

INTERVENTIONS TO TREAT BREASTFEEDING COMPLICATIONS:
BEST PRACTICE RECOMMENDATIONS

By

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Abstract

Purpose: To develop evidence-informed best practice recommendations for postpartum women to reference when experiencing breastfeeding complications such as nipple trauma, pain, and soreness.

Background: Breastfeeding is the optimal source of nutrition for infants as it provides nutrients and immunological support tailored to the infant's needs.

Approach to Practice: The best practice recommendations are based on a literature review that was conducted through a search on Google Scholar, PubMed, and the Health Sciences Library. Articles were filtered between the years 2010 to 2020. The literature selection process included the following keywords: *breastfeeding interventions, nipple shield, lanolin oil, proper positioning, breastfeeding complications, and nipple pain*. Ten articles were included in the literature review section of this thesis.

Outcomes: The proposed best practice recommendations are for all postpartum mothers to reference in order to prevent or reduce breastfeeding complications. The hypothetical implementation will be evaluated based on the effect of the infographic created and the breastfeeding outcomes of the women after discharge.

Conclusions: Although proper positioning, lanolin oil, and were beneficial for women experiencing breastfeeding complications, further research is needed to solidify the benefits of these therapeutic modalities.

CHAPTER 1

Introduction

Statement of Purpose

This thesis aims to develop an evidenced-informed best practice recommendation for postpartum women who are experiencing breastfeeding complications, such as nipple trauma, pain, and soreness. The goal is to improve breastfeeding outcomes and increase the rate of exclusive breastfeeding among new mothers. The best practice recommendations presented in this thesis is supported by evidence-informed research. The importance of exclusive breastfeeding and the relevance with respect to nursing will be discussed followed by a literature review of the current literature on this topic. Following the literature review, evidenced-informed best practice recommendations will be presented, along with a hypothetical implementation and evaluation.

Background of Issue Importance

Breastfeeding is a critical source of nutrition for infants; it supplies essential nutrients in adequate amounts from mothers to their offspring. Breast milk is uniquely tailored to meet the health needs of a growing infant. In the first few days after birth, the mother's breast produces colostrum, which is a thick, yellowish fluid that is high in protein, low in sugar, and loaded with beneficial compounds. It helps the newborn develop their immature digestive tract (La Leche League, 2021). Breast Milk also contains antibodies to help infants fight off viruses and bacteria. Colostrum has high amounts of immunoglobulin A, along with several other antibodies, forming a protective layer in the baby's nose, throat, and digestive tracts (La Leche League, 2021). According to the Centers for Disease Control and Prevention, "breastfeeding is the best source of nutrition for most infants" and it "can also reduce the risk for some short – and long-term health

conditions for both infants and mothers” (Centers for Disease Control and Prevention [CDC], 2020a, p. 1). Breastfeeding provides numerous benefits for both the infant and the mother. Benefits for the infant include reducing the risk of asthma, obesity, type 1 diabetes, acute otitis media, sudden infant death syndrome (SIDS), gastrointestinal infections, and lowers the risk of severe lower respiratory disease. Benefits for the mother include lowering the risk of high blood pressure, type 2 diabetes, ovarian cancer, and breast cancer (CDC, 2020a). According to the American Academy of Pediatrics (AAP), infants should be exclusively breastfed for the first six months, followed by continued breastfeeding while introducing appropriate complementary foods for one year or longer (CDC, 2021b).

Lactation is a characteristic of all mammalian species that is the result of evolutionary forces to shape an optimal nutrient delivery system, supplying essential nutrients from mother to offspring (Krol & Grossmann, 2018). Research has demonstrated that there is a correlation between breastfeeding experience and future cognitive development in infants. More specifically, a higher frequency and duration of breastfeeding during the infant’s first year of life is found to be positively associated with the Bayley Scales of Infant Development (a tool to assess the developmental function of infants, toddlers, and young children). These positive cognitive developments have been seen to last through childhood and adolescence (Krol & Grossmann, 2018). The immediate initiation of breastfeeding has also been suggested to have a positive correlation in reducing the risk for cognitive impairment among children (Krol & Grossmann, 2018)

Breastfeeding should be a pleasant experience for both the infant and mother. Oftentimes, women stop breastfeeding due to common problems that interfere with their ability to breastfeed. Some of these problems include inadequate milk supply, breast and nipple pain, and breast

infections (Lexicomp, 2019). One of the most common reasons that women may stop breastfeeding is inadequate milk production and poor milk extraction. Inadequate milk production can be due to previous breast surgery, hormonal imbalance, medications, and insufficient breast development (Lexicomp, 2019). Poor milk extraction can be due to inadequate frequency in feedings, poor latch, separation from mother, and interference from formula feeding (Lexicomp, 2019).

