Antenatal breastfeeding education through routine prenatal care at a community hospital: A quality improvement initiative

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Abstract

Background: Breastfeeding provides substantial health benefits for both infants and lactating individuals. However, insufficient support and education during the antenatal and postpartum periods can result in early breastfeeding cessation, which is linked to negative maternal mental health outcomes and diminished breastfeeding duration.

Local Problem: A community hospital embedded within a large academic institution identified key barriers to effective breastfeeding support, including the absence of standardized antenatal education, inconsistent lactation services, and inadequate provider knowledge regarding lactogenesis. These challenges contribute to premature breastfeeding cessation and unmet patient expectations.

Methods: A ten-week quality improvement initiative, utilizing the Plan-Do-Study-Act (PDSA) framework, was implemented to integrate evidence-based lactation education into routine prenatal care. A standardized educational handout was distributed to patients between 28- and 32-weeks gestation, with education provision and documentation monitored through the electronic medical record system.

Results: Of the 52 eligible patients, 79% received antenatal lactation education. The rate of inclusion of this education in the After Visit Summaries (AVS) reached 94% by the conclusion of the project. Pre- and post-intervention surveys demonstrated a statistically significant improvement in provider consistency in documenting lactation education ($p=0.01$).

Conclusion: The project successfully integrated standardized antenatal lactation education into clinical workflows, resulting in improved provider adherence and patient education. Future recommendations include expanding the education window and addressing workflow challenges to enhance long-term breastfeeding outcomes.

Contents

Antenatal breastfeeding education through routine prenatal care

Problem Description

People experience distress, confusion, and frustration when they are not supported in their desire to breastfeed (Snyder et al., 2021) and the impacts of impaired education and expectations become especially apparent in the postpartum period. Those that discontinue breastfeeding earlier than they intended report increased rates of postpartum mental health disorders, impaired bonding, social stigma and feelings of guilt and inadequacy (Beauregard et al., 2022; Snyder et al., 2021). Parents who have previously experienced challenges breast feeding may choose to formula feed and report experiencing bias and judgement from peers and healthcare providers, leading to isolation and anxiety (Barnes et al., 2021).

Breastfeeding offers neonatal benefits by protection from allergies, asthma, infection, and chronic diseases (Oregon Health Authority, 2023). Breastfeeding may be protective against ovarian and breast cancers, diabetes, postpartum depression, and improves confidence in the lactating person (Oregon Health Authority, 2023). When people need to discontinue breastfeeding before they intend to, they may hold grief, guilt, and frustration about their decision (Morrison et al., 2019).

Premature breastfeeding cessation rates disproportionately impact communities of color, those of lower socio-economic status, and those with lower levels of education (Mangrio et al., 2018) As the benefits of breastfeeding are significant, efforts to support people within these groups should be robust and assist in actively managing education and guidance regarding feeding preferences (Temple Newhook et al., 2017). In 2019, the national average rate of parents who initiated feeding with breast milk was 83.2%, but only 55.8% of infants were receiving breast milk at 6 months (CDC, 2022). In 2019, the state of Oregon documented a breastfeeding

initiation rate of 95.0%, significantly higher than the national average with subsequently higher rates of breastfeeding at 6 months (65.2%) (CDC, 2022). Notably, in Washington County, Oregon, the average breastfeeding initiation rate was 96%, however, only 42% report exclusive breastfeeding at six months of age, lower than both the state and national average (Oregon Health Authority, 2023).

In a collaborative practice at a community hospital embedded within a large academic university, stakeholders have reported concerns that there is no standardized antenatal education method, inpatient lactation is not offered seven days a week, and healthcare team members are generally new with less experience. Subsequently, staff are less equipped to provide support with the additional challenge that there is currently no outpatient lactation provider to support patients individually. Additionally, pregnancy care providers have voiced their concerns around limited education surrounding normal lactogenesis and how to assist patients when they voice concerns.

Without antenatal support, families hold unrealistic expectations about breastfeeding and lack education regarding how to manage typical setbacks. Without systemic support at the local, organizational, and national level, families will continue to be poorly informed and experience lack of support leading to a risk of early discontinuation of breastfeeding.

Available Knowledge

The data search was conducted using the following medical subheading (MeSH) terms: “antenatal”, “prenatal education”, “breastfeeding”, “rates”, “education”, “human milk”, “health promotion”, “postnatal care”, “cessation”, “experience”, “breastfeeding/statistical & numerical data”.

The databases searched include PubMed, ProQuest, the Cochrane Database System, and national and global databases including the World Health Organization (WHO) and Centers for Disease

Control (CDC). English was the only selected language with date constraints between 2015 and 2024. The search yielded 304 results. Selected articles include randomized controlled trials, retrospective cohort studies, meta-analyses, observational studies, and review articles. Selected articles included highest levels of evidence, currency, and those that took place in the United States. The following literature review outlines national and local breastfeeding rates and provides rationale for earlier than desired breastfeeding cessation and methodologies for supporting breastfeeding success.

Local and National Problem

As of UNICEF data in 2018, the United States recorded that 74% of babies were ever breastfed, compared to other high-income countries such as Australia and Norway, where the rates are 92% and 95%, respectively (UNICEF, 2018). Countries with higher breastfeeding rates are more likely to document factors contribute to creating a positive environment for breastfeeding such as support from family members who can provide examples and encouragement. At the national level, policies guaranteeing parental leave and the right to breastfeed in the workplace are critical and promote maternal-infant bonding through breastfeeding (UNICEF, 2018). Additionally, birthing people receive support immediately after birth, particularly through the Baby Friendly Hospital Initiative. Baby-Friendly Hospitals prioritize the promotion and support of breastfeeding through comprehensive staff training, evidence-based practices, a supportive environment, access to lactation support, and ongoing quality improvement efforts. This holistic approach helps to empower staff members to assist patients in breastfeeding successfully and promotes positive breastfeeding experiences for mothers and babies (Baby Friendly USA, 2024). The United States lacks such infrastructure to

support the initiation and continuation of breastfeeding and subsequently observes lower reported breastfeeding rates (CDC, 2022).

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). Exclusive breastfeeding is defined as "feeding your baby only breast milk, not any other foods or liquids (including infant formula or water), except for medications or vitamin and mineral supplements" (CDC, 2022). In 2019, the national average rate of parents who initiated feeding with breast milk was 83.2%, but only 55.8% of infants were receiving breast milk at 6 months (CDC, 2022). In 2019, the state of Oregon documented a breastfeeding initiation rate of 95.0%, significantly higher than the national average with subsequently higher rates of breastfeeding at 6 months (65.2%) (CDC, 2022). Notably, in Washington County, Oregon, the average breastfeeding initiation rate was 96%, however, only 42% report exclusive breastfeeding at six months of age, lower than both the state and national average (Oregon Health Authority, 2023).

Reasons for Cessation: Perceived Low Milk Supply

It is not uncommon for parents to believe they are not producing enough milk to meet their infant's needs, even when their supply is adequate. Premature discontinuation of breastfeeding has been associated with perceived low milk supply (Multnomah County Health Department, 2013) and misunderstanding of normal lactogenesis (Oggero et al., 2024) leading to a cessation rate of approximately 60% in the United States (Beauregard et al., 2022). However, true insufficient milk supply is exceptionally rare, affecting less than 5 percent of lactating parents (Gianni et al., 2019). Insufficient milk supply means that parents are biologically incapable of producing enough breast milk to accomplish infant weight gain through

breastfeeding alone (Gianni et al., 2019). Providers hold a responsibility to provide education that reflects expectations surrounding milk supply and quantity as the infant grows. With greater understanding of normal lactogenesis and newborn cues and feeding patterns, patients show greater adherence to breastfeeding without excessive concern about an underfed newborn (Wong et al., 2021; Oggero et al., 2024).

The concern for low milk supply can exacerbate stress and anxiety, which negatively affects milk production (Gila-Diaz et al., 2020). Moreover, without proper guidance and education regarding normal lactogenesis patterns and infant feeding cues from healthcare providers, parents may prematurely supplement with formula. This decision consequently exacerbates concerns of low milk supply by reducing breastfeeding frequency and interrupting the supply and demand cycle (Gianni et al., 2019).

Reasons for Cessation: Mental Health Challenges

Positive emotional experiences, characterized by confidence, support, satisfaction, and self-efficacy are strongly associated with higher breastfeeding rates (Bartle et al., 2017). Conversely, negative emotions such as stress, anxiety, and postpartum depression can hinder a parents' ability to breastfeed. According to a prospective cohort study by Gila-Diaz et al.(2020), people experiencing high levels of stress or depression and subsequently higher levels of cortisol, are more likely to report difficulties with breastfeeding and are at a greater risk of early cessation. The presence of emotional support from partners, family, and healthcare providers can mitigate these negative emotions, enhancing the lactating person's breastfeeding experience (Tully et al., 2017). Use of perceived stress scores and validating depression screening questionnaires such as the Edinburgh Postpartum Depression Scale (EPDS) allow for detection and opportunities to treat mental health concerns before they erode desired feeding practice

(Gila-Diaz et al., 2020). Emotional support helps to build confidence and reduce stress, making mothers more likely to persist with breastfeeding despite challenges. Furthermore, the American Psychological Association (2021) emphasizes that addressing mental health during the postpartum period is vital for supporting successful breastfeeding practices.

