, predominant race, principle insurance plan, IBCLC appointment attendance, and intended feeding method at admission to labor and delivery. The intervention included the development of a recorded voiceover presentation that was sent out to the faculty nurse-midwives and student nurse-midwife (SNW) students who actively worked in the outpatient reproductive health center. The presentation included an overview of the project, literature review, workflow, and tutorial on antenatal hand expression. Before the presentation was shared, an anonymous pretest survey was sent out to each nurse-midwife to assess clinical practices surrounding lactation education, along with preexisting knowledge of antenatal hand expression. The project lead reviewed nurse-midwife charts daily to identify all patients between 30 and 32 weeks of gestation and sent SPOK mobile messages to the nurse-midwives on the morning of their clinic shift. The messages included a list of eligible patients who needed to complete the prenatal lactation impairment self-assessment. Nurse-midwives informed the medical assistant about those eligible for screening during the morning huddle. After rooming the patient, the medical assistant requested the patient fill out the antenatal lactation self-assessment while they waited for the nurse-midwife. The nurse-midwife reviewed the assessment responses, individualized lactation education based on patient needs, and made appropriate clinical recommendations.

When patients indicated a history of diabetes, PCOS, or hypothyroidism on the self-assessment, antenatal hand expression was recommended and the nurse-midwife reviewed the technique with the patient. Nurse-midwives had the option to include the *.antenatalhandexpression* (see Appendix C) dot phrase in the electronic health record's antepartum note, which would attach the Antenatal Hand Expression How-To Handout to the patient's after-visit summary. Patients who screened positive for other lactation impairment risk factors may have been recommended to follow up with a lactation consultant. Each patient, regardless of feeding method or risk factors, had their assessment responses recorded in the antepartum note using the *.lactationscreening* (see Appendix C) dot phrase. Furthermore, every patient should have received lactation resources in their after-visit summary, by including *.lactationresources* (see Appendix C) in the antepartum note. A flowchart demonstrating the workflow was printed and posted on the cabinets above the provider computers in the nurses' station to offer guidance. A laminated handout with provider talking points relating to lactation was also posted at the nurses' station for nurse-midwives to reference.

Study of Intervention

The planned interventions took place throughout a 9-week time period with 3 executed PDSA cycles to achieve provider compliance and project success.

- PDSA 1: October 2 - October 20
- PDSA 2: October 23 - November 10
- PDSA 3: November 13 - December 1

The stated objective of the project was to establish standardized antepartum lactation education to assist nurse-midwives in identifying risk factors for impaired lactation, increase awareness of perceived insufficient milk supply, and promote breastfeeding self-efficacy. It was

predicted that antepartum lactation education was not consistent within the faculty practice. Furthermore, it was predicted that nurse-midwives would have differing levels of confidence surrounding antenatal hand expression at the beginning of the project. With educational teaching, clinical guidance, and streamlined templates integrated into the electronic health record, it was predicted that antenatal lactation education would become more utilized and nurse-midwifery confidence surrounding lactation education would increase by the end of the project.

The preparation that took place before the first PDSA cycle included: a pre-intervention survey of nurse-midwives, the development of an antenatal lactation education voice-over presentation, weekly email reminders to nurse-midwives to watch the presentation, AHE handout acquisition, flowchart and electronic medical record dot phrase creation, in addition to data storage and collection strategy confirmation.

Each PDSA cycle involved daily chart review (Sunday-Thursday) to identify patients between 30 and 32 weeks of gestation who needed to complete the antenatal lactation impairment self-assessment. The student nurse-midwife leading the project sent out SPOK mobile messages to nurse-midwives on the morning of each clinic, which included the appointment times of patients eligible to complete the antenatal lactation impairment self-assessment. Every Friday an email was sent out to the faculty practice to provide project updates and ask for feedback. After the first PDSA cycle, project improvements and faculty feedback were reviewed in the *act* stage and changes were incorporated into the *planning* stage of the subsequent PDSA cycle.

The *do* stage included the implementation of interventions including clinical use of the antenatal lactation impairment self-assessment, lactation education, documentation, and recommended follow-up. Unexpected observations and problems were documented and

improvements were made for the following PDSA cycle. Initial data analysis took place during the *do* stage of each PDSA cycle. The *study* stage encompassed more thorough data analysis and study of results. The data were compared to the project predictions to identify potential differences. Summarization and reflection took place during this stage to distinguish learning points. The final *act* stage focused on addressing necessary project modifications and planning for the next cycle (Institute for Healthcare Improvement, n.d.). Changes to project interventions were refined based on what was learned and modifications that were incorporated. A plan for the next PDSA cycle was developed and nurse-midwives involved in the project were notified of changes.

Measures

Before interventions were implemented, baseline data was collected and consisted of qualitative pre-project survey responses. These anonymous responses offered insight into preexisting nurse-midwifery knowledge of risk factors for lactation impairment, antenatal hand expression, as well as current lactation education clinical practices. After project interventions were implemented, specifically the antenatal lactation impairment self-assessment, outcome measures were used to assess the average number of nurse-midwifery patients who are at risk for lactation impairment. Furthermore, the evaluation of antenatal hand expression education served as an outcome measure when compared to postpartum breastfeeding initiation rates. Process measures included the percentage of patients who completed the standardized antenatal lactation impairment self-assessment and lactation education performed between 30 and 32 weeks of gestation. This marker tracked whether nurse-midwives were adhering to project practice recommendations relating to standardized antenatal lactation education. Project interventions were thought to inadvertently inflate lactation consultation referral rates incompatible with

availability. Lactation consultation referral rates were examined as a balancing measure in each PDSA cycle to ensure appropriate referral rates were taking place based on expected risk-based needs.

Data Collection

The EHRs of all pregnant people who attended prenatal visits between 30 and 32 weeks of gestation during the 9-week project period (October 2, 2023- December 1, 2023) were reviewed. Based on the average number of deliveries per month in the faculty nurse-midwifery practice, an estimated chart audit of 60-80 charts took place. Nurse-midwives' documentation of lactation impairment self-assessments of patients 30 to 32 weeks of gestation were collected during each PDSA cycle within the 9-week time frame. Pre-project survey data that assessed antepartum lactation education clinical practice and preexisting knowledge of antenatal hand expression were collected and developed using Typeform software. Qualitative pretest questionnaire answers and quantitative data derived from the EHR audit were managed using Excel and securely stored using OneDrive software.

Analysis

Descriptive statistics and run charts were used to analyze data collected before and after the implementation of project interventions. Descriptive statistics were used to summarize lactation consultation referral rates, the number and percentage of 30- to 32-week obstetric return visits that used the prenatal lactation self-assessment tool, and the percentage of patient charts that documented antenatal hand expression education before and after viewing the informational voice-over presentation. Gantt charts were created to visualize cycle timelines and indicate when project interventions took place. Run charts were used to assess effectiveness and improvement

in the standardization of lactation education throughout the 9-week project period. Analysis of the run charts provided an essential visual representation of improvement to clinical practice and whether interventions were indicative of sustainable change. The effect of time as nurse-midwives grew accustomed to the new workflow was also analyzed as another potential causative factor contributing to improvement.

Ethical Considerations

Institutional review board approval was obtained with exempt status with minimal risk criteria; the project was deemed not human subject research. Ethical considerations and confidentiality were maintained to preserve the identity of patients and the faculty practice. Patient data derived from the electronic health record chart audit were de-identified and contributed towards an aggregate data set that ensured the anonymity of each individual. There were no conflicts of interest involved in this project.

Results

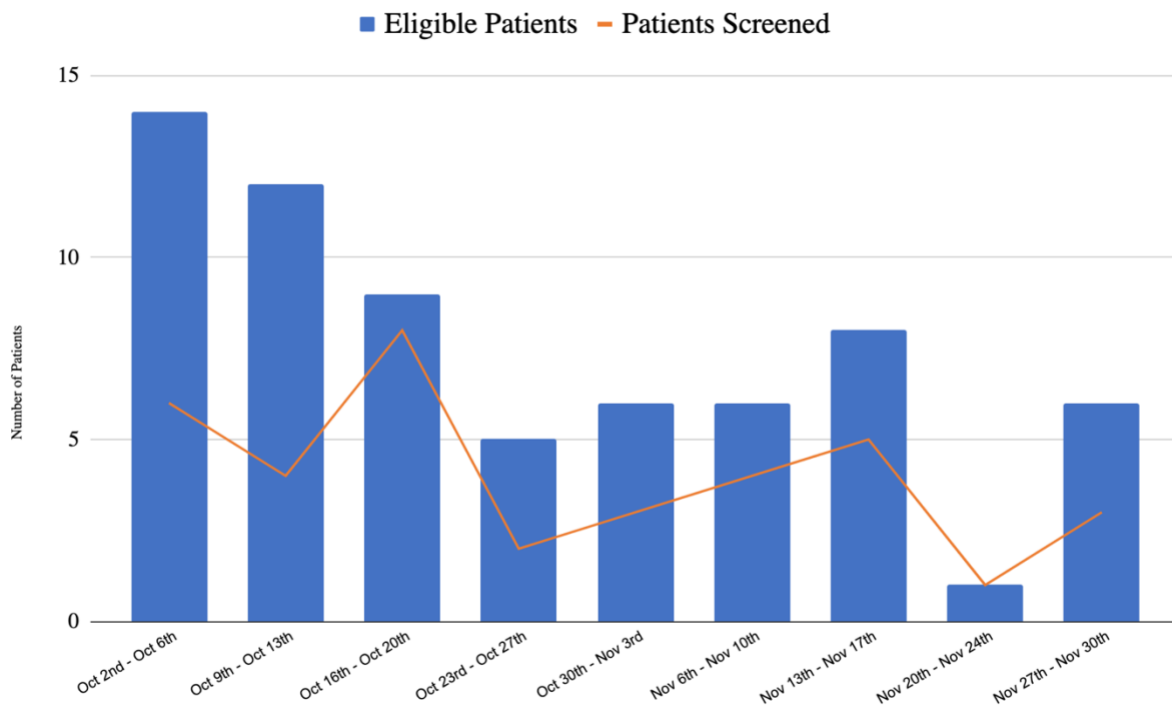
During the 9-week quality improvement initiative, 67 eligible pregnant patients between 30 to 32 weeks of gestation were identified. Our evidence-based antepartum lactation impairment screening questionnaire was administered to 54% of eligible patients throughout the nine-week project period. The run chart pictured in Figure 1 demonstrates the impact of project modifications and their significance on lactation impairment screening rates: 51% (18/35) of patients were screened in cycle I, 53% (9/17) in cycle II, and 60% (9/15) in cycle III.