Nipple and breast pain is the second most common reason that interferes with breastfeeding (Lexicomp, 2019). This can be caused by nipple injury from the infant or breast pump, engorgement, plugged milk ducts, nipple and breast infections, excessive milk supply, skin disorders, and nipple vasoconstriction (Lexicomp, 2019). Other causes related to the infant include ankyloglossia, torticollis, birth defects, and uncoordinated suck (Lexicomp, 2019). Nipple soreness in the first three to five days after delivery is common, however, if the mother is experiencing nipple soreness beyond slight tenderness when the baby is latching on, it could indicate an issue with the baby's latch, position, or suck (La Leche League, 2021). If a patient has complaints about nipple or breast pain, a thorough assessment should be performed to suggest interventions that may assist the mother. Proper education should be conveyed to the mother such as proper positioning of the baby for a good latch, keeping the nipples dry and allow them to air dry after feedings, not using harsh soap on the breast and nipples, and inspect the baby's mouth for any abnormalities (Lexicomp, 2019). Inadequate milk extraction can lead to engorgement, causing the breast to become full of milk, resulting in pain and tenderness. This can also make it more difficult for the infant to latch on. Interventions that could provide relief to the mother would be to use warm compresses, use a breast pump, and take mild pain relievers (Lexicomp, 2019).

Mastitis is the inflammation of the breasts that can be associated with a fever but may or may not indicate an infection. It can occur anytime during lactation, but it is most common during the first six weeks postpartum (Lexicomp, 2019). Mastitis occurs when the nipples are damaged, breasts are engorged for too long, or the breastmilk is not drained properly. Mothers can continue to breastfeed but should notify the provider if any signs of redness or firmness around the breast, a fever higher than 101°F, and other flu-like symptoms occur (Lexicomp, 2019). The shape of the nipple can also be problematic. Flat or inverted nipples may cause difficulty in breastfeeding, so in this case, nipple rolling, or breast pumps would help draw the nipple out (McKinney et al., 2018).

Complications could also arise with infants. This includes falling asleep after feeding less than five minutes, refusal to breastfeed, tongue thrusting, smacking or clicking sounds, dimpling of the cheeks, failure to open the mouth wide to latch -on, lower lip turned in, short, choppy motions of the jaw, no audible swallowing, and the use of formula (McKinney et al., 2018). Indications that the mother is having breastfeeding problems include, hard and tender breasts, painful, red cracked, blistered, or bleeding nipples, flat or inverted nipples, localized edema or pain in either breast, and a fever, generalized aching, or malaise (McKinney et al., 2018).

Significance of Problem

Although exclusive breastfeeding is the optimal feeding method, many women do not breastfeed or discontinue breastfeeding for a variety of reasons. According to the CDC, only 1 in 4 infants are exclusively breastfed, as recommended, by the time that they are 6 months old (CDC, 2021b). About 60% of mothers do not breastfeed for as long as they intend to (CDC, 2021b). Breastfeeding disparities exist. Numerous communities have lower rates of breastfeeding, including non-Hispanic black infants, Asian infants, non-Hispanic White infants,

Hispanic infants, infants eligible for Special Supplemental Nutrition Programs, young mothers aged 20-29 years, and mothers aged 30 years or older (CDC, 2021b). Low rates of breastfeeding will cost the United States at least \$3 billion a year in medical costs for mother and infant (CDC, 2021b). Improving the rates of breastfeeding can reduce the healthcare costs to the individual and the healthcare system as it decreases the use of health services.

Significance in Nursing

This is significant to the nursing community because nurses play an essential role in caring for the mother after delivery. The nurse should be knowledgeable and skilled to deliver quality patient care and ensure that the patient is properly educated on postpartum care. Nurses should provide proper health education regarding breastfeeding to increase the rates of exclusive breastfeeding among women and help eliminate breastfeeding disparities. In addition to providing education and support, they are responsible for referring patients to see lactation consultants for further assistance to improve breastfeeding outcomes.

Summary

In conclusion, there are numerous complications of breastfeeding that could result in the early cessation of exclusive breastfeeding. These include inadequate milk production; poor milk extraction; nipple or breast pain; and mastitis. Overall, breastfeeding is beneficial to both the infant and the mother, providing health benefits that are unmatched. The purpose of this thesis is to identify common maternal and infant complications that may cause nipple soreness and provide evidence-informed nursing recommendations that may assist with preventing and reducing nipple soreness.

CHAPTER 2

Review of Literature

Chapter two addresses a review of scientific literature that represents the current findings regarding breastfeeding interventions for mothers and infants who are experiencing breastfeeding complications. The PICO question guiding this literature search: Among women experiencing breastfeeding complications, what interventions will reduce or prevent nipple trauma, pain, and soreness? The search for literature for this thesis utilized the databases of Google Scholar, PubMed, and the Health Sciences Library between the years 2010 to 2020. The search included peer-reviewed journals and the keywords that were used during the literature selection process included, “breastfeeding interventions”, “nipple shield”, “lanolin oil”, and “proper positioning”, with the subheading “breastfeeding complications” and “nipple pain”.

Nipple Shields

A nipple shield is a tool that is positioned over the nipple and areola before nursing to aid in breastfeeding. It is often recommended for mothers who have flat or inverted nipples, or if their baby is not latching effectively. Recent studies have demonstrated the use of nipple shields to assist with proper latch for the infant which avoids early breastfeeding cessation. Nipple shields are commonly used to treat latching or sucking problems relating to the mother or baby. The mother may need nipple shields due to flat or inverted nipples, large breasts, engorgement, or pain due to sore and damaged nipples (Kronborg, Foverskov, Nilsson, & Masstrup, 2016). The baby may require nipple shields due to prematurity, disorganized such, or poor latch (Kronborg et al., 2016). The effectiveness of nipple shields has been established in research articles that were published in the late 1990s (Chow et al., 2015). Recent studies have been

examining both the positive and negative effects of nipple shields as it has become a controversial topic in lactation.