Reasons for Cessation: Lack of support postpartum

Postpartum support encompasses professional assistance from lactation consultants, emotional support from family and friends, and access to breastfeeding-friendly environments (Kehinde et al., 2023). A qualitative study by Snyder et al. (2021) indicated that while breastfeeding is a valued behavior, however, families are "hindered by exhaustion, isolation, time commitment of breastfeeding, latching difficulties, pain and lack of familial support". Findings of their study further implicated the need for legislation that supports breastfeeding practice to ensure workplace breastfeeding protections and prolong the breastfeeding period (Snyder et al., 2021). These issues can lead to frustration and discouragement, prompting some parents to switch to formula feeding prematurely (Oggero et al., 2024). A qualitative study by Bengough et al. (2022) highlighted that families who receive comprehensive postpartum support are more likely to continue breastfeeding exclusively for the recommended six months compared to those who do not receive such support (Bengough et al., 2022). Additionally, the Centers for Disease Control and Prevention (CDC) notes that hospitals with robust postpartum support programs, including but not limited to implementing the Baby Friendly Hospital Initiative, outpatient follow-up lactation and breastfeeding education, reported higher breastfeeding initiation and continuation rates (CDC, 2022). Thus, ensuring comprehensive postpartum support is crucial for improving breastfeeding outcomes and promoting maternal and infant health.

Health Disparities

Factors such as socioeconomic status, race, education level, and access to healthcare play crucial roles in breastfeeding initiation and duration (Temple-Newhook et al., 2017). Additionally, limited access to lactation support services and workplaces that do not accommodate breastfeeding further exacerbate these disparities. A cohort study completed by Temple Newhook et al. (2017) examined breastfeeding rates between socially marginalized and socially privileged groups using a prenatal survey. All participants reported intentions to breastfeed at baseline. Breastfeeding rates significantly differed between the groups; At one month, people of lower socioeconomic status stopped breastfeeding at a rate of 24.7% compared to 6.7% of people of higher socioeconomic status. Three significant determinants were identified: Unpartnered marital status (OR 5.10, p=0.05), <1 h of skin-to-skin contact after birth (OR 11.92, p=0.02), and negative first impression of breastfeeding (OR 11.07, p=0.01). These findings indicate a greater need for support and education for socially marginalized groups to support their desire to breast feed.

A longitudinal study conducted by Beauregard et al. (2022) examined the of feeding practices and nutrition outcomes among US-low-income women enrolled in the Women, Infants, and Children program (WIC). Data was used from the WIC Infant and Toddler Feeding Practices Study-2 on 1080 women who intended to breastfeed. Risk ratios for associations were assessed between each of six maternity care practices supportive of breastfeeding including breastfeeding within 1 hour of birth, showing mothers how to breastfeed, giving only breast milk, rooming-in, breastfeeding on demand and no pacifier use.

In adjusted models, breastfeeding within 1 hour of birth, giving only breast milk, and no pacifiers were associated with higher likelihood of meeting prenatal breastfeeding intentions (Beauregard et al., 2022). Particularly in vulnerable populations, people who experienced maternity care

practices supportive of breastfeeding were more likely to meet their prenatal breastfeeding intentions.

In support of the Beauregard et al. (2022) findings, a qualitative research systematic review by Mangrio et al. (2018) showed that sociodemographic factors such as young age, lower education level, and the need to return to work within twelve weeks postpartum were associated with earlier cessation. Their research proposed that improving health care provider knowledge and implementing targeted interventions such as prenatal lactation education and support in the postpartum period for at risk parents could be effective in preventing premature cessation (Mangrio et al., 2018).

Racism continues to define the health status of people of color. The initiation rate, exclusive breastfeeding rate through 6 months and the 12-month duration rate for Black women was 64.3%, 14% and 17.1% respectively, compared with White women 81.5%, 22.5% and 30.8% respectively (Anstey et al., 2017). In a scoping review by Robinson et al. (2019) racism, bias, and discrimination against people of color were examined to determine the effect on breastfeeding intention, initiation, and duration. The study examined five qualitative and quantitative articles that examined the experience of pregnant Black women and the perspective of care providers. African American women reported that racism adversely affected breastfeeding initiation and duration. Furthermore, the healthcare providers made biased assumptions that Black women would not breastfeed which affected the quality of breastfeeding support and education. Additionally, African American women received fewer referrals for lactation support and more limited assistance when problems developed (Robinson et al., 2019). While structured racism requires legislative solutions, bias and discrimination by healthcare

providers are risk factors that can be modified through awareness and training mitigate racist consequences and support the feeding intentions of people of color.

A person's socioeconomic status and social support should be considered to methodologically support their intention to breastfeed. Addressing disparities requires targeted interventions that include culturally appropriate breastfeeding education, improved access to lactation consultants, and supportive workplace policies. By mitigating these social determinants, breastfeeding rates can be more equitably improved across diverse populations, ultimately enhancing health outcomes for both mothers and infants.

Rationale

Best Practice Recommendations

The Academy of Breastfeeding Medicine (ABM) clinical protocol on peripartum breastfeeding management recommends that all pregnant individuals receive prenatal education on the benefits and management of breastfeeding to make informed decisions about infant feeding (Palmer, 2024). Similarly, the American College of Obstetrics and Gynecology (ACOG) policy statement supports early educational intervention by healthcare professionals during pregnancy (ACOG, 2021). The American College of Nurse-Midwives (ACNM) position statement highlights midwives as "essential care providers, well-equipped to support patient lactation goals through direct health education and support during the prenatal, immediate postpartum, and ongoing postpartum periods"(ACNM, 2022). With consideration of these recommendations, the gaps in the practice require intervention to improve the provided care.

Breastfeeding Promotion: Antenatal Education

Antenatal breastfeeding education significantly impacts breastfeeding rates by preparing expectant parents with the knowledge and confidence needed to initiate and sustain breastfeeding

(ABM, 2015). The ABM recommends the “integration of breastfeeding promotion, education and support throughout prenatal care”. To guide providers, their protocol breaks down teaching points and education by trimester. They specifically advocate for “reviewing breastfeeding basics, such as the importance of exclusive breastfeeding, the relationship of supply and demand, feeding on demand, frequency of feedings, cues of hunger and satiety, and the importance of a good latch” in the third trimester (ABM, 2015) as these are the critical aspects of self-efficacy related to breast feeding and associated success.

Educational programs provided during pregnancy can address common concerns and misconceptions about breastfeeding, teach practical skills such as proper latch techniques, and highlight the benefits of breastfeeding for both mother and baby (Huang et al., 2019). A randomized controlled trial by Huang et al. (2019) randomized families into either typical prenatal care or the intervention group in which they received additional antenatal breastfeeding education. This included a 30-minute video which introduced the benefits of breastfeeding, barriers to success and how one might manage these, and ideas for feeding positions. At 4 months, 70.9% of the intervention group were exclusively breastfeeding compared with 46.2% of the women in the control group (2.84; 1.76-4.60). At discharge from hospital, 95.1% of women in the intervention group were breastfeeding on demand compared with 68.1% of women receiving routine care (9.00; 4.09-19.74). Their findings indicated that standardized antenatal education and can effectively increase the rates of exclusive breastfeeding from delivery to postpartum 4 months and change breastfeeding behavior (Huang et al., 2019).

A systematic review done by Kehinde et al. (2023) showed that increases in positive attitudes towards breastfeeding and self-efficacy were correlated in parents that participated in breastfeeding educational programs during their routine prenatal care. The findings of this

review implicate antenatal education as a key facilitator of increased breastfeeding intention and initiation rates.

In support of this recommendation is a meta-analysis done by Wong et al. (2021), finding that education and supportive measures were most effective in promoting exclusive breastfeeding when delivered in both the antenatal and postnatal setting. The intervention involved multiple components such as individual and group education and phone call follow-up. Their research indicated that families should receive at least three instances of breastfeeding education throughout the antenatal and postnatal period to replicate their findings (Wong et al., 2021). Prenatal lactation education also empowers parents with self-efficacy to manage the complications and pursue their feeding intentions (Ouyang et al.,2024). As there is not a standardized approach to antenatal lactation education, various theories are utilized in education to promote breastfeeding initiation and adherence. Amoo et al. (2022) examined the philosophical schools of thought and theories used to promote breast feeding. Theories of self-efficacy and planned behavior were the most used theories in antenatal education (Amoo et al., 2022). Understanding relevant theories can benefit future patients by improving awareness of contextually relevant factors that will impact a person's breastfeeding journey and tailor education to their situation (Amoo et al., 2022). As evidenced by the data, antenatal education that extends to the postpartum period benefits breastfeeding rates by creating reliable expectations surrounding breastfeeding, strategies to mitigate issues and distress, and encourage lactating parents with self-efficacy.