The screening questionnaires identified lactation impairment risk factors among 31% of the project participants who were screened (Fig 2). Among the patients who screened positive for lactation impairment risk factors, the following risk factors were identified (Fig 3): flat, inverted, or nipple-related concern 14% (5/12), problems breastfeeding previous infant(s) 11% (4/12),

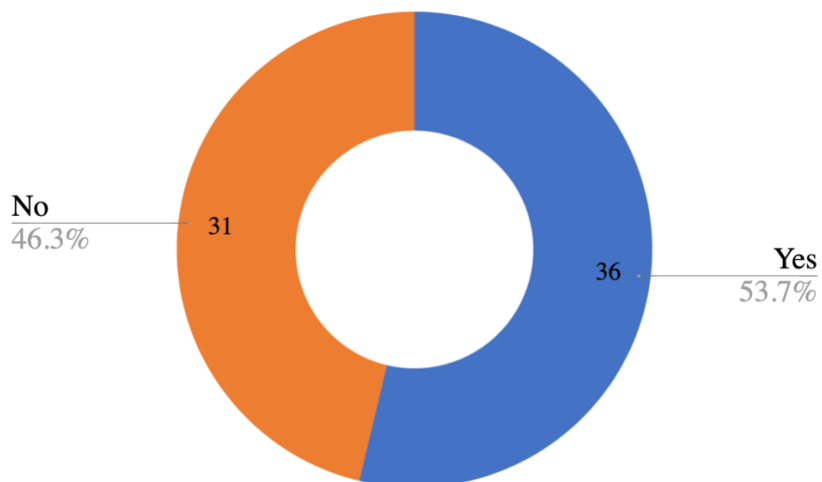
diabetes 6% (2/12), and lack of family or partner support 3% (1/12). These results constituted an average of 1 in every 3 pregnant patients with potential lactation impairment risk factors. Among the 12 patients who screened positive for lactation impairment, 6 patients were identified as candidates for antenatal hand expression and 7 patients were given the clinical recommendation to meet with a lactation consultant antenatally.

Figure 1

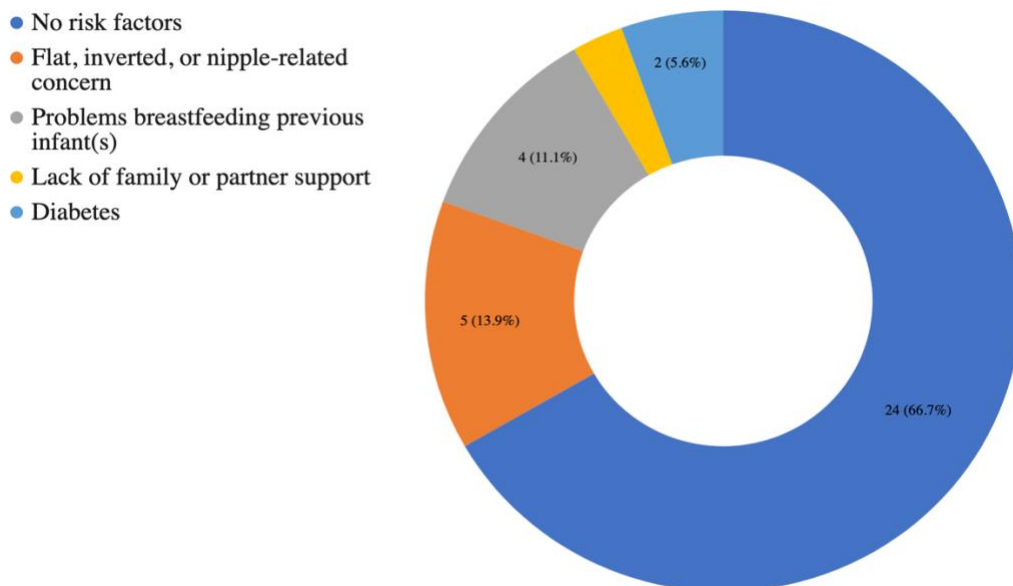
Screenings by Week



Note. Number of patients who completed the lactation impairment screening questionnaires each week.

Figure 2*Patient Screening Rate*

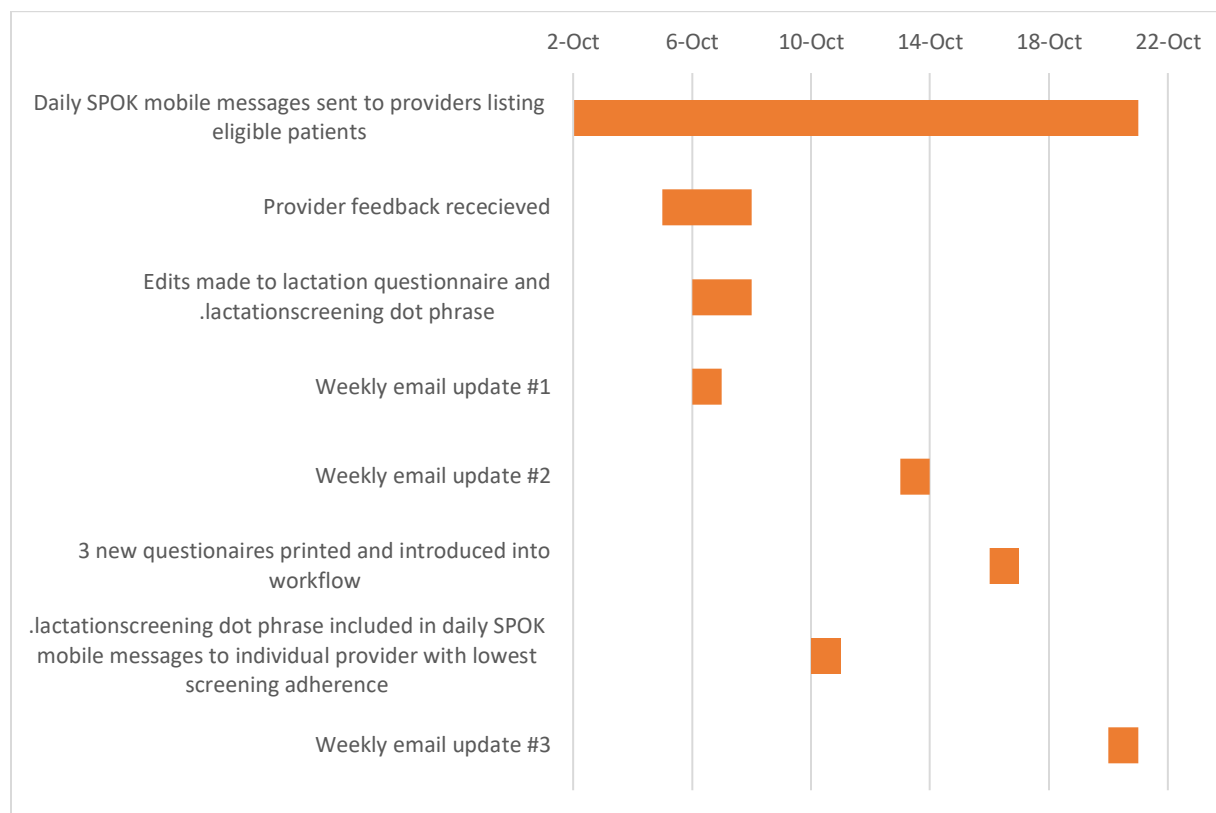
Note. Overall screening rates by the end of the 9-week project period.

Figure 3*Lactation Impairment Risk Factors*

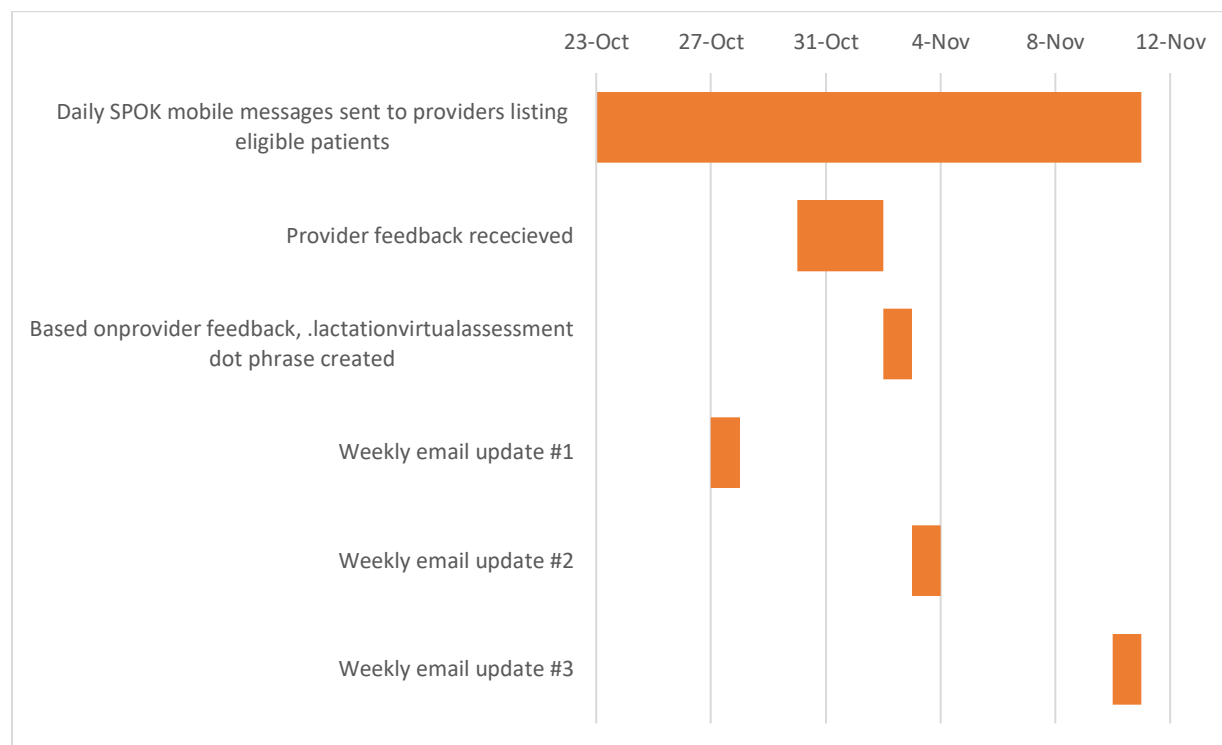
Note. Risk factors that were identified among the (11/36) patients who screened positive for lactation impairment risk factors.