Clinical studies have demonstrated that nipple shields received both positive and negative feedback from women. Although nipple shields are beneficial to preventing breastfeeding termination, limitations exist. Nipple shields may lead to a decrease in milk production, and it was found in previous research that breast pumping was recommended over nipple shields to promote an adequate milk supply (Kronborg et al., 2016). In this study by Kronborg et al. (2016), a Danish sample of women was asked open and closed questions about their nipple shield use six months postpartum. The goal of the study was to explore the self-reported reasons why the mothers started the use of nipple shields, assess the use of the nipple shields in association with maternal or infant characteristics, and examine the relationship between nipple shield use and the duration of exclusive breastfeeding. This study is an observational cross-sectional study design that took place in the western part of Denmark. There were seven hospitals that participated in the study. The participants were recruited through a Civil Registration System where all citizens are assigned a unique civil registration number at birth which identifies newborns and their mothers. Women who gave birth from April 1st to June 30th, 2008, and from August 1st to October 31st, 2008 were recruited. A total of 7,113 newborns and mothers were part of the inclusion criteria (Kronborg et al., 2016). Eligible mothers received anonymous self-administered questionnaires 6 months after birth which included questions about their socio-demographic, previous breastfeeding experience, early breastfeeding problems, duration of breastfeeding, and infant growth and wellbeing.

The variables from the primary study included initiation, duration, and reason for the use of nipple shields in relation to the initiation and duration of exclusive breastfeeding. The

mother's self-reported responses were categorized into three categories: "In the beginning" meaning that she initially used nipple shields then stopped, "all the time" meaning that she used it during the entire breastfeeding period, and "never" meaning she has never used nipple shields. After the closed questions, open questions were asked for the women to describe their reason for the use. Maternal factors were accounted for such as their body mass index (BMI), length of education, ethnicity, previous experience with breastfeeding, and parity. Child factors included gender, pacifier use, gestational age at birth, and birth weight (Kronborg et al., 2016).

The outcome factor of breastfeeding duration was cut-off at 17 weeks because the Danish recommendation of exclusive breastfeeding was for at least four months. The results were assessed using the chi-squared test. The duration of the exclusive breastfeeding in accordance with the use of nipple shields was analyzed using the Kaplan-Meier method. A log-rank test was then used to compare the survival distributions based on the use of nipple shields. A multivariable logistic regression analysis was used to evaluate the influence of the nipple shields on the cessation of exclusive breastfeeding before week 17. The maternal, infant, and early breastfeeding characteristics were significantly correlated ($P < 0.05$). The mother's self-reported answers to the questions asked were analyzed using qualitative content analysis. The responses were analyzed in three phases, in the first phase, the responses were read to have a general understanding of the whole content. In the second phase, the responses were reread to focus the responses on the goal of the study. In the third phase, the texts were clustered, and they were organized into themes and subthemes so that the researchers can pay special attention to the patterns and time frame in the data material.

The results of this study indicate that out of the 7,113 eligible couplets, 5,127 mothers had returned the questionnaire, so the response rate was 72%. There were 203 mothers who did

not start breastfeeding and 106 mothers did not receive complete information about full breastfeeding duration and the use of nipple shields. Since the study population was defined by mothers who started breastfeeding and had complete knowledge about exclusive breastfeeding duration and the use of nipple shields, the study population was reduced to 4,815 couples. Within the sample size, 3,441 of the mothers had never used a nipple shield, 1,037 used it in the beginning, and 340 participants used it all the time. It was found that the proportion of mothers who used the nipple shields both in the beginning and all the time were mothers who had breastfeeding problems with latching, blocked milk ducts, mastitis, or insufficient milk supply (Kronborg et al., 2016). The findings of this study found that some mothers found the nipple shields helpful and others did not. Some mothers had an issue with the infant finding dependence on the nipple shield to breastfeed as they did not suck on the nipple without the shield. Some of the responses from the mothers include, “help relieve painful breastfeeding”, “prevent painful breastfeeding”, and “the infant got dependent” (Kronborg et al., 2016, p. 8). Nipple shields assist with early breastfeeding problems although they may create a tendency for dependence. Since this is an observational cross-sectional, a definitive causal conclusion relating to the strong association between the use of nipple shield and duration of exclusive breastfeeding cannot be drawn. The use of nipple shields may be a marker for breastfeeding difficulties, but a randomized trial should be used to test this (Kronborg et al., 2016).

The strengths of this study are that there was a large sample size and large inclusion criterion which decreases the selection bias. The limitations of this study are from how the study was implemented. This study could be more organized to test the benefits of nipple shields. Future research can implement this study by organizing the participants into two groups. The

inclusion criteria would be breastfeeding mothers experiencing complications. The two groups would be mothers using nipple shields, mothers using other interventions, and a control group.

The information synthesized from this article revealed that nipple shields provided good support for primiparous women, as well as women with lower education levels, higher BMI, lower gestational age, or infants with low birthweight. In conclusion, although nipple shields were effective initially, it is also correlated with earlier cessation of exclusive breastfeeding (although a strong definitive association could not be drawn from this study) and causes a dependence for breastfeeding women.