Best practice guidelines recommend antenatal breastfeeding education and given the effectiveness of this evidence-based approach; this is the proposed intervention. Currently, no standardized breastfeeding education is provided in the prenatal care setting. The current system

is not performing optimally, which leaves families without knowledge of normal lactation, leading to premature cessation.

Research consistently indicates that it takes an average of 17 years for best practices to be integrated into clinical settings which is known as the "knowledge-practice gap," (Munro & Savel, 2016). Knowledge translation has emerged as a crucial method for mitigating these gaps which focuses on converting clinical science into practical applications that enhance patient care outcomes (Ten Ham-Baloyi, 2022). The Knowledge-to-Action (KTA) framework provides a structured approach to facilitate this process. The KTA framework includes two interconnected components: Knowledge Creation and the Action Cycle, which iteratively inform and refine each other, thereby promoting the effective implementation of new research findings into clinical practice (Ten Ham-Baloyi, 2022).

Complementing the KTA framework, the Plan–Do–Study–Act (PDSA) cycle is a scientific method that employs action-oriented learning to test changes (Institute for Healthcare Improvement, n.d.). By planning, observing results, and acting on the insights gained, the PDSA cycle allows for continuous improvement tailored to the specific needs of a practice. This iterative cycle is particularly effective for implementing change, as it enables teams to acquire valuable insights through the ongoing repetition of cycles, thus addressing practice-specific requirements throughout the process (Institute for Healthcare Improvement, n.d.). The nurse midwife may use these frameworks and methods to implement the latest clinical guidelines to achieve optimal outcomes. By leveraging these structured approaches, the healthcare community can work towards closing the knowledge-practice gap and improving the timeliness and quality of patient care.

The effective reception and processing of information in handout form is grounded in principles from cognitive psychology and educational theory. According to John Sweller's Cognitive Load Theory (CLT), instructional materials should be designed to optimize the cognitive load on learners' working memory, which is limited in capacity (Sweller, 2011). Well-organized, concise handouts that include relevant visuals can reduce extraneous cognitive load, thereby enhancing learning by allowing the brain to focus on integrating new information with existing knowledge. Additionally, Allan Paivio's Dual Coding Theory posits that people process information more effectively when it is presented both verbally and visually (Paivio, & Clark, 2006). Handouts that combine text with supportive images or diagrams utilize this dual-channel processing, making it easier for learners to understand and retain information (Paivio, & Clark, 2006). By adhering to these cognitive principles, handouts can significantly improve information retention and comprehension by aligning with the natural ways in which the human brain processes and organizes information.

Context

This project took place in a collaborative OBGYN and midwifery community practice in the Pacific Northwest at a large academic university. The primary stake holders of this quality improvement project were five full-time midwives, three part-time midwives, one lactation consultant, and three student nurse midwives. Prenatal care is provided to patients of reproductive age with of mixed-resource access. From 2021 to 2023, 25% of patients identified Spanish as their preferred language, and 51% of respondents identified as Hispanic, Mexican, Mexican American, Latinx, Puerto Rican, or of Spanish origin (OHSU, 2023). 39% of respondents identified as non-Hispanic white and 10% of the served community identify as non-Hispanic Black, African American, Asian, or Pacific Islander (OHSU, 2023). English was listed

as the preferred language for 77% of patients and roughly 2% of patients reported their preferred language as something other than English or Spanish. The majority of patients served in this setting use Medicaid insurance. In 2023, the number of deliveries was 469 (OHSU, 2023). Outpatient prenatal care is also a teaching setting for nurse-midwifery students.

Specific Aims

The purpose of this project is to establish standardized lactation education provided by the nurse-midwifery team in the prenatal care setting. As recommended by the evidence, education will include the supply and demand nature of breastfeeding, lactation timing, newborn feeding patterns and cues, and general information about an effective latch. The following list of specific aims was developed to provide structure and actionable guidance toward the project objectives:

- By the end of PDSA cycle one, 70% of chart notes for pregnancy gestational ages 28-32 will contain the lactation smart phrase populated through the Prenatal checklist.
- By the end of cycle two, 80% of chart notes for pregnancy gestational ages 28-32 will contain the lactation smart phrase populated through the Prenatal checklist.
- By the end of PDSA cycle three, 90% of chart notes for pregnancy gestational ages 28-32 will contain the lactation smart phrase populated through the Prenatal checklist.
- By the end of PDSA cycle one, 60% of the AVS of eligible patients will show the lactation education dot phrase.
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- By the end of PDSA cycle one, 80% of the AVS of eligible patients will show the lactation education dot phrase.

Methods

Interventions

This project is to be implemented in the prenatal care setting at between 28- and 32-weeks gestation. The project with be executed by certified nurse midwives (CNM) and student nurse midwives (SNM). The project lead reviewed the schedules weekly to identify patients eligible to receive education based on their gestational age. A reminder sign to implement this project was placed above the computers at the desks in the CNM office. Two copies of the laminated antenatal breastfeeding education handout were stored in the CNM office (See Appendix B). Counseling was provided to patients using the handout to prompt conversation and provide consistent education. Providers also informed patients that a copy of this handout would be included in patient's After Visit Summary (AVS). The discussion was charted using the dot phrase (See Appendix E). Providers included a copy of the antenatal breastfeeding education handout in the AVS using the dot phrase (See Appendix E). For those patients who prefer Spanish, handouts were provided in Spanish (See Appendix C). One laminated hard copy was stored in the CNM office. The Spanish version of the handout for people who prefer Spanish was provided in the AVS using the dot phrase (See Appendix E and F). To educate the midwifery team on the new workflow process, midwives were provided with a voiceover PowerPoint via and link over email one week prior to the implementation of the project that outlined the evidence-based approach of the intervention and the content of the lactation education handout. Demonstration of appropriate documentation in the Pregnancy Checklist in the EPIC EMR and inclusion of resources in the AVS was including using a mock patient chart within the voiceover presentation. A workflow process chart was provided and used to help engage medical assistants

and team members with process change and to prompt the recognition of eligible patients (See Appendix D).

Via a weekly email reminder, midwives were asked to provide eligible patients with education and were additionally reminded of this intervention using brightly colored paper above the CNM workstations. The project lead utilized the yellow sticky note within the EPIC charting system to track whether eligible patients' charts reflected the project smart phrases through the PDSA cycles.

Study of Interventions

This intervention took place over a ten-week period broken into 3 PDSA cycles to gather participant feedback, adherence to the intervention, and compared team performance against the specific aims. PDSA 1 took place between September 30 and October 18, PDSA 2 took place between October 21 and November 8, and PDSA 3 took place between November 11 and December 6 . Each cycle had two days (one weekend) in between to re-work the intervention using provided feedback.

Midwives were prompted to provide feedback and concerns via secure email every Friday. Project updates were also given at this and included project successes and challenges. The student midwife additionally attended the monthly midwife team practice meetings to update the team on project performance, gather feedback and answer questions.

After each PDSA cycle, provider feedback and workflow issues were reviewed and incorporated into the planning phase subsequent PDSA cycle. All feedback, issues, and recommendations were documented. Initial data analysis was conducted during the 'do' phase of each PDSA cycle while more comprehensive data analysis and examination of results occurred in the 'study' phase. The weekly numerical percentages were compared to the project's specific

aims to measure for success. Once the midwife disseminated, the info sheet, “Pregnancy Checklist Lactation” or “AVS Lactation” was written in the yellow sticky note to ensure that the intervention was measured correctly.

Email feedback and monthly meeting suggestions were used to develop ideal workflow and address presented issues to move the PDSA cycle percentage data towards the goals of the specific aims. The percentages were averaged over the three weeks of each PDSA cycle. Numerical data was stored using the organization’s secure file on OneDrive. The final ‘act’ stage of each cycle addressed project modifications and planning for the next cycle (Institute for Healthcare Improvement, n.d.). Changes to interventions were refined based on lessons learned and a new plan was developed to increase uptake of the interventions.