Lactation outcomes among the patients who screened positive for lactation impairment demonstrated that 36% (4/12) of patients at two weeks postpartum reported use of formula supplementation due to insufficient milk supply, 9.1% (1/12) reported mechanical inability to breastfeed due to ankyloglossia, and 54.5% (6/12) reported exclusive breastfeeding. At six weeks postpartum 36.3% (4/12) of patients did not return to care, one patient (14.3%; 1/7) was feeding their infant a combination of formula and breastmilk due to insufficient milk production, and 85.7% (6/7) of the patients were exclusively breastfeeding. Lactation consultation referral rates in each PDSA cycle were found to be 22 %, 11%, and 22 %. Despite these clinical recommendations, it was found that 0% of these patients scheduled a lactation consultation before delivery and only 1 of the 7 patients received a Lactation Resource Handout in their AVS.

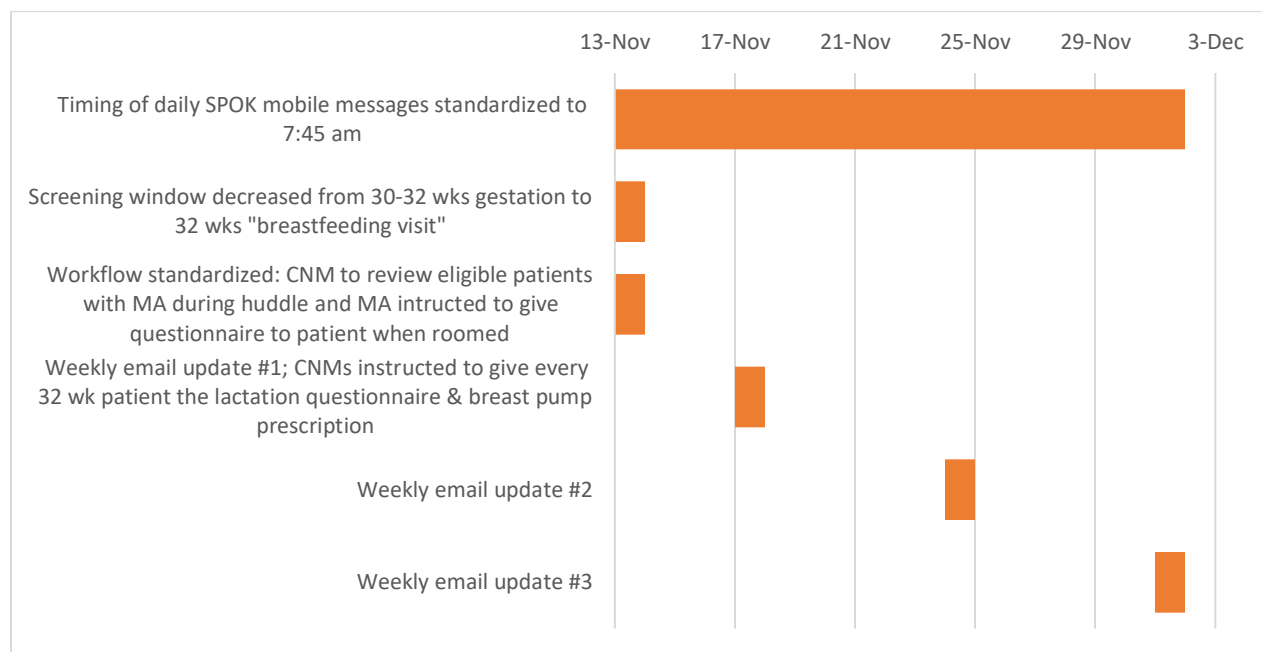
In the first PDSA cycle, modifications were made based on individual provider feedback obtained from email responses to weekly email updates that were sent out to the faculty practice every Friday. Based on provider feedback, the following changes were made to the clinical recommendations listed within the .lactationscreening dot phrase: duplicate answers were deleted, lactation consultation was added as a clinical recommendation, and AHE was changed to antenatal hand expression. Additionally, a typo on question four of the antenatal lactation impairment questionnaire was corrected from “breast breast reduction” to “breast reduction”. In response to one provider’s low adherence to questionnaire administration and project workflow, the .lactationscreening dot phrase was included in the daily text to the provider for the remainder of the project to minimize potential barriers.

Figure 4*PDSA Cycle I Timeline*

During the second PDSA cycle, a new dot phrase for virtual visits was created in response to provider feedback relating to the inability to administer the lactation impairment questionnaire virtually. As a result, .lactationvirtualassessment (see Appendix C) was developed to increase screening accessibility.

Figure 5*PDSA Cycle II Timeline*

In PDSA cycle III, major modifications were made to the workflow to promote the sustainability of the project. The screening window decreased from 30-32 weeks of gestation to 32 weeks and the visit was named the “breastfeeding visit” to bundle tasks into one visit and make it easier for nurse-midwives to remember which patients to screen. Nurse-midwives were instructed to give every 32-week patient the lactation self-assessment questionnaire along with their breast pump prescription. Furthermore, reminder texts were sent out earlier in the morning, at 7:45 am, and nurse-midwives were asked to review patients who needed to be screened with the medical assistant during the morning huddle and have the medical assistant give the questionnaire to the patient when they were roomed.

Figure 6*PDSA Cycle III Timeline*

Before the implementation of project interventions, pre-project surveys (see Appendix A) were sent to all 13 nurse-midwives who actively worked in the outpatient setting to gauge confidence surrounding antenatal lactation education and clinical practices. It was found that all 13 nurse-midwives started the survey and 11 of them completed it. Pretest questionnaire findings illuminated that 60% of nurse-midwives felt “confident” and 40% identified as “fairly confident” in addressing antenatal lactation. The leading reasons for not addressing lactation antenatally were largely due to a lack of knowledge related to specific patient lactation concerns (50%) and limited time during appointments (40%). Furthermore, respondents (70%) overwhelmingly indicated a preference for increased educational material to help provide comprehensive patient lactation education. These survey findings helped gauge baseline confidence, which was then compared to provider screening adherence and project satisfaction at the end of the quality improvement initiative.

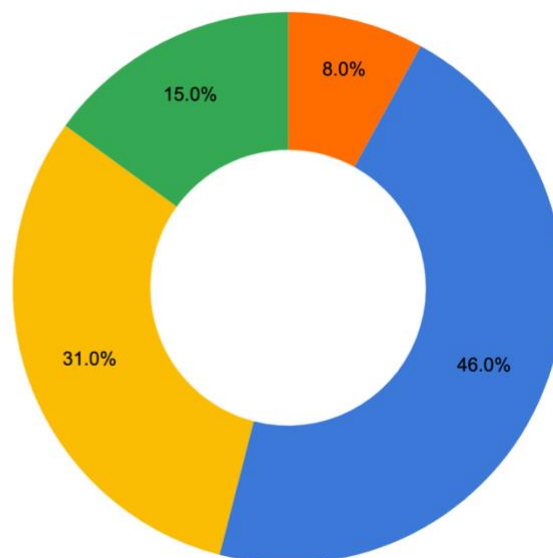
A post-project survey (see Appendix B) was sent out to all 13 nurse-midwives who actively worked in the outpatient setting. All 13 of the nurse-midwives started the survey, however only 10 of them completed the survey in its entirety. When asked about the optimal time to screen patients for lactation impairment, 92% of nurse-midwives believed that 32 weeks of gestation was the optimal time. The majority of nurse-midwives (73%) felt the lactation impairment patient self-assessment saved time when compared to a provider-administered questionnaire. Figure 4 demonstrates how nurse-midwives presented the lactation self-assessment to the patient: 46% of the time the medical assistant brought it into the room, 31% of the time the midwife brought it into the room, 8% of the time questionnaires were left in the room and the medical assistant asked the patient to fill it out, and the remaining 15% indicated an alternate workflow by responding “other”. Nurse-midwifery reflections on the documentation process indicated that 73% felt documentation was straightforward and time efficient, whereas 18% felt it was hard to remember the name of the dot phrase. When asked about the usefulness of project resources, 70% of respondents found the lactation resources handout helpful and 73% found the lactation impairment self-assessment useful. The antenatal hand expression handout was a valuable visual aid for 50% of nurse-midwives and the provider talking points handout proved to be helpful for 40% of nurse-midwives, whereas 18% of nurse-midwives found the workflow flowchart to be useful. Overall, the majority of the nurse-midwives (70%) indicated they were in favor of continuing this project with minor revisions.