A longitudinal descriptive survey explored the ultrathin silicone nipple shields and in relation to the breastfeeding experiences among mothers who were experiencing early breastfeeding difficulties. In this study, there was a convenience sample of 81 postpartum mothers who were in a hospital in the northwest region of the United States. This study measured the mother's ratings of the helpfulness of the nipple shields, the duration of nipple shield use, breastfeeding experience, and infant weight gain patterns (Hanna, Wilson, & Norwood, 2013). There is little published research on nipple shields, so the researchers desired to generate new insights. Qualitative and quantitative data was collected, and it was collected through face-to-face and telephone interviews.

The inclusion criteria included postpartum mothers who were referred to a lactation consultant for difficulty initiating feeding, were given a nipple shield as a postpartum inpatient to assist in breastfeeding, and were available for follow-up contact (Hanna et al., 2013). Mothers who had a history of previous breast surgery, multiparous women, and women who gave birth to children with a neuromuscular condition were excluded from the survey. The sample size was 81 postpartum women and data was collected over 12 months. To measure this data, two

instruments were created. In the first instrument, a 38-item questionnaire was used to ask questions about “previous experience with breastfeeding or nipple shields, motivation for breastfeeding, reasons for receiving the nipple shield, and personal goals for the length of breastfeeding duration” (Hanna et al., 2013, p. 617). In the second instrument, a 28-item questionnaire was used to collect follow-up data in intervals of 5,9,17, and 25 weeks postpartum to analyze the mother’s perceived level of support at home, whether they were “still breastfeeding and using the nipple shield, whether they were supplementing breast milk with artificial milk, ratings of nipple shield usefulness, and any problems associated with the nipple shield, and their overall satisfaction of their breastfeeding experience” (Hanna et al., 2013, p. 617). At the end of the study, the participants were given open-ended questions to make additional comments about the nipple shield. The data was administered to a pilot study. Content and face validity was measured using obstetric nurses and the hospital nursing research council to utilize their experience for feedback.

The results of this study found that 55.5% of the participants were given nipple shields to help with infant latch problems that could not be resolved with lactation consultations on proper positioning and other techniques (Hanna et al., 2013). The other problems resulting in the use of nipple shields included the following: 31.2% for flat nipples, 25.9% for painful nipples, 12.3% for disorganized suck, 9.8% for crackled nipples, 8.6% inverted nipples, and 1.2% from sexual abuse. The median duration for nipple shield use was about 6.6 weeks where the majority of the mothers had stopped using the nipple shields by the fifth week of the postpartum period. The data for nipple shield helpfulness was rated on a 0-to-5 scale (0 = not helpful and 5 = extremely helpful) and 80% of the mothers had rated the nipple shields to be helpful where 72% of the responses were rated a ‘5’ (Hanna et al., 2013). Concerns regarding the nipple shields included

adherence issues (n=3), misplacement (n=2), poor feeding response (n=1), pain (n=1), and the infant not wanting to suckle on the shield (n=7) (Hanna et al., 2013). After the survey, the mothers received a follow-up phone call rating their satisfaction on a 1-to-5 scale where 79% of the women reported a 4 or a 5. In conclusion, many of the mothers were satisfied with the use of nipple shields and had presented with comments about its usefulness for decreasing pain and avoiding breastfeeding cessation (Hanna et al., 2013).

The strengths of this study lie in the complement and refined quantitative and qualitative data. There were also multiple methods to gather data, as evident by the two instruments of data collection mentioned previously. The limitations of this study lie in the use of a convenience sample, self-reported data, and the difficulty to reach all of the participants. Future studies should have a larger sample size to build a more predictive model and further analyze the effectiveness of breastfeeding practices in regard to the use of nipple shields.

The information synthesized from this research study indicates that although nipple shields are helpful to help early breastfeeding difficulties, they can cause mothers to abandon breastfeeding early. This information needs to be conveyed to every mother prior to the suggestion of nipple shields. Furthermore, a standardized protocol should be developed to guide the use of nipple shields (Hanna et al., 2013).

Lanolin Oil

Lanolin oil is a waxy substance that is obtained from sheep's wool. Specifically, it is the yellow fat that is secreted from the sebaceous glands of sheep, similar to the sebum on the human skin. It has been used traditionally to treat sore and cracked nipples during breastfeeding. It is also said to be effective for the prevention and treatment of nipple pain during breastfeeding. Lanolin is an occlusive moisturizer and works by creating a protective barrier on the stratum

cornerman (outer layer of the epidermis) to rehydrate and heal the skin from within and relieve nipple soreness. “Lanolin is proven to have anti-inflammatory, antimicrobial, skin-protecting and barrier repair properties” (Abou-Dakn, Fluhr, Gensch, & Wöckel, 2011, p. 28).

The first article evaluated the efficacy of specific-grade highly purified anhydrous (HPA) lanolin versus expressed breast milk (EBM) for the treatment of painful and damaged nipples. There are many grades of lanolin with varying degrees of purity that range from crude industrial grades to ultra-purified medical grades (Abou-Dakn et al., 2011). This study used the intervention of HPA lanolin in their experimental group. HPA lanolin is purified by a special proprietary process where impurities and allergenic components are removed. As a result, the lanolin is free of odor, taste, bleaches, and preservatives. This is important because having impure topical ointments can be unsafe for the infant, exacerbate existing nipple soreness, cause allergies, and early cessation of breastfeeding.