Measures

Before interventions were implemented, a three-question Likert scale survey was administrated to the practicing midwives (See Appendix A). These anonymous responses offered insight into preexisting nurse-midwifery knowledge and comfort in providing standardized evidence-based lactation education and resources, in addition to their self-reported documentation practices prior to the intervention. The responses were assigned numerical quantitative data using the Likert Scale where 1 corresponded to “Strongly disagree” through 5 which corresponded to “Strongly Agree”. Midwives completed the same survey after the intervention to assess the practice’s satisfaction with the intervention. These measures were analyzed at the end of the project using a t-test. After project interventions were implemented, success was measured by assessing the percentage of charts that contained the lactation smart phrase within the prenatal note between the patient gestational ages of 28 and 32 weeks. A note to the project lead was left within the yellow sticky note of the EPIC charting system, only

visible on their user end, denoting the patient's gestational age eligibility. This number was documented and compared to the number of charts that contained the established dot phrase and included the handout in the AVS at the end of the week. The number of charts with documented education in the form of the dot phrase was divided by the number of eligible patients to determine the percentage of patients that received the intervention. This was measured weekly. Specific aim percentages were compared against the actual percent to establish a target growth for the intervention.

Analysis

Linear trend lines were used to analyze data collected after the implementation of project interventions with the vertical axis showing percentage and the horizontal axis showing time. Descriptive statistics were used to analyze the weekly percentage of charts that contained the lactation smart phrase in the prenatal chart note. Each PDSA cycle performances were compared against the specific aims. The percentage of lactation smart phrases in the AVS of eligible charts was documented and analyzed using descriptive statistics following the same process as the prenatal chart documentation analysis. The survey administered to nurse-midwives pre- and post-intervention was analyzed using the Likert scale and assessed for statistical significance using a t-test. This test was selected due to its capacity to compare the same group without identifying individuals. This was essential as the pre- and post-surveys were anonymous. Data was compared to the project specific aims, showing improvement in the uptake of interventions.

Ethical Considerations

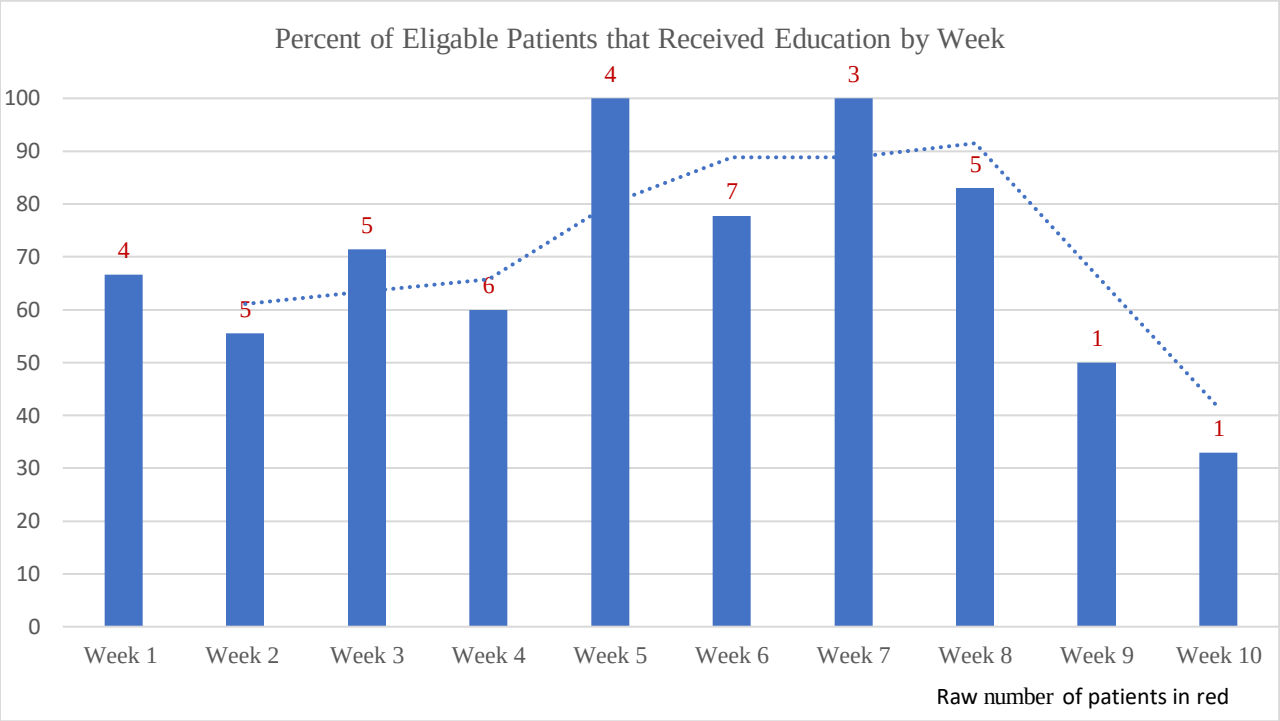
This QI project leader applied for Institutional review board review prior to initiating the project to ensure details were not overlooked that would constitute human research. Ethical considerations and confidentiality were maintained to preserve the identity of patients and the

faculty practice. No PHI was reviewed, collected or stored for the purpose of this quality improvement project. There were no conflicts of interest involved in this project. Of note, any new workflow process change can create additional burden on the health care team. This ethical concern was address throughout feedback from each PDSA cycle.

Results

During the 10-week quality improvement initiative, 52 eligible pregnant patients between 28 weeks 0 days to 32 weeks 6 days of gestation were identified. The evidence-based antepartum lactation education handout was administered to 79% of eligible patients throughout the ten-week project period. The bar chart in Figure 1 displays percentage of patients that received antenatal lactation education by week with the number value of patients annotated above bar line. The Spanish version of the lactation education handout was documented and included in the AVS in 7.7% (4/52) of charts of total eligible patients.

Figure 1.



The protocol timeline for education included gestations between 28 weeks 0 days and 32 weeks 6 days. However, education provided slightly outside of these parameters was provided and this was included in the data set due to scheduling concerns for patients and the clinic. Figure 2 portrays the number value of patients who received education at varying gestational ages.

Figure 2.

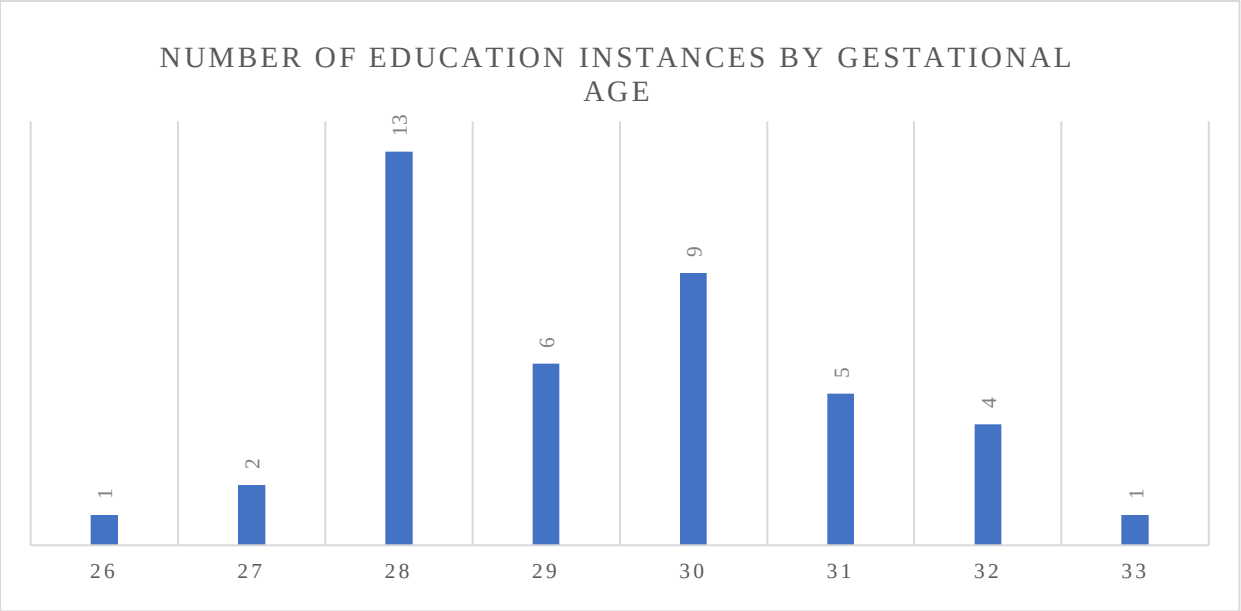
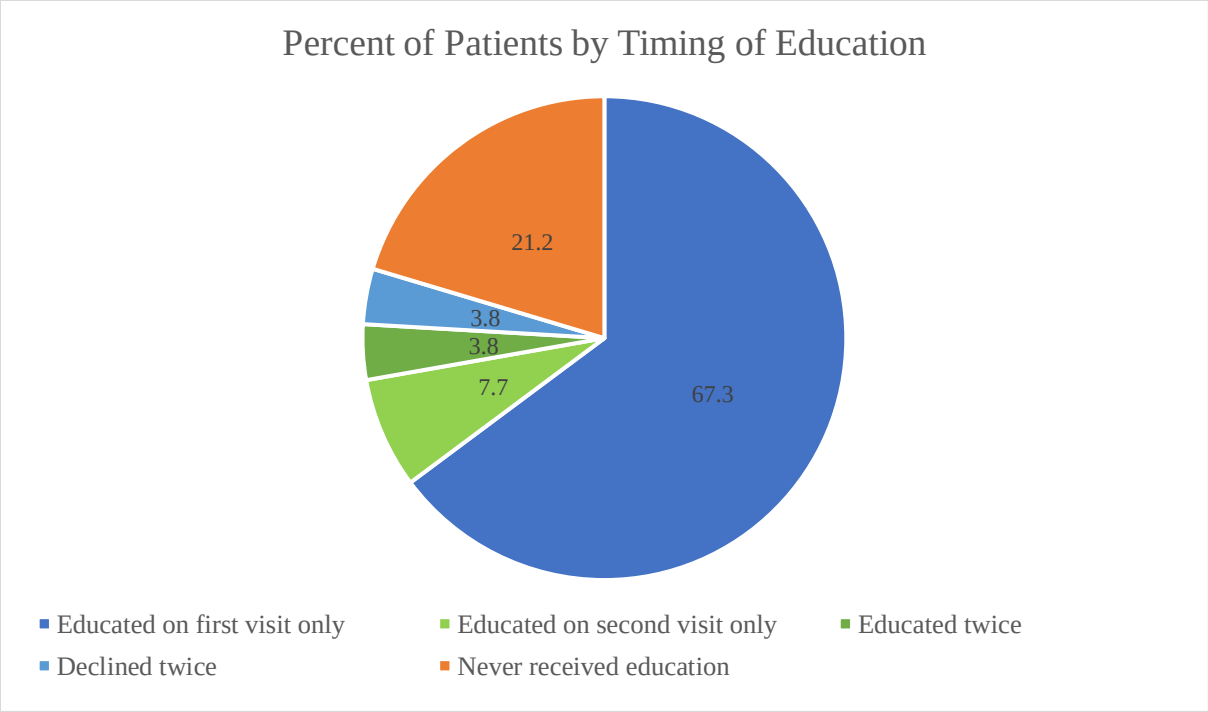