Figure 7

Post-project Survey Result

How did you present the lactation self-assessment to the patient?

- Questionnaires were left in the room and the MA asked the patient to fill the questionnaire out while the patient waited for the CNM
- The MA brought the questionnaire into the room and asked the patient to fill out the questionnaire while the patient waited for the CNM
- The CNM brought the questionnaire into the room and asked the patient to fill it out
- Other



Discussion

Summary

Throughout the 9-week project period, 67 pregnant patients participated in the quality improvement initiative. By the end of the project, quality improvement interventions and workflow efficiencies successfully captured lactation risk assessment data from 36 patients. Lactation impairment screening rates for the first PDSA cycle were 51%, which fell close to the specific aim stated at the beginning of the project which strived for a 60% screening rate. By the end of the third PDSA cycle, the aim was to achieve a 90% screening rate, which was far from achieved when compared to the final screening rate of 54%. As demonstrated in Appendix A, the pre-project survey response rate of 84% surpassed the initial 80% response rate goal. Achievement of this aim provided essential baseline information on clinical practices and

educational tools needed to assist nurse-midwives in facilitating conversations surrounding lactation in the antepartum period. The post-project survey listed in Appendix B highlights key interventions and educational documents that were most helpful to providers, along with resources that proved to be cumbersome in practice and therefore warrant exclusion from future workflows. While the initial intent was to measure the number of nurse-midwives who watched the voice-over presentation before project implementation, this aim was not achieved due to an imprecise project design that failed to include survey data confirming whether or not providers watched the presentation. Despite these shortcomings, project strengths include the development of a screening tool that assisted with the identification of lactation impairment risk factors, educational documents that helped nurse-midwives individualize patient care, and a screening workflow that was found to be time efficient. This success can serve as a model on how to equip nurse-midwifery practices with actionable tools to help address the local prevalence of perceived insufficient milk supply and early termination of breastfeeding experienced by community members throughout Multnomah County. Project strengths can also add to national efforts to achieve the Healthy People Initiative 2030 goals of increasing rates of exclusive breastfeeding initiation and duration (Raju, 2023).

Interpretation

This quality improvement project contributed a standardized instrument to the faculty practice that has the potential for long-term use and possible adoption within the greater health system. With this tool and increased knowledge, nurse-midwives were able to provide education tailored to patient-specific risk factors and infant feeding preferences. These improvements are in contrast to the lack of consistency in content or timing of lactation education in the antepartum

period among the nurse-midwifery faculty practice before the implementation of quality improvement interventions.

The lactation impairment screening tool identified lactation impairment risk factors among 31% of the project participants who completed the questionnaire. This statistic lies in contrast to the lack of preexisting data on lactation impairment among pregnant patients obtaining care from the faculty nurse-midwifery practice. This is important information to identify because recent research has demonstrated that one or more maternal and/or infant risk factors are present when breastfeeding problems arise (Flagg & Busch, 2019). Among the patients who screened positive for antenatal lactation impairment risk factors, 36% of patients at two weeks postpartum reported inability to exclusively breastfeed due to insufficient milk supply and 9% reported mechanical inability to breastfeed due to ankyloglossia. Breastfeeding rates at two weeks postpartum demonstrate a close measure between pregnant patients with identified lactation impairment risk factors (31%) and patients who experienced lactation impairment due to insufficient milk supply (36%); whereas, ankyloglossia cannot be predicted or screened for in the antepartum period. Among the patients who returned to care at 6 weeks postpartum, only 14% were feeding their infant a combination of formula and breastmilk due to insufficient milk production and 86% were exclusively breastfeeding. These findings are consistent with the literature, which estimates ~5–15% of lactating people are biologically incapable of producing a sufficient quantity of milk to exclusively breastfeed their infant (Baker et al., 2007; Cromi et al., 2015; Lee & Kelleher, 2016; Neifert et al., 1990; Odom et al., 2013). As demonstrated by the project findings, the standardized approach to addressing lactation in the third trimester proved to successfully identify patients at risk for lactation impairment and helped individualize patient education. As a result, participants were able to gain awareness of their bodies and learn

techniques that could prepare them for breastfeeding challenges and potentially decrease perceptions of low milk supply in the postpartum period.

While there were no other quality improvement initiatives identified in the literature that explored the impact of antepartum lactation impairment screening for comparison, no unintended negative consequences were observed during the 9-week project period. However, practice-specific workflow inefficiencies relating to inadequate clinical follow-up were observed among the faculty practice. Among the six patients who were given the clinical recommendation to consider antenatal hand expression, it was found that in all cases nurse-midwives never documented followed up with patients to inquire if patients had initiated the technique or needed support. Additionally, among the seven patients who were given the clinical recommendation to meet with a lactation consultant prenatally, no follow-up was documented demonstrating scheduling assistance or interest in antepartum lactation consultation. For these reasons, findings from this quality improvement project cannot be used to substantiate claims that lactation consultations improve breastfeeding outcomes (Shafaei et al. 2020, Kehinde et al. 2023, and Tseng et al., 2020). Furthermore, the lack of clinical follow-up made it impossible to support the research of Demirci et al. on antenatal hand expression as an effective method to reduce reliance on infant formula when advised or desired postpartum. Despite these observations, clinical follow-up was not included in the workflow due to the intentional choice to narrow the project focus on risk identification rather than provider follow-up. The lack of problem-specific follow-up observed within the faculty practice highlights a need for an agreed-upon approach to charting medical problems and recommendations that warrant follow-up.

In contrast, post-project survey data revealed faculty practice agreement that 32 weeks of gestation was the optimal time to screen patients and therefore should be maintained to optimize

the sustainability of project objectives. Resounding approval for the lactation resources handout, lactation impairment self-assessment tool, and .lactationscreening dot phrase among the faculty practice demonstrated the utility of these resources. Interestingly, nurse-midwives were also in agreement that the lactation impairment self-assessment saved time when compared to provider administration. This consensus was contrary to observed workflow inconsistencies in lactation assessment administration that demonstrated divided approaches among the faculty practice. The workflow was designed to save time for providers by having the medical assistants bring the questionnaire into the room when rooming the patient and instructing the patient to fill it out while they waited for the midwife. Yet, only 46% of nurse-midwives indicated the medical assistant brought the questionnaire into the room compared to 31% of nurse-midwives who brought the questionnaire into the room, presumably necessitating more time. It was not in the scope of this quality improvement project to collect outcome data measuring the differences among patients who received questionnaires from the nurse-midwife compared to the medical assistant. For this reason, standardization of the intended workflow cannot be supported by project data, however, these workflow inconsistencies lend themselves to future research or quality improvement initiatives.

Nurse-midwifery reflections on the documentation process indicated that 73% felt documentation was straightforward and time efficient, whereas 18% felt it was hard to remember the name of the .lactationscreening dot phrase. When asked about the usefulness of project resources, 70% of respondents found the lactation resources handout helpful and 73% found the lactation impairment self-assessment useful. The antenatal hand expression handout was a valuable visual aid for 50% of nurse midwives and the provider talking points handout proved to be helpful for 40% of nurse-midwives, whereas a mere 18% of nurse-midwives found the

workflow flowchart to be useful. These findings revealed a correlation between provider difficulty remembering the *.lactationscreening* dot phrase (18%) with provider dissatisfaction using the workflow flowchart handout (82%), the resource where in which the dot phrase was listed. Increased documentation rates of lactation impairment assessments may have been achieved with a simplified flowchart that had a greater emphasis on documentation rather than clinical decision-making.

Limitations

The context and clinical environment where interventions took place may have limited results. The nurse-midwifery faculty practice where this project was conducted operates within a health system that does not have a baby-friendly designation. The Baby Friendly Hospital Initiative (BFHI) requires at least 70% of patients in their third trimester to be able to confirm that a staff member has talked with them individually or offered a group talk that includes information on breastfeeding (WHO, 2009). Had this quality improvement project taken place in a baby-friendly designated health system, screening rates may have exceeded 54% and conversations surrounding lactation in the third trimester may have been more habitual among the faculty practice.

The methodology for data collection changed in the third PDSA cycle, narrowing the screening window from 30-32 weeks to just 32 weeks of gestation. This change drastically decreased screening eligibility and thereby decreased the number of screening responses in the third PDSA cycle. However, the third PDSA cycle also had the highest screening rate (60%). The decision to narrow the screening window was based on faculty practice preference for a more delineated gestational time that nurse-midwives could commit to memory. Despite the

decrease in overall patients screened, post-project surveys demonstrate provider preference (73%) for retaining the 32-week screening period.

It was anticipated that lactation consultation visits would artificially inflate due to increased lactation impairment screening rates. Among the study population who screened positive for lactation impairment risk factors, 7 patients were given the clinical recommendation to meet with a lactation consultant antenatally. Despite these clinical recommendations, none of these patients scheduled a lactation consultation before delivery. It was found that only 1 of the 7 patients received a Lactation Resource Handout in their AVS, which lists the lactation consultation phone number needed to schedule an appointment. More antenatal lactation consultation visits may have been scheduled had there been an integrated workflow that encompassed verbal scheduling instructions, attachment of the lactation resource handout to the patient AVS, along with clinical follow-up initiated by the provider.

Nurse-midwifery documentation of lactation impairment risk factors demonstrated that 54.5% (6/11) of the patients who screened positive were identified as candidates for antenatal hand expression and were taught how to correctly perform the technique. The project workflow did not incorporate antenatal hand expression follow-up, therefore no further documentation was made to demonstrate the use of antenatal hand expression before delivery. Without data to prove low adoption of the technique, it cannot be concluded whether or not patients benefitted from antenatal hand expression. However, current literature has found that negative side effects related to antenatal hand expression include difficulty learning the technique, discomfort, and feelings of awkwardness while expressing (Sobik et al., 2023). Therefore, it can be extrapolated that thorough education surrounding antenatal hand expression may require additional follow-up with a provider to review proper technique and promote self-efficacy.