This study was a prospective controlled clinical trial. This was evaluated through a prospective controlled clinical trial with 84 participants. The inclusion criteria were women older than 18 years who had a low-risk pregnancy, delivered a child greater than 37 weeks, no neonatal complications, and have developed nipple pain (rated a 2 or higher in the visual analog scale [VAS]) while breastfeeding within 72 hours after delivery (Abou-Dakn et al., 2011). The exclusion criteria were anomalies in the breast, nipple anatomy, chronic illness, and the presence of other pain-related conditions (Abou-Dakn et al., 2011). There was no statistical difference in the demographic characteristics of the women assigned to the intervention group or control group. These participants were allocated into the intervention group (HPA lanolin) and the control group expressed breastmilk (EBM). “The outcome parameters were healed nipples, nipple pain, cracked nipples, breastfeeding duration, and the incidence of related breastfeeding

complications” (Abou-Dakn et al., 2011, p. 28). The outcome of nipple trauma and healing rates were assessed through a Visual analog Scale (VAS) which is a valid and reliable measure of subjective phenomena (Abou-Dakn et al., 2011). Pain was assessed at the start of the study to obtain their baseline, on days 3, 7, 14, and after enrollment. A microbiological swab of the mammilla regions of both groups were also obtained to identify the baseline cutaneous bacterial colonization (Abou-Dakn et al., 2011). The control group was instructed to express and massage a few drops of EBM on the nipples and areola after each feed and allow the nipples to air dry (Abou-Dakn et al., 2011). The intervention group was instructed to pat the nipples dry after each feeding and apply a pea-sized amount of HPA lanolin to the nipples and areola and ensure that this area is covered with lanolin at all times (Abou-Dakn et al., 2011). The women were not allowed to wash off the HPA lanolin until the next feeding, in order to create a moist healing environment.

The outcome measured maternal stress using the standardized 20-item Perceived Stress Questionnaire; nipple pain using a numerical scale from 0 to 10 with increasing scale figure; and nipple trauma using the Nipple Trauma Score (NTS) (Abou-Dakn et al., 2011). The microbiological swab indicated that there were no statistically significant results of baseline cutaneous bacterial colonization between the two groups. In terms of pain, it was discovered that the participants in the intervention group had a faster decrease in nipple pain intensity during feedings (89% of the participants) compared to the control group (88% of the participants) (Abou-Dakn et al., 2011). In the control group, the pain intensity initially increased and peaked on the third day postpartum (Abou-Dakn et al., 2011). It was also noted that nipple trauma was more severe in the group using EBM. There were significantly greater numbers of healed nipples in the HPA lanolin group compared to the EBM group (n=52 vs n=38) (Abou-Dakn et al., 2011).

Furthermore, it was found that HPA lanolin was effective to prevent new skin defects within the first three days of treatment (Abou-Dakn et al., 2011). In addition, it was found that only 7% of the participants in the intervention group stopped breastfeeding during the first 14 days of treatment, compared to 15% of the women that stopped breastfeeding in the EBM group (Abou-Dakn et al., 2011). In the EBM group, it was found that 8 women suffered from breast engorgement and 3 had developed mastitis, meanwhile, only 4 women from the HPA lanolin group developed breast engorgement with no cases of mastitis (Abou-Dakn et al., 2011).

The strength of this article was that data collection was collected through physicians instead of nurses, to reduce potential bias in allocating the women into the groups. Bedside nurses spend more time with these patients and develop a deeper professional relationship compared to physicians. Furthermore, the women were not given any advice about EBM or lanolin prior to the study. The weakness of this study is that this study does not meet the criteria to be classified as a randomized trial because the intervention was performed depending on whether the participant reported pain for the first time on a day with an even or odd date (Abou-Dakn et al., 2011).

The significance of this study indicates that HPA lanolin is effective in the treatment of sore or damaged nipples associated with breastfeeding, compared to the intervention of EBM. Pain associated with breastfeeding may inhibit the let-down reflex, therefore it is imperative that the mother receives symptomatic relief while treating the underlying cause of trauma. Lanolin is effective especially during the critical period of initiation of breastfeeding. This article also enforces that correct positioning of the baby at the breast and fixing any improper latch by the baby attaching to the breast will help improve nipple trauma.

A randomized, single-blind, controlled trial performed by Jackson and Dennis (2017) evaluated the impact of lanolin on nipple pain among breastfeeding women with damaged nipples. This study was conducted at a tertiary care hospital in Hamilton, Ontario, Canada. There was a total of 186 participants (Jackson & Dennis, 2017). The inclusion criteria included breastfeeding women who are having nipple pain or damaged nipples. The participants were separated into the intervention group who received lanolin oil treatment and the control group who received normal postpartum care. The normal postpartum care was not specifically defined in the article. The intervention group (n=93) consisted of randomized participants with nipple pain or damaged nipples who will apply lanolin and the control group (n=93) included randomized participants with nipple pain or damaged nipples who will receive normal postpartum care. The outcome was measured using a Numeric Rating Scale for nipple pain, the Short-Form McGill Pain Questionnaire, breastfeeding duration/exclusivity, breastfeeding self-efficacy, and maternal satisfaction with lanolin treatment versus usual care (Jackson & Dennis, 2017). The usual care was not defined in the article.