Figure 3 displays the breakdown of how education was provided to eligible patients. 67.3% of patients were educated on their first eligible visit, 7.7% of patients were education on their second eligible visit and 21% of patients were missed throughout the intervention period. 3.8% of gestationally eligible patients declined education and 3.8% of patients were educated twice. These patients were noted, and they were not counted as ‘eligible’ in review of the data.

Figure 3.



Before the implementation of project interventions, a pre-project survey consisting of three questions (see Appendix A) was sent to the clinic midwives who actively worked in the outpatient setting to gauge confidence surrounding antenatal lactation education and clinical practices. The same survey was provided at the end of the intervention period. 8 survey responses were recorded anonymously pre- and post-intervention. Table 1 displays the average score for each question in the pre and post intervention survey. A Likert scale was used to convert responses where 1 represented 'Strongly Disagree' and 5 represented 'Strongly Agree'. A t-test was conducted to determine statistical significance between pre- and post-intervention survey results. Question 2, "I routinely document lactation education in prenatal charting" was found to be statistically significant with $p=0.01$. Questions 1 and 3 both noted increases from the pre-to post-response, but these results were not statistically significant, $p=0.08$ and $p=0.07$, respectively.

Table 1.

	Pre-Survey	Post-Survey	Mean Difference	t test (p value)
Q1	4.0 (1.0)	4.5 (0.0)	0.5 (0.58)	0.08
Q2	2.63 (1.15)	4.5 (1.15)	1.88 (1.5)	*0.01
Q3	3.63 (1.00)	4.2 (0.58)	0.58 (0.82)	0.07

Note: Standard deviation is noted with parenthesis. * Represents statistical significance. N=8 for pre- and post-intervention.

Project Modifications

The project lead provided weekly updates and reminders to the clinic midwives during which they asked for feedback and suggestions. At the end of each PDSA cycle, clinic midwives were forwarded the data in reference to the specific aims of the cycle. Suggestions and feedback were encouraged weekly and at the end of each cycle. No suggestions or modifications were made in the first PDSA cycle. Stylistic feedback regarding when providers preferred to review the lactation handout with patients to benefit their workflow was discussed in the second PSDA cycle, but no systematic changes were made. Similarly, some providers preferred to leave a note in the pink sticky note (an EPIC feature which only obstetric providers have access to) reading '[ ] Antenatal lactation education' to serve as a reminder to provide education. However, this was not formally adopted to the workflow for PDSA cycle 3.

It was determined that due to EPIC charting constraints, providers that saw patients virtually did not have access to the prenatal checklist and could therefore not document the provided education in this format. For these patients, inclusion of the lactation handout in the AVS in addition to documentation of lactation education provision within the visit note was deemed sufficient documentation and these patients were counted towards the total of successful education instances.

Some patients requested that they be given a hard copy of the handout instead of having it attached in their After Visit Summary. This request was fulfilled by the medical assistant.

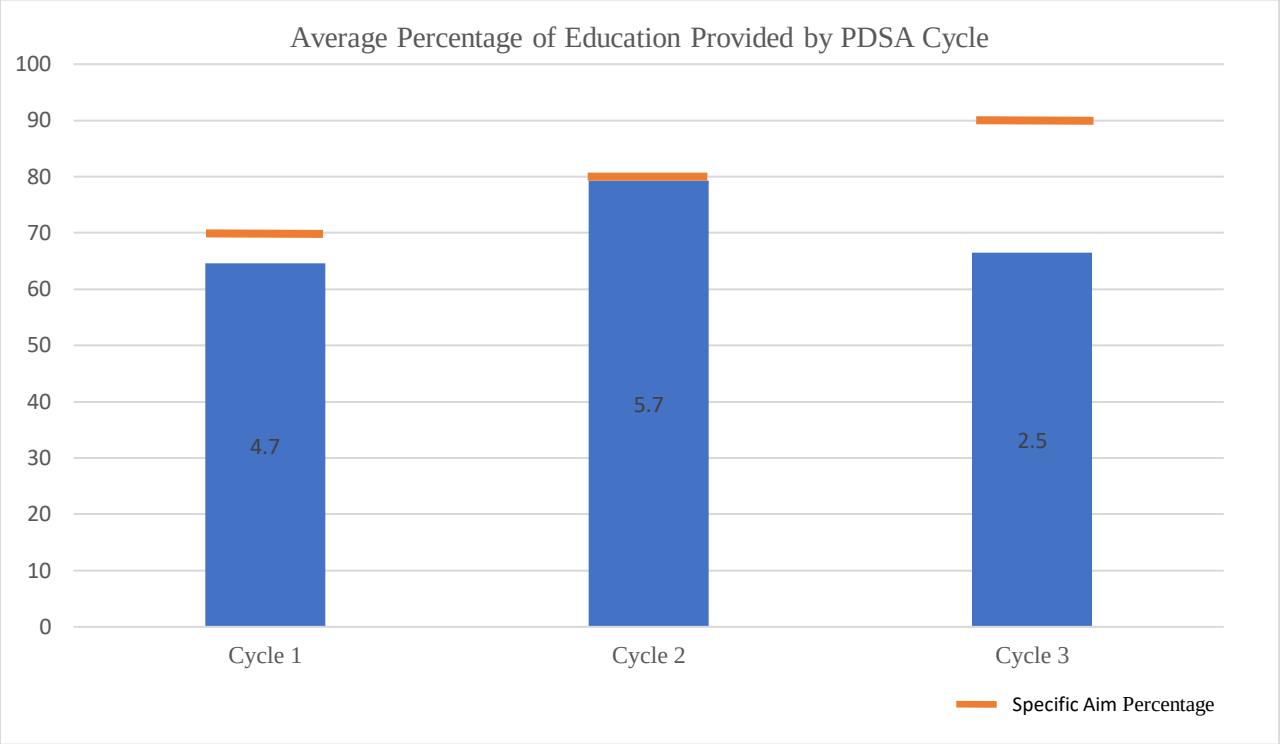
In summary, no changes to the workflow were made throughout the three PDSA cycles. Providers consistently reported that remembering to provide education was challenging amidst other projects but did not endorse wanting or needing changes in workflow.