Loss of lactation impairment self-assessment questionnaires limited screening capacity in the first PDSA cycle, which was adjusted for by introducing 3 more questionnaires into the clinic workflow at the end of week 2. As seen in Figure 1, there was a surge in the number of patients screened during week 3. This association was likely attributed to the increased supply of lactation self-assessment questionnaires from one copy to four copies, thereby increasing the availability and ease of screening eligible patients. When designing this project clinic closures were not accounted for, therefore the limited sample size was made even smaller due to missing data during week 8 of the third PDSA cycle, Thanksgiving holiday week. This observation was made after the completion of the study; therefore, efforts were not made to accommodate for this loss in data.

Overall, the results from this project have good generalizability to other health systems striving to improve lactation education and risk assessment in the antepartum period. As indicated by project data and provider survey responses, the workflows and interventions developed for this quality improvement initiative resulted in adequate provider adherence and predictable identification of patients at risk for impaired lactation. Moreover, the lactation impairment risk assessment questionnaire proved to be an essential tool that can be easily applied to other practice environments and modified to meet the unique needs of differing patient populations. The context of this project posed structural limitations to the standardization of project workflows, which led to modifications specific to the needs of the faculty practice that may not apply to alternate practice environments.

Conclusion

The integration of antepartum lactation self-assessments into clinical practice spurred important conversations surrounding infant feeding preferences and helped identify lactation

impairment risk factors. The lactation impairment self-assessment proved to be an integral tool in the standardization of antepartum lactation in the third trimester and helped nurse-midwives individualize patient care. The sustainability of this quality improvement project is contingent on the nurse-midwifery ability to habituate the screening of patients at 32 weeks of gestation along with increased collaboration with medical assistants to improve workflow consistency. The use and impact of antenatal hand expression among participants in this quality improvement project were understudied. If antenatal hand expression continues to be a fundamental part of this quality improvement effort, it is recommended that increased educational follow-up surrounding antenatal hand expression technique be implemented to provide the necessary support to patients. Elements of this project that warrant modification or exclusion are the workflow flowchart handout and the virtual assessment dot phrase due to underutilization and ineffective integration into project workflows. An alternate resource that focuses on documentation and succinctly lists the dot phrases would likely provide more utility to future practice environments. Furthermore, translation of the lactation impairment screening questionnaire to languages pertinent to other practice populations should be an inclusive consideration for the future. Practice-specific workflow inefficiencies relating to inadequate clinical follow-up were observed among the faculty practice. Careful consideration and consensus among the faculty practice are needed to address problem-based charting inconsistencies and provide comprehensive care throughout the perinatal period. The standardization of follow-up care may help connect patients who screen positive for lactation impairment risk factors with added support from their nurse-midwife that could help to increase body awareness, learn techniques that could prepare them for breastfeeding, and potentially decrease perceptions of low milk supply in the postpartum period. These metrics were not measured in this quality improvement project, but point to future

research needs. As demonstrated by the project findings, the lactation impairment screening tool identified lactation impairment risk factors among one-third of the patients who completed the questionnaires. The successful capture of this at-risk patient population helps drive next steps to promote the expansion of screening efforts and provides a strong basis for expansion. For this reason, the standardized approach to antepartum lactation and risk assessment developed throughout this quality improvement project serves as a model for similar practice environments and larger systems of care that desire a more structured approach.

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Appendix A

Antenatal Lactation DNP Pre-Project Survey

1. In which trimester do you address the patient's intention to breastfeed during antenatal care? Select all that apply.
 - a. I don't routinely address it
 - b. 1st trimester
 - c. 2nd trimester
 - d. 3rd trimester
2. How confident are you educating patients about lactation and answering questions about lactation concerns antenatally?
 - a. Not confident
 - b. Fairly confident
 - c. Confident
3. How confident are you educating patients about antenatal hand expression?
 - a. Not confident
 - b. Fairly confident
 - c. Confident
4. In the last 2 weeks, how many times have you discussed antenatal hand expression with a patient?
 - a. 0
 - b. 1
 - c. 2
 - d. >3
5. What are some of the reasons that you find it challenging to provide education about lactation antenatally in the clinic? Select all that apply.
 - a. Limited time during appointments
 - b. Lack of confidence about lactation principles
 - c. Lack of knowledge related to specific lactation patient concerns
6. What training resources would be most helpful to you in providing patient lactation education?
 - a. CME module
 - b. Review article on the topic
 - c. Patient education materials readily available

Appendix B

Antenatal Lactation DNP Post-Project Survey

The goal of this project aimed to identify infant feeding preferences and screen for lactation impairment in the antepartum period. Lactation self-assessments were administered in the third trimester as a means to identify lactation impairment risk factors and promote breastfeeding self-efficacy.

1. In an effort to make it easier to remember when to screen patients for lactation impairment, the screening window was narrowed to the 32-week visit in the last PDSA cycle. When do you think patients should be screened in your MH practice?
 - a. 30 weeks
 - b. 32 weeks
 - c. 34 weeks
 - d. Screen anytime in the 3rd trimester
 - e. Screen in the first trimester or at the NOB
 - f. I do not feel routine screening is necessary
 - g. Other:
2. How did you present the lactation self-assessment to the patient?
 - a. Questionnaires were left in the room and the MA asked the patient to fill the questionnaire out while the patient waited for the CNM
 - b. The MA brought the questionnaire into the room and asked the patient to fill out the questionnaire while the patient waited for the CNM
 - c. The CNM brought the questionnaire into the room and asked the patient to fill it out
 - d. Other:
3. Please rate your experience with the screening process: Select all statements that you agree with
 - a. Patient self-administration of the screening assessment tool saved time (over CNM administration).
 - b. The amount of time it took to screen the patient and discuss the responses with the patient was appropriate.
 - c. The amount of time it took to huddle with the MA to review eligible patients who needed to be screened was appropriate.
 - d. The text reminders and the 32-week screening window made it easy to remember which patients needed to be screened.
 - e. Other:
4. How did you use the resources with the patient? Select all that apply
 - a. I reviewed each item of the lactation self-assessment with the patient
 - b. I assessed the results and provided a verbal overview of the findings
 - c. I verbally referenced the handouts and attached them to the AVS
 - d. I reviewed the handouts with patients and rarely attached them to the AVS
 - e. I reviewed the handouts with patients and attached them to the AVS
5. Was this resource helpful? Antenatal Lactation Self-Assessment Screening Tool
 - a. Yes
 - b. Somewhat

- c. No
 - d. Comment:
6. Was this resource helpful? Provider Talking Points Handout, a resource containing common questions and helpful answers
- a. Yes
 - b. Somewhat
 - c. No
 - d. I never reviewed this resource
 - e. Comment:
7. Was this resource helpful? Workflow Flowchart Handout, a visual aid to help guide clinical decision-making
- a. Yes
 - b. Somewhat
 - c. No
 - d. I never reviewed this resource
 - e. Comment:
8. Was this resource helpful? Lactation Resources Handout, a consolidated list of resources at OHSU and in the community
- a. Yes
 - b. Somewhat
 - c. No
 - d. I never reviewed this resource
 - e. Comment:
9. Was this resource helpful? Antenatal Hand Expression Handout, a visual aid to bolster patient education
- a. Yes
 - b. Somewhat
 - c. No
 - d. I never reviewed this resource
 - e. Comment:
10. The dot phrase .lactationscreening was developed to document screening results. What are your reflections on the documentation process? Choose all that apply
- a. Documentation felt straightforward and time-efficient
 - b. Documentation added too much time to my day
 - c. It was hard to remember the name of the dot phrase
 - d. It was challenging to coordinate with SNMs to ensure they were documenting screening results
 - e. Other:
11. Which resources were most helpful for lactation education?
- a. Antenatal lactation self-assessment survey tool
 - b. Lactation resources handout
 - c. Provider talking points handout
 - d. Antenatal hand expression handout
 - e. Workflow flowchart handout
12. Of the least helpful aspects of the project, what feedback do you have?
- a. Provider comments:

- i. “I mostly used the dot phrase with the prenatal and postpartum patients. I do a targeted review of specific concerns around breastfeeding instead of a full overview to manage time in clinic.”
 - ii. “The workflow was extensive after reviewing patient answers with them. It was not time efficient.”
 - iii. “None”
 - iv. “Provider talking points- could see how this would be helpful maybe as a reference for midwives in the teams folder? I just didn’t need to reference during this study.”
 - v. “Too many words, not enough photos.”
13. Do you feel the workflow should be continued in the CNM faculty practice?
 - a. Yes, the standardized lactation impairment screening conducted in this project is a sustainable workflow
 - b. Somewhat, continued with a few minor revisions
 - c. No, there were too many barriers and the workflow conducted in this project must be completely revised
 - d. Comment:

Appendix C

Dot phrases

Lactation Risks: .lactationscreening

1. Patient preferred infant feeding method: (drop down)
 - Breastmilk- direct breastfeeding
 - Breastmilk- exclusive pumping
 - Breastmilk/formula combination
 - Formula- would like more information about breastmilk
 - Formula- do not wish to discuss breastmilk further
2. Lactation Impairment Risk Factors: (drop down/select all that apply)
 - No risk factors
 - Minimal breast changes in pregnancy
 - Problems with breastfeeding previous infants
 - History of breast surgery or biopsy
 - Flat or inverted nipples
 - Hypothyroidism
 - Gestational diabetes or pre-existing diabetes mellitus
 - Polycystic Ovarian Syndrome
 - Contraindicated medications
 - Lack of partner/family breastfeeding support
3. Clinical Recommendation: (drop down/select all that apply):
 - Routine lactation education and classes recommended
 - Lactation consultation recommended
 - Candidate for antenatal hand expression, technique reviewed with patient