The results indicated that there were no significant group differences in mean pain scores at 4 days post-randomization. However, both groups did experience clinically relevant decreases in nipple pain by day 7. In terms of breastfeeding duration and exclusivity, 24% of the participants in the control group had discontinued breastfeeding at four weeks postpartum meanwhile only 15% of the participants in the lanolin group had discontinued breastfeeding. At 12 weeks postpartum, 37% of the control group had discontinued breastfeeding, while only 28% of the lanolin group had discontinued breastfeeding. Participants in both groups reported high levels of breastfeeding self-efficacy, the control group had a mean score of 55.4 and the lanolin group had a mean score of 56.3. The majority of the women (53%) from the lanolin group were

very satisfied with the effects of lanolin treating their nipple pain and only 22% of the women in the control group reported satisfaction with the care that they received to manage their nipple pain. Only 1% of the participants in the lanolin group were very dissatisfied with the treatment they received compared to the 14% that were dissatisfied in the control groups. Ultimately this study concluded that lanolin did not significantly improve nipple pain and damage compared to normal postpartum care. This study suggested that regardless of the use of lanolin or normal postpartum care, nipple pain intensity scores will decrease approximately seven to ten days postpartum.

The strengths of this study include the large sample size of the participants and randomization of the sample groups. The limitations of this study include the inconsistent time period of reassessment. For each of the categories that were tested, the participants should be reassessed at the same time for all of those categories. For example, they should be reassessed at the end of four weeks and 12 weeks for all of the categories and not just a few of the categories.

The significant findings of this study include that all of the participants experienced reduced nipple pain after approximately seven to ten days postpartum. Furthermore, it was found that nipple pain peaks at around three days postpartum and decreases after that period. It has been suggested that teaching about pain will help participants sustain breastfeeding during their most painful period of time. Nipple damage is often due to the result of improper latch or positioning of the breast, therefore, it is important to provide education regarding proper positioning and latch for newly breastfeeding women. The nurse should also observe breastfeeding in the early postpartum period and provide hands-on assistance if needed.

Proper Positioning

Proper positioning and attachment are essential for effective breastfeeding. The positioning of the infant is important for good attachment and successful breastfeeding. It is believed that most breastfeeding complications can be avoided if good attachment and positioning are established early. Effective sucking technique is necessary to ensure milk transfer and prevent complications. According to the CDC (2020d), the nipples may be sensitive for the first few weeks of breastfeeding as they are adjusting to the baby's suckling. Once the baby is well latched, breastfeeding should not be painful (CDC, 2020d). Improper latch occurs when the baby does not grasp enough breast tissue or if their tongue is not positioned properly. Correcting the baby's position and latch can help relieve nipple pain (CDC, 2020d).

A quasi-experimental design study was performed to evaluate the effectiveness of breastfeeding techniques in the prevention of nipple soreness. It also evaluated the effectiveness of teaching programs regarding breastfeeding techniques on the participant's knowledge in preventing nipple sores (Tamilselvi, 2017). The structured teaching program teaches newly breastfeeding mothers about breastfeeding techniques and the practice to prevent nipple soreness (Tamilselvi, 2017). Mothers were taught how to use proper positioning, choosing from cradle hold, cross-cradle hold, football or clutch hold, and lying down (Tamilselvi, 2017). This study has a sample size of 60 postnatal mothers, and they were recruited using a random sampling technique. There were 30 participants in the experimental group to receive education on breastfeeding techniques, and 30 participants in the control group where they received normal postpartum care. The independent variable of this study was teaching breastfeeding techniques and the dependent variable is nipple soreness caused by breastfeeding (Tamilselvi, 2017). The inclusion criteria include primipara mothers who were willing to participate. The exclusion

criteria consisted of multipara mothers who were having nipple soreness. They examined the outcomes of demographic variables, clinical variables, and nipple soreness rating. They rated nipple soreness on the Nipple Soreness Rating Scale which ranges from grade 0 (normal nipple color and tenderness) to 5 (cracked and sore nipples) (Tamilselvi, 2017). A pre-test and a post-test were performed. The pre-test indicated that all of the participants had a grade 0, indicating no nipple soreness. The duration of the study lasted 5 days. In the post-test, there were 28 participants in the experimental group who scored a grade 0 and 2 participants scored a grade 1 indicating slightly reddened and tender nipples. The results indicated that on average, the participants in the experimental group had a 20.6% reduction of nipple soreness score after the structured teaching program (Tamilselvi, 2017). In the control group, there is only a 4.6% reduction of score (Tamilselvi, 2017).

The strength of this study is due to the random sampling of the participants and the large sample size. The weakness of this study is due to the lack of description about the study. More information could have been included about the methods of this study to enhance its overall reliability.

The significant findings revealed that breastfeeding techniques had a significant effect in preventing nipple soreness. This was evident in the study because the majority of the participants in the experimental group had preventable nipple soreness (Tamilselvi, 2017). This indicates that mothers should be provided with education on proper breastfeeding techniques when they initially start breastfeeding to prevent nipple soreness.

A community-based cross-sectional study that was performed to assess the mother and infant latch on position and the impact of the position on the child's health status (Joshi, Magon, & Raina, 2016). This study had a sample size of 1,267 children between the ages of 0-24 months.