Discussion

Summary

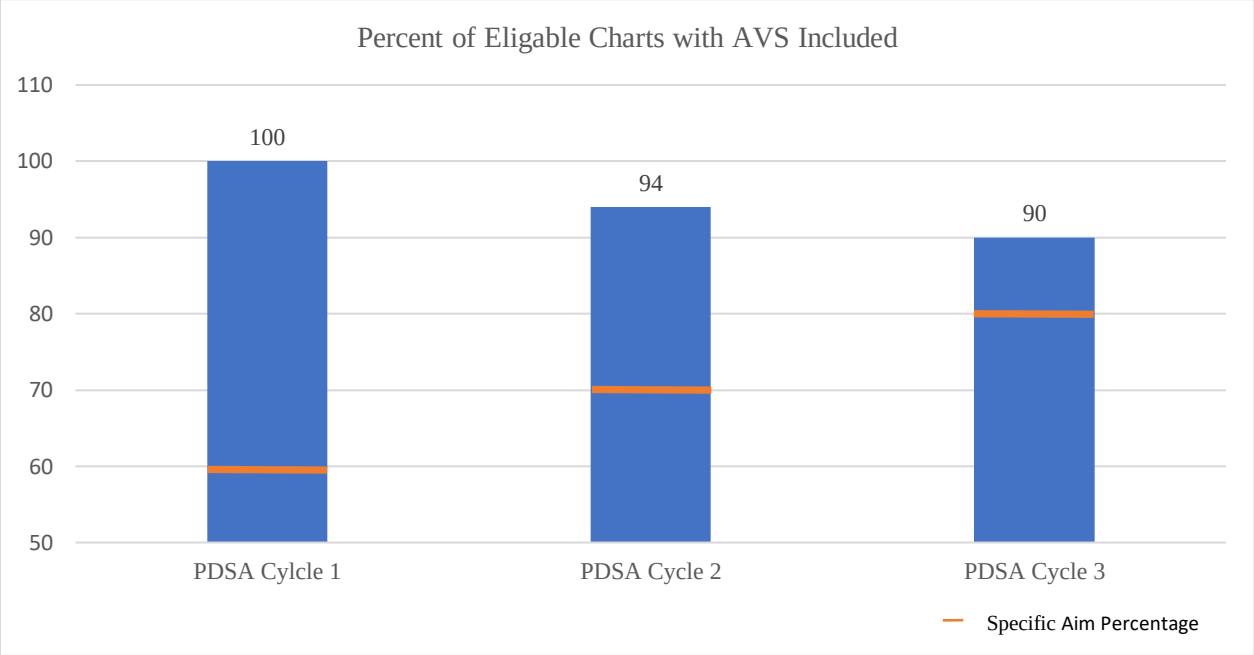
Throughout the 10-week project period, 52 pregnant patients participated in the quality improvement initiative. By the end of the project, the interventions and workflow improvements successfully facilitated the provision of antenatal lactation education. In the first PDSA cycle, education rates reached 65%, coming close to the initial goal of 70%. However, by the third PDSA cycle, the target of a 90% education rate was not met, with the final rate reaching 67% (Figure 4) Additionally, the inclusion of a lactation education document in the After Visit Summary (AVS) was assessed (Figure 5). The inclusion rates were 100%, 90%, and 94% across PDSA cycles 1, 2, and 3, respectively, surpassing the initial targets of 60%, 70%, and 80%. A pre- and post-implementation survey (Appendix A) was used to assess baseline clinical practices, education delivery, and changes following project implementation. Average percentages for each PDSA cycle are displayed in Figure 4 with the average number of patients above the bar In PDSA cycle 1, 65% of eligible patients received education, 79% of eligible patients received education in PDSA cycle 2, and 67% eligible patients received education in PDSA cycle 3. PSDA cycle specific aims are displayed in red. Figure 5 displays the percentage of charts of eligible patients that also included the lactation hand out in the AVS. Specific aims were met and surpassed in each PDSA cycle.

Figure 4.



Note: Raw average number of patients noted within bar.

Figure 5.



Although the specific goal of educating 90% of eligible patients was not met, the project demonstrated key strengths. These include the development of a standardized education document tailored to specific gestational ages, enabling nurse-midwives to individualize care, and the creation of a time-efficient screening workflow. Additionally, the handout was available in both English and Spanish as a digital handout and hardcopy and was therefore accessible to a greater number of patients. This model can serve as a valuable tool for nurse-midwifery practices, addressing local concerns such as perceived insufficient milk supply and early breastfeeding cessation in Multnomah County. Furthermore, these project strengths contribute to national efforts aligned with the Healthy People 2030 goals of increasing exclusive breastfeeding initiation and duration (Raju, 2023).

Interpretation

This quality improvement project contributed a standardized education format for the faculty practice with the potential for long-term use and possible adoption within the greater health system. With this handout and increased knowledge, nurse-midwives were able to provide education that provided generalized information with the capacity to lead to patient-specific concerns and preferences and subsequently provide patient-specific recommendations. These improvements contrast with the lack of consistency in content or timing of lactation education in the antepartum setting among the nurse-midwifery faculty practice before the implementation of quality improvement interventions.

The antenatal lactation education handout was administered to 79% of eligible patients throughout the 10-week quality improvement project. Prior to this project, no standardized, evidence-based form of education took place at this practice. A similar quality improvement

project by Hanapi (2019) was implemented in Baby Friendly Hospital in Hawaii in 2019. Antenatal lactation education was provided outside of routine prenatal visits in a group setting and was well-received by patients. Patients took pre and post-tests regarding their breastfeeding knowledge, with post-tests showing statistically significant in mean score increases (Hanapi, 2019). While similar quality improvement projects have taken place, none have attempted to incorporate antenatal lactation education into routine prenatal visits.

The practices and attitudes pertaining to antenatal lactation education was assessed using a pre- and post-intervention (Appendix A). Both surveys recorded eight responses but due to the anonymity of the screening, it is unknown if the survey captured the same clinicians' attitudes and practices prior to and after the intervention. Notably, mean score increases were seen across all three questions of the post-intervention survey. However, question 2, "I routinely document lactation education in prenatal charting" was the only question to achieve statistical significance. This is likely due intent of this quality improvement project which was to incorporate antenatal lactation education into routine chart documentation. The other question responses pertained to provider attitudes and comfort with the topic which likely showed increases in mean scores due to better familiarity with the content of the handout and the resources provided. The lack of statistically significant increase from pre- to post-intervention survey is likely related to range of pre-existing provider knowledge prior to the implementation of this project.

The lower percentages for each specific aims in PDSA Cycle 3 compared to the first two PDSA cycles, likely relate to the lower number of total eligible patients; More patients had been previously educated in other PDSA cycles and were therefore no longer eligible so the number to eligible patients decreased with each PDSA cycle. For example, as seen in Figure 4, PDSA cycle 3, the average number of patients who received education is lower (2.5) in accordance with the

lower percentage (90%). This is an important distinction, as the lower percentages for the last PDSA cycle are not a reflection of workflow change or individual failings, but rather reflect the decreasing denominator of eligible patients with the continuation of the project over time.

The designated location for charting education documentation was the prenatal checklist. While this is consistent with the current workflow and charting habits that are currently in place for the clinic, some issues were identified. Because the prenatal checklist was not accessible to providers unless the patient was physically checked in, providers were not able to see if patients had previously received education while they were pre-charting and preparing for their clinic days. This meant that providers could not plan or prepare and may explain why some patients were missed or others were provided education twice. Proof of documentation was available in the previous note; however, this is an additional step and creates greater provider burden. Access to with prenatal checklist during pre-charting is a workflow issue that would need to be solved through EPIC systems, rather than through improved provider diligence.

Limitations

This quality improvement initiative was conducted within a collaborative OBGYN and midwifery community practice at a large academic institution in the Pacific Northwest. While it followed evidence-based recommendations for antenatal lactation education and demonstrated its value, several factors limit the internal validity.

Although PDSA cycles enable rapid testing and refinement, they do not account for confounding variables, such as seasonal fluctuations in patient volume, staffing changes, or organizational shifts. The relatively short ten-week timeline limited the ability to assess long-term trends and sustained effectiveness. Additionally, two out of the three scheduled monthly feedback meetings were canceled during the project period, which led to feedback being solicited

via email instead. This shift may have created a barrier, as the effort required to provide written feedback could have hindered communication, potentially limiting adjustments that might have enhanced workflow and implementation rates.

Overall, the results of this project, while promising, are specific to the context and organization in which they took place. This quality improvement project was developed with the population-served, team-based charting, and current clinic workflow in mind. The project has high potential for uptake as the developed lactation handout proved to be a valuable tool for providers, adaptable for use in various practice settings, and customizable to meet the unique needs of different patient populations. However, the structural constraints within the project context limited the standardization of workflows, leading to adjustments tailored specifically to the faculty practice that may not be directly transferable to other environments.

Recommendations

As displayed in Figure 2, most antenatal lactation education was delivered between weeks 28-30 (27/52). This timing may provide valuable insight into when to focus education efforts. It could reflect both when providers had the most capacity to offer education and when patients were most open to receiving it. However, narrowing the window of eligibility for education might decrease the overall number of educational sessions. During this period, patients transition from prenatal visits every four weeks to visits every two weeks. Expanding the education window could capture patients who attend their final four-week visit around weeks 26-27 and choose to return four weeks later.