Virtual Prenatal Lactation Assessment: .lactationvirtualassessment

1. What is your intended infant feeding method? (drop down)
 - Breastmilk- direct breastfeeding
 - Breastmilk- exclusive pumping
 - Breastmilk/formula combination
 - Formula- would like more information about breastmilk
 - Formula- do not wish to discuss breastmilk further
2. Are you concerned about your ability to breastfeed because you haven't yet experienced breast changes (heaviness, size, and/or tenderness in pregnancy) (Y/N)
3. Have you ever had problems breastfeeding any previous babies? (Y/N)
4. Have you ever had any breast surgery or breast biopsy? (drop down/select all that apply):
 - Breast Implants
 - Lump Removal
 - Breast Reduction
 - Top Surgery
5. Do you think you have flat or inverted nipples? (Y/N)

6. Some medical conditions can impact breastfeeding, do you have a history of: (drop down/select all that apply):
 - Low thyroid (hypothyroid)
 - Diabetes
 - Polycystic Ovarian Syndrome
7. Have you ever been told that you have a health problem that might keep you from breastfeeding your baby? (Y/N)
8. Will you be on any medications while you are breastfeeding? (Y/N)
9. Would you like your partner and/or family members to be more supportive of your breastfeeding plans? (Y/N)
10. Do you have any other concerns or worries about breastfeeding? (Y/N)

Antenatal Hand Expression How-To Handout: .antenatalhandexpression

- Handout will generate for AVS

Lactation Resources: .lactationresources

- Handout will generate for AVS

Appendix D

Prenatal Lactation Self-Assessment

Prenatal Lactation Self-Assessment

This faculty practice endorses the American Academy of Pediatrics' guidelines to feed your baby only breast milk for the first 6 months of life. Breastfeeding is a learned skill that takes practice and patience. We are here to help you succeed.

The questions below will guide us in planning for your infant feeding journey.

1. What is your intended infant feeding method?
 - Breastmilk- direct breastfeeding
 - Breastmilk- exclusive pumping
 - Breastmilk/formula combination
 - Formula- would like more information about breastmilk
 - Formula- do not wish to discuss breastmilk further

2. Are you concerned about your ability to breastfeed because you haven't yet experienced breast changes (heaviness, size, and/or tenderness in pregnancy)

3. Have you ever had problems breastfeeding any previous babies? Yes No
 Briefly explain _____

4. Have you ever had any breast surgery or breast biopsy? Yes No
 - Breast Implants
 - Lump Removal Yes No
 - Breast Reduction
 - Top Surgery

5. Do you think you have flat or inverted nipples?

6. Some medical conditions can impact breastfeeding, do you have a history of: Yes No
 - Low thyroid (hypothyroid) Yes No
 - Diabetes
 - Polycystic Ovarian Syndrome

7. Have you ever been told that you have a health problem that might keep you from breastfeeding your baby? Yes No
 Briefly explain _____

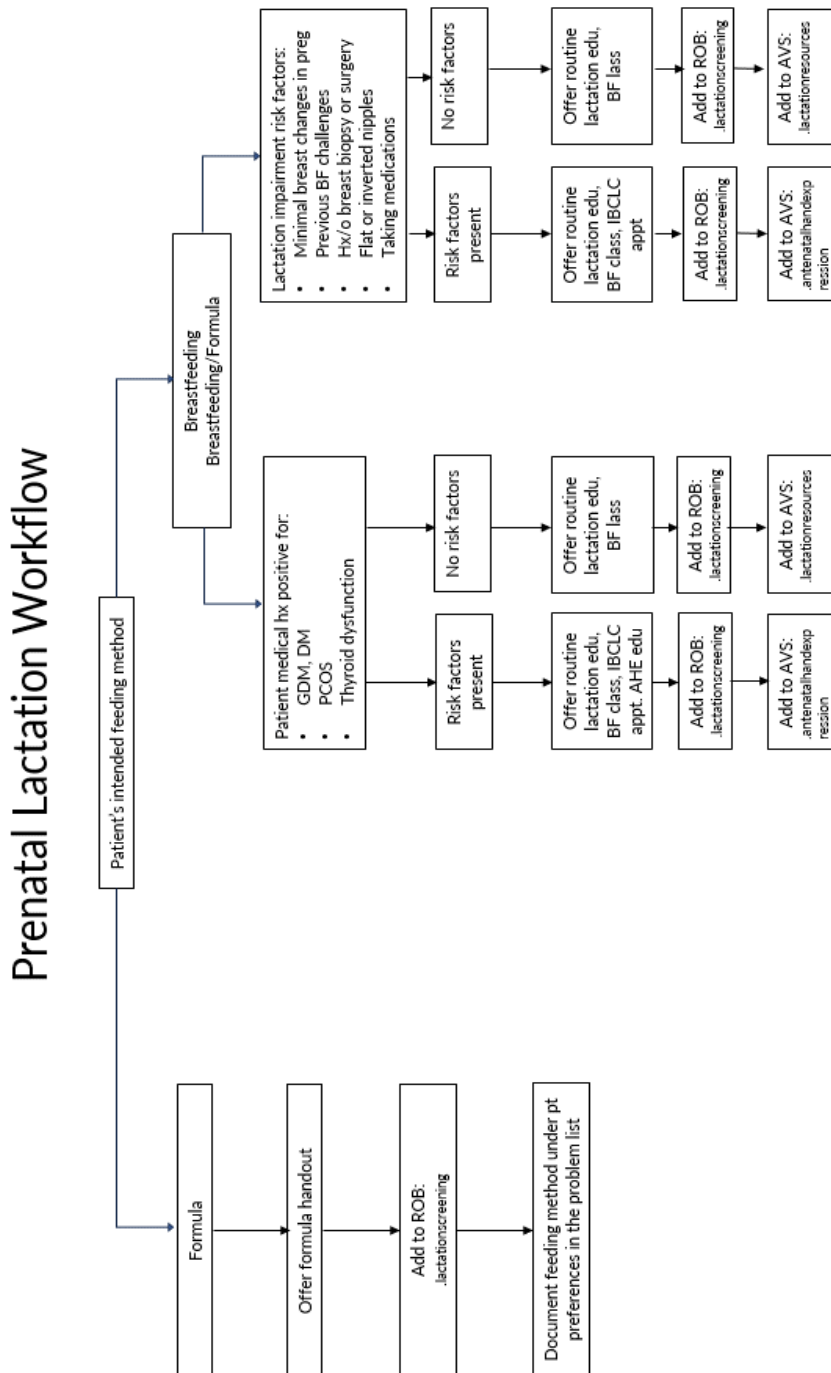
8. Will you be on any medications while you are breastfeeding? Yes No
 If yes, which medications? _____

9. Would you like your partner and/or family members to be more supportive of your breastfeeding plans? Yes No

10. Do you have any other concerns or worries about breastfeeding? Yes No
 Briefly explain _____

Appendix E

Prenatal Lactation Workflow



Appendix F

Antenatal Hand Expression Handout

Hand Expressing Breast Milk

What is hand expression?

- Involves massaging your breasts with your hands and fingers to stimulate the release of milk.
- You can start hand expressing either before or after you have your baby. Please consult your healthcare provider if you want to hand express before your baby is born.

Why hand express?

- To collect colostrum before your baby is born and prepare for feedings before your milk comes in.
- To increase your supply of breast milk.
- To relieve hard (engorged) breasts.

How do I get started?

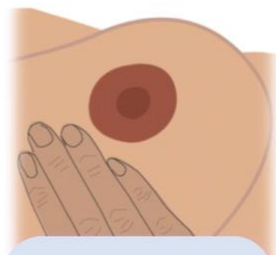
- Wash your hands before you start.
- Pick a relaxing spot, sit comfortably and try leaning forward.
- Follow the instructions in the diagram.
- It may take a few compressions before you start to see drops of milk, and the expected volume of milk may also vary.
- Shorter, frequent sessions of up to 30 minutes are the most effective.

How do I hand express?

1

Gently massage the breast.

Start at the top of your breast and move your hand down toward the nipple.



3

Push back towards your chest.

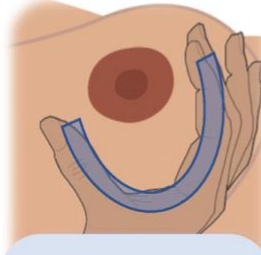
Keep your thumb and fingers cupped in a C shape around the nipple.



2

Cup the breast in a C-shape.

Place your thumb and fingers 1-2 inches away from the nipple, on opposite sides.



4

Express milk.

Bring your thumb and fingers together. Slide forward toward but not on the areola. Press, compress & release. Repeat right away.

**Can I store the milk I collect?**

- Collect the milk in a clean container (i.e., cup, syringe).
- Seal & label the container with the date it was expressed.
- Store in the fridge (up to 4 days) or freezer (up to 12 months).



Scan for
video tutorial

Appendix G

Breastfeeding and Infant Feeding Resource Handout

Breastfeeding (Lactation) and Infant Feeding



OHSU Breastfeeding support in and out of the hospital

- 24/7 in-hospital breastfeeding help. All labor and delivery nurses and recovery nurses are trained in breastfeeding. They can help around the clock when your baby is feeding.
- In-hospital certified lactation consultants. For more complex issues, our lactation consultants are available every day to visit your hospital room or the NICU (neonatal intensive care unit). If your baby is in the NICU, they can help you express or pump milk.
- Breastfeeding help once you're home. Our outpatient lactation consultants are board-certified and are also nurses. They can also help you prepare for breastfeeding before your baby's birth.