The sample size was calculated using a simple random sampling technique performed by a random number table (Joshi et al., 2016). A self-designed questionnaire was used to assess the correct latch-on the position of the child to the mother, collect data on relevant sociodemographic factors, trends of infant feeds, and assess the impact of the feeding practices on the mother and child's health and nutritional status (Joshi et al., 2016). Based on the WHO criteria, a grading system was established where each criterion was assigned 1 point. The criteria categories are as followed: mother relaxed and comfortable, mother sit straight and well-supported back, trunk facing forward and lap flat, baby neck straight or bent slightly back and body straight, baby's body turned toward mother, baby's body close to mother's body and facing breast, and baby's whole body supported (Joshi et al., 2016). The scores for grading the correct position ranges from 0-7, 7 being the best score. Correctness of attachment is also graded based on the criteria of chin touching breast, mouth wide open, lower lip turned outward, and more areola toward the baby's mouth. This is graded on a score of 1-4 based on how many of the criteria are followed. Lastly, the correctness of effective sucking is graded based on the criteria of slow sucks, deep sucks, and sometimes pausing. This is graded on a scale of 1-2 (Joshi et al., 2016).

The data that was collected was entered into Microsoft Excel and analyzed using the Statistical Package for Social Sciences (SPSS). A chi-squared test was used to establish an association of breastfeeding with child feeding practices, socioeconomic and demographic factors, and impact on the nutritional status of children. The results were found to be statically significant ($P < 0.05$) (Joshi et al., 2016). The results indicated that out of 1,267 mothers, only 29.9% of them initiated breastfeeding within one hour of delivery. Effective sucking and attachment had a positive correlation ($P < 0.01$). Mothers with a high parity had better

positioning scores as compared to mothers with low parity scores so there was a significant association between parity and positioning of the mother ($P < 0.001$) (Joshi et al., 2016). The data indicated that 62.7% of the children with mothers who had poor positioning had suffered from acute respiratory infections ($P < 0.001$); 46.7% of infants were held in excellent positions and excellent attachment was seen in 48.4% of mothers; and 83.7% of mothers who had a parity of more than 2 had excellent positioning and attachment. It is concluded that 74.0% of multiparous mothers had good positioning and attachment (Joshi et al., 2016).

This study provides clear information, and they were organized with the information provided. The strength of this study relies on the large sample size and clear description of how the sample size was randomly obtained. The limitation of this study may be that they did not clearly describe the measures that were taken to ensure that bias was eliminated. Future research can be done to determine which positioning is better for the infant when breastfeeding.

The significant findings of this study indicates that since multiparous women had better positioning and attachment, further education is needed for primiparous women. Evidence-informed practice recommendations should focus on health education provided to primiparous women which details the proper positions and how an infant should latch effectively.

A cross-sectional study performed at two hospitals in Benghazi Libya assessed the effectiveness of correct positioning, attachment, and suckling. The sample size included 192 mother-neonate couplets (Goyal, Banginwar, Ziyu, & Toweir, 2011). Each couplet was observed for the mother's and baby's position, attachment, and effective suckling. The World Health Organization (WHO) B-R-E-A-S-T Feed observation form was used to grade positioning, attachment, and suckling. The scoring is based on various characteristics that indicate correct body position, correct attachment, and correctness of effective suckling (Goyal et al., 2011).

Each characteristic was graded on a criterion of good, average, or poor. Each category was graded on a numerical scale with one point assigned to each criterion per characteristic. Six female medical interns were trained to observe and collect data. They observed the breastfeeding process for five minutes and had recorded the mother and infant's positioning, attachment to the breast, and effective suckling. The data from this study were analyzed using the statistical analysis software (SPSS) and a chi-squared test was used to determine the significance of the P-value and a P value less than 0.05 was considered for statistical significance (Goyal et al., 2011).

The results from this study examined numerous characteristics. The demographics of the participants revealed that 55.7% of the mothers were between 20-30 years of age, 39.6% of the participants were over 30 years old, and 4.7% of the participants were below 20 years of age (Goyal et al., 2011). Poor positioning (22.2%) and poor attachment (33.3%) were higher among mothers less than 20 years of age (Goyal et al., 2011). However, there was no significant association between the mother's age and poor positioning and attachment of their infants during breastfeeding ($P=0.238$) (Goyal et al., 2011). The study then looked at the association between breast complications with poor positioning and attachment. It was found that breast diseases such as cracked nipples, mastitis, and sore nipples were significantly associated with poor positioning (57.1%) and attachment (71.4%) (Goyal et al., 2011). The P-value for positioning was $P=0.002$ and $P=0.006$ for attachment. This study also revealed that multiparous mothers had better positions and attachments compared to primiparous women (74.0%) (Goyal et al., 2011).

Shifting the focus to infant characteristics, about 14.6% of the infants were less than 1 week old (early neonatal period) and 85.4% of the infants were between 7-28 days (late neonatal period) (Goyal et al., 2011). It was found that suckling was poorer in the early neonatal period (42.8%) than the late neonatal period (32.9%) (Goyal et al., 2011). Most of the neonates were

full term, only 22% of the total full-term infants had a poorer attachment than preterm infants (60%) (Goyal et al., 2011). Moreover, 20.3% of the full-term infants had poor suckling compared to 50% of the preterm infants (Goyal et al., 2011).