Further recommendations include modifying the lactation dot phrase to incorporate information about antenatal hand expression of colostrum, in addition to instructions on how to obtain a breast pump. While these suggestions are specific to the clinic where the intervention

took place, they align with evidence-based guidelines for antenatal lactation education. Streamlining and enhancing the comprehensiveness of education may be achieved by integrating these recommendations.

Conclusion

In conclusion, this quality improvement initiative successfully enhanced the provision of antenatal lactation education to eligible patients at a collaborative OBGYN and midwifery practice within a large academic institution. Over the ten-week intervention period, 79% of eligible patients received the standardized lactation education handout, marking a significant improvement in patient education compared to the pre-intervention state. This intervention not only increased education rates but also provided a systematic approach for integrating lactation education into the clinical workflow, aligning with evidence-based guidelines from the Academy of Breastfeeding Medicine (ABM) and the American College of Obstetrics and Gynecology (ACOG). Although the specific aim of educating 90% of eligible patients by the end of PDSA Cycle 3 not met, the initiative demonstrated meaningful progress in the standardization and delivery of lactation education.

The project also revealed key areas for improvement, such as ensuring consistency in documentation and expanding the time frame for education provision. Despite some challenges, including limitations posed by the electronic medical record system (EPIC) and a lack of immediate feedback mechanisms, the overall intervention led to a more consistent approach to antenatal lactation education within the practice. Provider surveys indicated improvements in confidence and documentation practices, with one question on routine lactation education documentation achieving statistical significance. These results highlight the project's success in fostering better clinical practices and integrating education into prenatal care.

Limitations of the initiative include the short intervention period, which limited the ability to assess long-term outcomes and trends, as well as the logistical challenges posed by the EPIC charting system. These structural constraints may have affected the consistency of education delivery, but they also offer valuable insights for future projects aiming to streamline workflows.

Future research may focus on expanding the education window to include patients at earlier gestational ages and incorporating additional content, such as antenatal hand expression of colostrum, could further enhance the initiative's impact. Providing printed versions of the handout for patients who prefer physical copies, as well as addressing workflow barriers related to electronic documentation, may help to sustain and improve the quality of lactation education in this setting. Overall, this project lays the groundwork for continued efforts to improve patient education, enhance breastfeeding outcomes, and promote evidence-based antenatal care in nurse-midwifery practices.

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Appendix A: Pre and Post Implementation Survey

I feel confident providing education regarding normal lactogenesis, latch, and newborn feeding patterns in a prenatal visit

- ○ Strongly Agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly Disagree

I routinely document lactation education in prenatal charting

- ○ Strongly agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Disagree
- ○ Strongly disagree

I am confident in the resources I can provide to patients to help with breastfeeding

- ○ Strongly Agree
- ○ Agree
- ○ Neither agree nor disagree
- ○ Somewhat disagree
- ○ Strongly disagree

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Appendix B: Lactation Education Handout

Beginning Breastfeeding

START YOUR FEEDING INFORMED

IN PREGNANCY

Breastfeeding takes time and practice- Sometimes weeks! The first step to successful breastfeeding is understanding that it will take time, effort, and patience to learn your own feeding preferences and the preferences of your baby.

THE FIRST FEW DAYS

You may have noticed that even before your baby is born, your breasts have started to produce a thick yellow liquid called colostrum. This is what your baby eats before your milk comes in. While there may not be much, it is perfect for your newborn! Colostrum can be collected and stored in the freezer. You can also use your finger or a plastic spoon to feed your baby right away.

LATCH

Not every latch is created equal. An effective, comfortable, "deep latch" is one with your nipple placed far back in the baby's mouth. To support an effective latch, spend lots of time skin-to-skin and trying different positions and handling techniques. Pain most often occurs when a latch is shallow. Ask for guidance before you leave the hospital!

WHEN WILL I MAKE MILK?

This typically happens 3 to 5 days after your baby is born. Your breasts may feel swollen, tender, and full of milk. This process is one of supply and demand, so the more you put your baby to breast in their first days of life, the more your body is stimulated to make milk. True milk insufficiency is rare. Once your milk comes in, if your baby has roughly 6 wet diapers and roughly 3 dirty diapers in a 24-hour period, they are getting enough to eat.

HOW MUCH WILL MY BABY EAT?

A newborn's stomach is the size of a blueberry! On Day 2 of life it is the size of a large grape and an apricot on Day 3. Knowing this can help explain why babies feed so often and why they don't need very much milk at once. It is normal for your baby to lose weight right after birth. If you are concerned, talk to your pediatrician.

BREASTFEEDING YOUR BABY CAN BE CHALLENGING AND CONFUSING. GETTING ONE-ON-ONE SUPPORT FROM A CERTIFIED LACTATION CONSULTANT CAN BE SO HELPFUL IN TROUBLESHOOTING!

Appendix B: Lactation Education Handout Continued

Resources

Online Resources:

First Droplets

https://firstdroplets.com/

La Leche League

https://llli.org/

Global Health Media

https://globalhealthmedia.org/videos/attaching-your-baby-at-the-breast/?portfolioCats=191%2C94%2C13%2C23%2C65

Kelly Mom

https://kellymom.com/

Local Resources:

OHSU Breastfeeding Self-Guided E-Class

https://ohsu.asapconnected.com#CourseID=204784

Your Pediatrician

Many pediatric offices have lactation resources for you to access

Appendix C: Lactation Education Handout Spanish Version

Comenzar a amamantar

Durante el embarazo

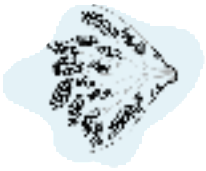
Amamantar toma tiempo y práctica... ¡a veces semanas! El primer paso para amamantar con éxito es tener presente que se va requerir de tiempo, esfuerzo y paciencia para aprender sus propias preferencias al amamantar, así como lo que le gusta a su bebé.

Los primeros días

Tal vez vea que sus senos producen un líquido espeso amarillento, incluso antes de que nazca su bebé. Este líquido se llama calostro. Esto es lo que su bebé come antes de que usted empiece a producir leche. Aunque tal vez no sea mucho, es perfecto para su recién nacido/a. Puede extraerlo y guardarlo en el congelador. O bien, puede usar el dedo o una cuchara de plástico para alimentárselo al bebé.

Enganche

Un "enganche profundo", eficaz y cómodo es cuando su pezón se coloca hasta atrás en la boca de su bebé. Para lograr un buen enganche, pase mucho tiempo haciendo contacto de piel a piel. Pruebe muchas posiciones y estilos para cargar al bebé. Puede haber dolor cuando el enganche es superficial. Pida ayuda.



¿Cuándo empezaré a producir leche?

Suele ocurrir que la leche comience de 3 a 5 días después del nacimiento de su bebé. Puede sentir los senos hinchados, sensibles y llenos. Mientras más ponga al bebé al pecho en sus primeros días de vida, más leche producirá su cuerpo. La mayoría de las mamás producen leche suficiente para sus bebés. Si su bebé moja alrededor de 6 pañales y ensucia como 3 pañales en un periodo de 24 horas, está comiendo suficiente.

¿Cuánto comerá mi bebé?

¡El estómago de un recién nacido es del tamaño de un arándano! Para el segundo día, es del tamaño de una uva grande. Para el tercer día, es del tamaño de un chabacano. Es por esto que se alimenta a los bebés con tanta frecuencia y no necesitan tanta leche de una sola vez. Es normal que el bebé baje de peso justo después de nacer. Si esto le preocupa, hable con el médico/a de su bebé.

Amamantar a su bebé puede ser confuso y todo un desafío.
Recibir apoyo individualizado de una consultora certificada
de lactancia puede ser de mucha ayuda.