OHSU Lactation Classes & Consultations:

- **Breastfeeding Class:** Learn what to expect and how to breast or chestfeed successfully.
 - **Topics:** Latching and positioning, breast/chest care, feeding cues, common challenges
 - **When to register:** In your fourth month of pregnancy. Take this class after your fifth month of pregnancy. People who've already had their baby are also welcome.
 - **Class Options:**
 - **Virtual:** A group webinar-style class on Tuesdays from 6 pm-8:30 pm
 - **Self-guided Class:** You will have seven months of access to our web-based class that uses videos, personal breastfeeding stories, animations, activities, and games to help you prepare for breastfeeding
 - **In-person class:** A three-hour class held on Tuesdays 6-9 pm, available monthly
 - **Fee:** All classes assess \$95 (insurance may reimburse)
- **Understanding Pumping Class:** This class is ideal for families soon to be returning to work
 - **Topics:** Returning to work, effective expressing, maintaining milk supply, postpartum care, balancing family life/self-care/work
 - **What to bring:** partner or support person, your baby, and your pump if you have questions about it
 - **In-person class:** A two-hour class held on the fourth Wednesday each month, from 12-2 pm
 - **Fee:** All classes assess \$65 (insurance may reimburse)
- **Lactation Consultation:**
 - Infant feeding experts offer virtual or in-person appointments before and after your baby is born
 - Call 503-418-4500 for an appointment

Other Lactation Resources:

- **Providence Portland Medical Center:** Open seven days a week: 9 a.m. - 5 p.m., In-person and video visits, call to schedule 503-215-6085
- Breastfeeding recommendations: <https://www.cdc.gov/nutrition/InfantandToddlerNutrition/breastfeeding/index.htm>
- Milk storage guidelines: https://www.cdc.gov/breastfeeding/recommendations/handling_breastmilk.htm
- Attaching baby to breast/chest: https://globalhealthmedia.org/language/english/?_stf_topic=breastfeeding
- Formula recommendations: <https://www.cdc.gov/nutrition/InfantandToddlerNutrition/formula-feeding/index.html>
- Bottle feeding: <https://www.youtube.com/search?q=breast+paced+bottle+feeding+video&rotate=90&vid-id=#7e5a8fvidOGPm52oLxXY>


Appendix H

Provider Talking Points Handout

Lactation Talking Points and Resources	
Question	CNM Talking Points
2. No breast changes yet during pregnancy	<ul style="list-style-type: none"> • <i>"Breast changes often indicate your body will be able to produce milk. However, even if you have not noticed many changes, we still assume you will be able to produce milk. It is difficult to predict milk supply before your baby arrives and you start the process!"</i> • <i>"Breast size is not related to milk production."</i> • <i>"Your body has been producing colostrum since mid-pregnancy. Some people experience leaking in pregnancy, while others do not. It is not reflective of what your milk supply will be."</i> • <i>"Colostrum is highly nutritious, and your baby just needs small amounts of it. Your hormones shift significantly when you deliver the placenta, which signals to your body that it is time to produce milk for your baby."</i>
3. Previous breastfeeding/ chestfeeding problems	<ul style="list-style-type: none"> • <i>"Breastfeeding/chestfeeding is like learning a new sport, it takes lots of practice! Every baby has a different journey. This new baby will need time to practice, as well."</i> • <i>"If a previous baby had tongue-tie, it can be helpful to have that assessed on the new baby early on. Inpatient lactation consultants can evaluate your baby on the Mother Baby Unit."</i> • <i>"You have learned things from your last experience that will help you troubleshoot and seek help during this experience."</i>
4. History of breast surgery	<ul style="list-style-type: none"> • <i>"Many women and postpartum parents are able to breastfeed/chestfeed successfully with implants or after breast surgery. The location of the surgery or placement of the implants may have an impact, but it is difficult to know how the surgery will affect you specifically until your baby arrives and starts the breast/chestfeeding process."</i>
5. Flat nipples	<ul style="list-style-type: none"> • <i>"Often, nipples can evert with stimulation. Sometimes stimulating your nipple to evert prior to latching your infant can be helpful."</i> • <i>"Many mothers and postpartum parents are able to breastfeed/chestfeed successfully with flat or inverted nipples. Babies are very good at using what they are given."</i> • <i>"Occasionally, we use tools like a nipple shield to help the baby latch. Your nurse/lactation consultant can help with this on the Mother Baby Unit."</i>
6. History of hypothyroid, diabetes or PCOS	<ul style="list-style-type: none"> • <i>"Untreated low thyroid levels may result in a decrease in milk supply - if thyroid replacement therapy is adequate there is often no concerns for milk supply."</i> • <i>"History of PCOS and diabetes are risk factors for delayed lactogenesis (milk may come in later than Day 3). Antenatal hand expression, starting at 37 weeks, can provide colostrum for supplementation early on and stimulate milk to come in sooner."</i>
7. Health problem	<ul style="list-style-type: none"> • <i>"What are your concerns?"</i> • <i>"What is this health problem?"</i>
8. Medications and breastfeeding/ chestfeeding	<ul style="list-style-type: none"> • <i>Great resource is: LactMed app</i> • <i>OTC meds/supplements that can decrease supply: mint, antihistamines, decongestants</i>
9. Partner/family not supportive of breastfeeding/ chestfeeding plans	<ul style="list-style-type: none"> • <i>"Attending a breastfeeding class with your support team can be helpful, so they can learn what to expect and how to best help support you."</i> • <i>"Any amount of colostrum and breast milk your baby receives is beneficial even if only for a few days/weeks."</i> • <i>"If feeding your baby with a bottle is important to your partner/family, we will send some information in you AVS about Paced Bottle Feeding which helps support your baby going back and forth between breast and bottle."</i>
10. Other concerns	<ul style="list-style-type: none"> • <i>"When you have questions or experience challenges please call to schedule an appointment with a lactation consultant, we'll include the phone number in your after-visit summary"</i> • <i>"We have many wonderful local resources available to help you breastfeed/chestfeed successfully- we will include a list in your after-visit summary"</i>

Appendix I

Standardizing Antepartum Lactation Education: A Quality Improvement Project



**Standardizing Antepartum
Lactation Education**

A QUALITY IMPROVEMENT PROJECT

DATE: SEPTEMBER 8, 2023 PRESENTED BY: NAOMI HESTER, RN, BSN

Problem Description

- **The AAP recommendation:**
 - Exclusively breastfeed for the first six months of life
 - Breastfeed in combination with nutritious complementary foods for at least 1 year
- **60% of lactating parents stop breastfeeding before they intend to**
- **Perceived Insufficient Milk Supply**
 - The most frequent reason for breastfeeding cessation in Multnomah County
 - 33% at 3 months and 39% at 6 months
- **In the US, it's estimated 1 in 20 birthing people may experience impaired lactation**

Literature Review: Impaired Lactation

- Delayed lactogenesis (II): age, parity, obesity, prenatal care provider, mode of delivery, labor course, infant birth weight, excess infant weight loss, Apgar score <8, flat or inverted nipples, supplementation within 48 hours postpartum, and nipple pain
- Insufficient lactation:
 - Preglandular: DM, obesity, thyroid dysfunction, retained placental fragments, theca lutein cysts, postpartum pituitary infarction, and PCOS
 - Glandular: mammary hypoplasia, augmentation, reduction, and gender-affirming top surgery
 - Postglandular:
 - Infant: preterm birth, cleft lip/palate, ankyloglossia, and conditions that impair suck/swallow
 - Maternal: medications or substances that inhibit milk synthesis, fatigue, and stress

3

Literature Review: Lactation Education

- **Lactation education, Breastfeeding Classes, IBCLC consults**
 - Tseng et al. (2020): 3 group-based 2.5-hour sessions at 34-, 35-, and 36 weeks gestation demonstrated significantly improved breastfeeding self-efficacy, infant feeding attitudes, and exclusive breastfeeding rates
 - Shafaei et al. (2020): 4 prenatal and 1 postpartum breastfeeding counseling sessions from a clinician or IBCLC demonstrated increased rates of breastfeeding self-efficacy and mitigation of lactation issues during the postpartum period
 - Kehinde et al. (2023): Optimal breastfeeding uptake is largely dependent on educating pregnant people during the antepartum period on the benefits of breastfeeding for the birthing parent and the baby
- **Antenatal Hand Expression**
 - Shafaei et al. (2020): four prenatal and one postpartum breastfeeding counseling session from a clinician or IBCLC demonstrated increased rates of breastfeeding self-efficacy and mitigation of lactation issues during the postpartum period
 - Initiate at 37 weeks

4

Project Aims

- The purpose of this project is to establish standardized lactation education that nurse-midwives can use during the antenatal period to help identify risk factors for impaired lactation and promote breastfeeding self-efficacy among pregnant people.
- Specific Aims:
 - By September 25, 80% of midwives will have responded to the survey assessing lactation education clinical practices and preexisting knowledge of antenatal hand expression.
 - By October 2, 100% of nurse-midwives and student midwives involved in antepartum care will view the voice-over presentation
 - By the end of the first PDSA cycle, 80% of pregnant patients seen between 30 and 32 weeks will be screened for lactation impairment using the lactation impairment risk assessment tool.

5

Intervention

- Pretest Survey
- Recorded voiceover presentation
- SNM daily chart review → SPOK alerts to CNMs (TBD)
- Prenatal lactation self-assessment screening tool at 30-32 weeks gestation
- Provider talking points & workflow flow chart
- Patient screens positive/negative:
 - Individualize prenatal education, resources, and referrals based on patient risk factors
 - Utilize dot phrases to document risk factors and clinical recommendations
 - Utilize dot phrases to generate lactation education resources

6

Prenatal Lactation Self-Assessment Screening Tool

7

Center for Women's Health

Prenatal Lactation Self-Assessment

OWH endorses the American Academy of Pediatrics' guidelines to feed your baby only breast milk for the first 6 months of life. Breastfeeding is a learned skill that takes practice and patience. We are here to help you succeed.