Recursos

Recursos en línea

First Droplets

https://firstdroplets.com/

La Leche League

https://llli.org/

Kelly Mom

https://kellymom.com/

Recursos locales:

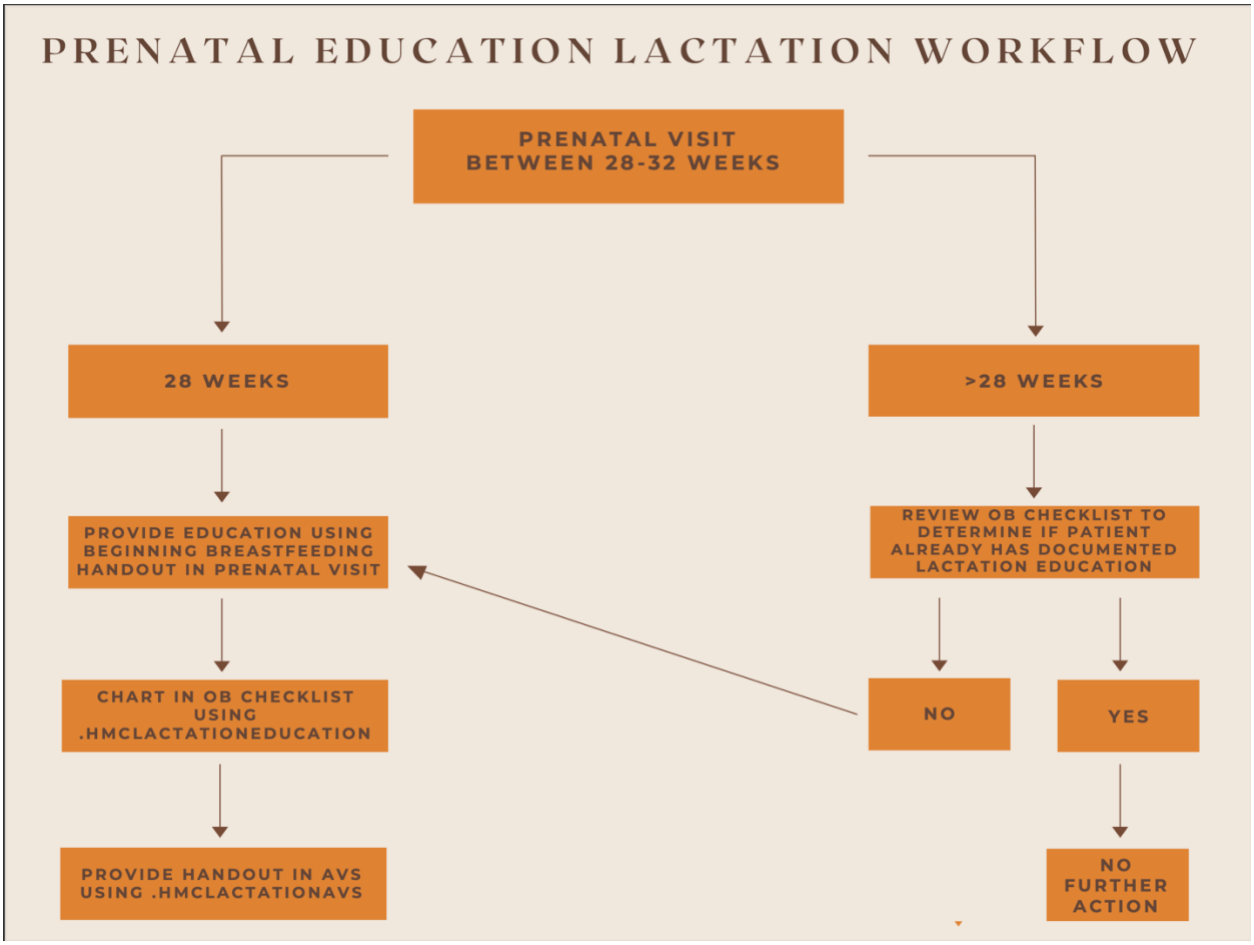
Clase electrónica autoguiada de lactancia de OHSU

https://ohsu.asapconnected.com#CourseID=204784

Su pediatra

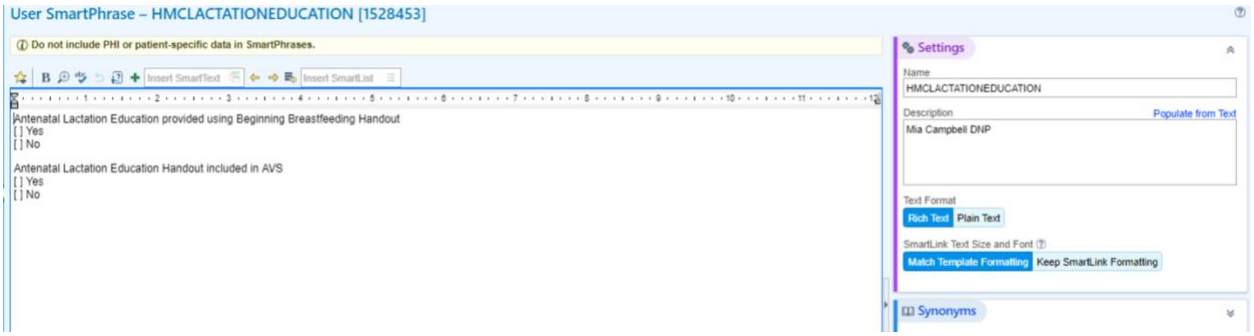
Muchos consultorios pediátricos cuentan con recursos de lactancia para usted.

Appendix D: Prenatal Lactation Education Workflow

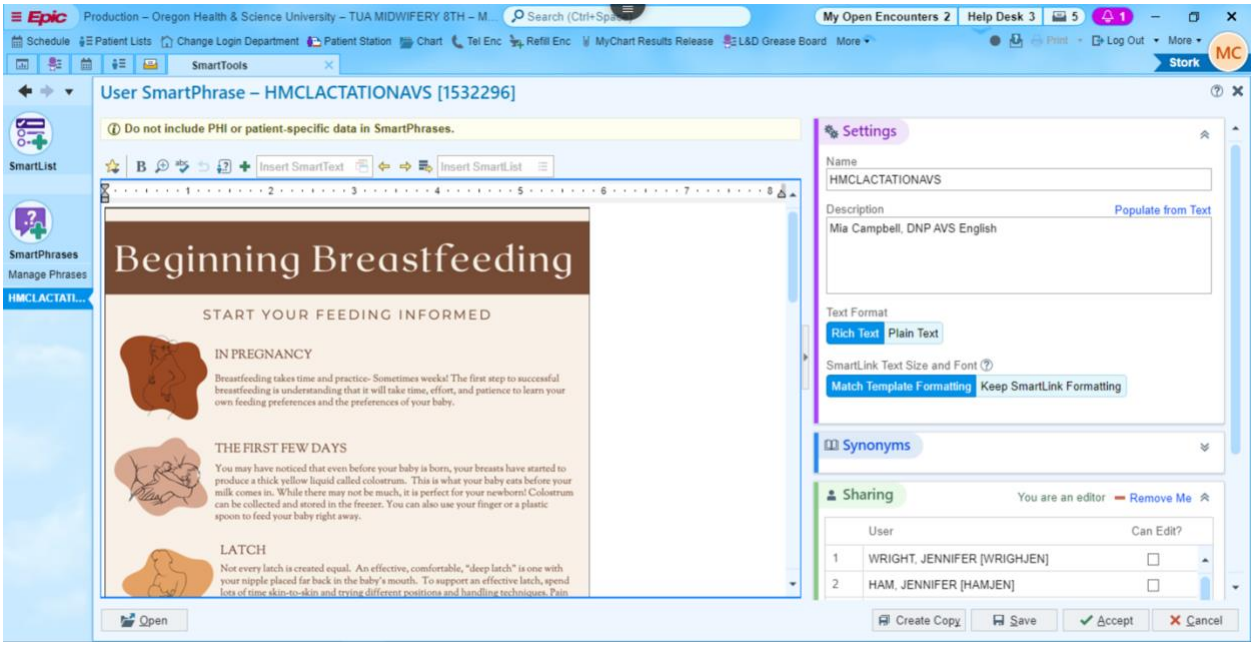


Appendix E: Dot Phrases

Prenatal Checklist (Prenatal Chart): .HMCLACTATIONEDUCATION



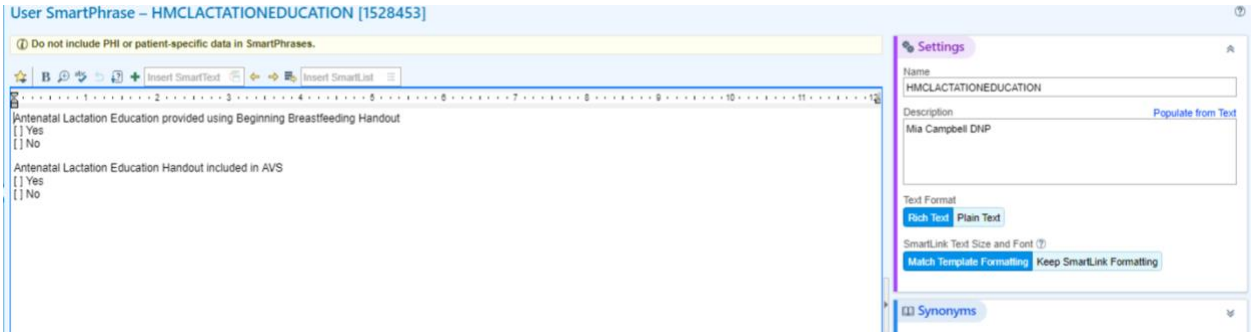
After Visit Summary (AVS): .HMCLACTATIONAVS



Appendix F: Dot Phrases Spanish Version

Prenatal Checklist (Prenatal Chart) Spanish speaking patients:

.HMCLACTATIONEDUCATION



After Visit Summary (AVS) Spanish speaking patients: .HMCLACTATIONAVSSPANISH