The questions below will guide us in planning for your infant feeding journey.

1. What is your intended infant feeding method?
 - Breastmilk: direct breastfeeding
 - Breastmilk: exclusive pumping
 - Breastmilk/formula combination
 - Formula: would like more information about breastmilk
 - Formula: do not wish to discuss breastmilk further
2. Are you concerned about your ability to breastfeed because you haven't yet experienced breast changes (heaviness, size, and/or tenderness in your pregnancy)? Yes No
3. Have you ever had problems breastfeeding any previous babies? Yes No
Briefly explain _____
4. Have you ever had any breast surgery or breast biopsy? Yes No
 - Breast Implants
 - Lumps Removal
 - Breast Breast Reduction
 - Top Surgery
5. Do you think you have flat or inverted nipples? Yes No
6. Some medical conditions can impact breastfeeding, do you have a history of: Yes No
 - Low thyroid (hypothyroid)
 - Diabetes
 - Polycystic Ovarian Syndrome
7. Have you ever been told that you have a health problem that might keep you from breastfeeding your baby? Yes No
Briefly explain _____
8. Will you be on any medications while you are breastfeeding? Yes No
If yes, which medications? _____
9. Would you like your partner and/or family members to be more supportive of your breastfeeding plans? Yes No
10. Do you have any other concerns or worries about breastfeeding? Yes No
Briefly explain _____

Provider Resource: Lactation Talking Points

8

Lactation Talking Points and Resources

Question	CNM Talking Points
3. No breast changes yet during pregnancy	<ul style="list-style-type: none"> • "Breast changes often indicate your body will be able to produce milk. However, even if you have not noticed many changes, we still assume you will be able to produce milk. It is difficult to predict milk supply before your baby arrives and you start the process." • "Breast size is not related to milk production." • "Your body has been producing colostrum since mid-pregnancy. Some people experience leaking in pregnancy, while others do not. It is not reflective of what your milk supply will be." • "Colostrum is highly nutritious, and your baby just needs small amounts of it. Your hormones shift significantly when you deliver the placenta, which signals to your body that it is time to produce milk for your baby."
3. Previous breastfeeding/checked problems	<ul style="list-style-type: none"> • "Breastfeeding/checked feeding is like learning a new sport. It takes lots of practice! Every baby has a different journey. This new baby will need time to practice as well." • "If a previous baby had longer ties, it can be helpful to have that assessed on the new baby early on. Inpatient lactation consultants can evaluate new babies on the Mother Baby Unit." • "You have learned things from your last experience that will help you troubleshoot and seek help during this experience."
4. History of breast surgery	<ul style="list-style-type: none"> • "Many women and postpartum parents are able to breastfeed/checked successfully with implants or after breast surgery. The location of the surgery or placement of the implants may have an impact, but it is difficult to know how the surgery will affect you specifically until your baby arrives and starts the breast/checked process."
5. Flat nipples	<ul style="list-style-type: none"> • "Often nipples can evert with stimulation. Sometimes stimulating your nipple to evert prior to latching your infant can be helpful." • "Many mothers and postpartum parents are able to breastfeed/checked successfully with flat or inverted nipples. Babies are very good at using what they are given." • "Occasionally, we use tools like a nipple shield to help the baby latch. Your nurse/lactation consultant can help with this on the Mother Baby Unit."
6. History of hypothyroid, diabetes or PCOS	<ul style="list-style-type: none"> • "Undiagnosed low thyroid levels may result in a decrease in milk supply - if thyroid replacement therapy is adequate there is often no concern for milk supply." • "History of PCOS and diabetes are risk factors for delayed lactogenesis II, which may come in later than Day 3. Antenatal hand expression, starting at 37 weeks, can provide colostrum for supplementation early on and stimulate milk to come in sooner."
7. Health problem	<ul style="list-style-type: none"> • "What are your concerns?" • "What is this health problem?"
8. Medications and breastfeeding/checked	<ul style="list-style-type: none"> • Great resource is: LactMed app • OTC meds/supplements that can decrease supply: mint, antihistamines, decongestants
9. Partner/Family not supportive of breastfeeding/checked plans	<ul style="list-style-type: none"> • "Attending a breastfeeding class with your support team can be helpful, as they can learn what to expect and how to best help support you." • "Any amount of colostrum and breast milk your baby receives is beneficial even if only for a few days/weeks." • "If feeding your baby with a bottle is important to your partner/family, we will send some information in you AIV about Paced Bottle Feeding which helps support your baby going back and forth between breast and bottle."
10. Other concerns	<ul style="list-style-type: none"> • "When you have questions or experience challenges please call to schedule an appointment with a lactation consultant, we'll include the phone number in your after-visit summary." • "We have many wonderful local resources available to help you breastfeed/checked successfully - we will include a list in your after-visit summary."

Lactation Risk Factors Dot Phrase

.lactationscreening

1. Patient preferred infant feeding method: (drop-down, select one)
 - Breastmilk- direct breastfeeding
 - Breastmilk- exclusive pumping
 - Breastmilk/formula combination
 - Formula- would like more information about breastmilk
 - Formula- do not wish to discuss breastmilk further
2. Lactation Impairment Risk Factors: (drop-down/select all that apply)
 - No risk factors
 - Minimal breast changes in pregnancy
 - Problems with breastfeeding previous infants
 - History of breast surgery or biopsy
 - Flat or inverted nipples
 - Hypothyroidism
 - Gestational diabetes or pre-existing diabetes mellitus
 - Polycystic Ovarian Syndrome
 - Contraindicated medications
 - Lack of partner/family breastfeeding support
3. Clinical Recommendation: (drop-down/select all that apply):
 - Routine lactation education and classes recommended
 - Lactation consultation recommended
 - Candidate for AHE, technique reviewed with patient

9

Lactation Risk Factors Dot Phrase

.lactationscreening

1. Patient preferred infant feeding method: (drop-down, select one)
 - Breastmilk- direct breastfeeding
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 - Breastmilk/formula combination
 - Formula- would like more information about breastmilk
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2. Lactation Impairment Risk Factors: (drop-down/select all that apply)
 - No risk factors
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 - Gestational diabetes or pre-existing diabetes mellitus
 - Polycystic Ovarian Syndrome
 - Contraindicated medications
 - Lack of partner/family breastfeeding support
3. Clinical Recommendation: (drop-down/select all that apply):
 - Routine lactation education and classes recommended
 - Lactation consultation recommended
 - Candidate for AHE, technique reviewed with patient

9

AHE How-To After Visit Summary

antenatalhandexpression

Hand Expressing Breast Milk

What is hand expression?

- Involves massaging your breasts with your hands and fingers to stimulate the release of milk.
- You can start hand expressing either before or after you have your baby. Please consult your healthcare provider if you want to hand express before your baby is born.

Why hand express?

- To collect colostrum before your baby is born and prepare for feedings before your milk comes in.
- To increase your supply of breast milk.
- To relieve hard (engorged) breasts.

How do I get started?

- Wash your hands before you start.
- Pick a relaxing spot, sit comfortably and try leaning forward.
- Follow the instructions in the diagram.
- It may take a few compressions before you start to see drops of milk, and the expected volume of milk may also vary.
- Shorter, frequent sessions of up to 30 minutes are the most effective.


How do I hand express?

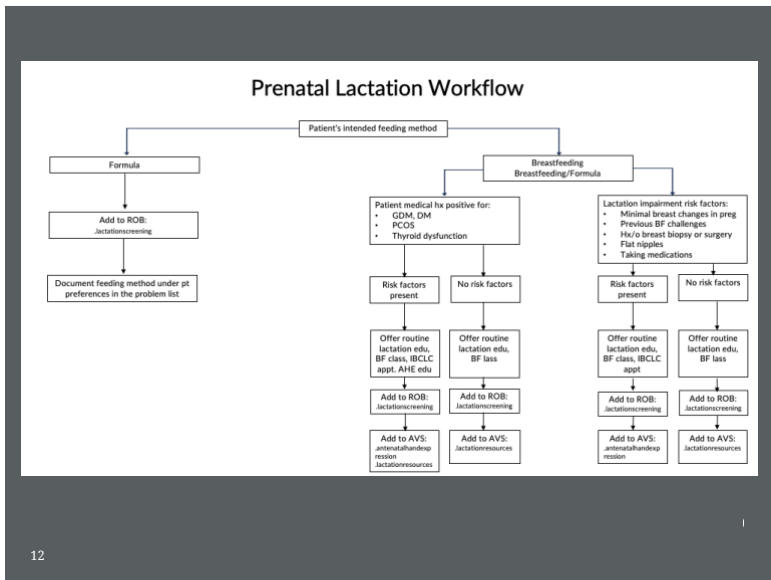
- Gently massage the breast.** Start at the top of your breast and move your hand down toward the nipple.
- Cup the breast in a C-shape.** Place your thumb and fingers 1-2 inches away from the nipple, on opposite sides.
- Push back towards your chest.** Keep your thumb and fingers cupped in a C-shape around the nipple.
- Express milk.** Bring your thumb and fingers together. Slide forward toward but not on the areola. Press, compress & release. Repeat right away.

Can I store the milk I collect?

- Collect the milk in a clean container (i.e., cup, syringe).
- Seal & label the container with the date it was expressed.
- Store in the fridge (up to 4 days) or freezer (up to 12 months).

Scan for video tutorial





Study of Intervention

- PDSA Cycles:
 - PDSA #1: October 2- October 20
 - PDSA #2: October 23- November 10
 - PDSA #3: November 13- December 1
- Data Collection
 - Pretest survey of CNMs using Typeform software
 - IBCLC referral baseline rates will be measured before interventions take place and tracked in each PDSA cycle
 - Qualitative pretest questionnaire answers and quantitative data derived from the EHR audit will be managed using Excel and securely stored using Box software

13

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