The significant findings indicated that poor positioning and attachment is found to be significantly associated with cracked nipples, mastitis, and sore nipples (Goyal et al., 2011). Specifically, poor positioning increases the risk of developing nipple trauma by 1.94 times compared to women whose infants were correctly positioned (Goyal et al., 2011). The study concluded that effective positioning and attachment were significantly associated with parity. Ultimately, primiparous women have a higher incidence of nipple trauma and may require additional education to improve their breastfeeding experience.

The strength of this study was attributed to the large sample size. Limitations included a lack of depth in the information provided. The study had discussed other points such as nipple trauma towards the end, but they did not go in-depth with this topic during the study. It would be beneficial if they had implemented another characteristic discussing the impacts of nipple trauma on proper positioning and attachment so that clear data could be extracted.

Lactation Consult

Lactation specialists can help provide education and support to pregnant women and new mothers to improve their breastfeeding outcomes. The primary focus of the lactation specialist is to counsel, encourage, and manage lactation crises for nursing families to help them meet their breastfeeding goals and combat barriers to breastfeeding (Patel & Patel, 2016). They provide psychological, physical, financial, or informational support, and they help with latch and positioning. A systematic review conducted by Patel & Patel assessed the efficacy of lactation education or support programs to improve the rates of initiation and duration of any

breastfeeding and exclusive breastfeeding compared to usual practices, although the usual practices were not clearly defined (Patel & Patel, 2016). The systematic review was limited to randomized trials which yielded 16 studies with a total number of 5084 participants (Patel & Patel, 2016). The outcome that was measured included breastfeeding initiation rates, breastfeeding duration, any breastfeeding rates, exclusive breastfeeding rates, infant health outcomes, and maternal health outcomes (Patel & Patel, 2016).

The results indicated that breastfeeding interventions using lactation consult increases the number of women initiating breastfeeding (odds ratio for any initiation vs not initiating breastfeeding was 1.35 with a confidence interval [CI] of 95%), improved breastfeeding rates (odds ratio for any breastfeeding up to one month vs not breastfeeding was 1.49 with a CI of 95%), and had beneficial effects on exclusive breastfeeding rates (odds ratio for exclusive breastfeeding up to one month vs not exclusive breastfeeding was 1.71 with a CI of 95%) (Patel & Patel, 2016). The significant findings indicate that implementing lactation consultants in the postpartum care and breastfeeding interventions of new mothers, benefit breastfeeding outcomes.

The strength of this systematic review is the overall large sample size. The limitation of this study is due to the reviews not specifically evaluating the effects of lactation consults on breastfeeding outcomes. The systematic review would have been stronger if there were studies that directly detailed breastfeeding outcomes, however, the article indicated that past systematic reviews have already examined the overall effect of breastfeeding interventions on breastfeeding outcomes. It could be concluded that since the efficacy of lactation consultation has been established in previous studies, thus, fewer recent studies have examined this causal relationship.

Conclusion

Providing support and education to postpartum mothers, especially on positioning and correct latch, is important. Positioning and attachment are the most common recommendation for the treatment of nipple pain. Performing this intervention within the first week of birth has been associated with a longer duration of breastfeeding and fewer breastfeeding problems. Nipple shields have been suggested as a short-term measure to relieve breastfeeding complications, but it is not advised to be used long-term. The primary concern is that nipple shields may reduce overall milk output. The conflicting evidence found on nipple shields suggests that nipple shields should be used under expert supervision. Lanolin oil has been concluded to be effective in treating nipple trauma, but further research is needed to determine if it is more effective than regular postpartum care. It is suggested that lactation support should be provided to aid these interventions and enhance breastfeeding outcomes. Overall, there is an insufficient number of recent studies conducted on the effectiveness of nipple shields and lanolin oil as many studies performed in the 1990's has established their efficacy. Recent studies have questioned the benefits of nipple shields and lanolin oil. There is also insufficient evidence to demonstrate the effectiveness of latch, although there were no contraindications found within the studies reviewed. Further research is necessary to validate these therapeutic modalities and provide reliable data. As of now, it is recommended that a thorough health education should be provided on these interventions. A guideline should be provided for breastfeeding mothers about the benefits and risks of all of these interventions as well as the proper way to use them.

CHAPTER 3

Best Practice Recommendations: Preventing and Managing Breastfeeding Related Nipple Trauma, Pain, and Soreness

The purpose of this thesis is to develop evidence-informed best practice recommendations for infants, new mothers, nurses, and other healthcare professionals when assisting mothers with breastfeeding. The recommendations in this chapter are a combination of best practice recommendations published by peer-reviewed journals which focus on improving breastfeeding experience, in addition to the evidence-informed literature reviewed in chapter 2. The recommendations listed in Table 1 along with the levels of evidence are provided along with each supporting article.

Nipple pain and trauma associated with breastfeeding are common and it is one of the main reasons for early cessation of breastfeeding in the postpartum period (Abou-Dakn et al., 2011). Treating sore or traumatized nipples quickly and effectively is important to establish successful breastfeeding to ensure that the experience is pleasurable between the infant and the mother. This would also prevent further complications such as mastitis or breast abscesses. Although previous research has established the effectiveness of nipple shields and lanolin oil for the use of treating nipple pain and trauma, recent studies have questioned these interventions due to possible complications such as reduced milk output. Therefore, in this thesis, an evidence-informed best practice recommendation will suggest the intervention of nipple shields and lanolin oil to manage nipple trauma and pain, however, the focus will be on proper positioning and latch. The focus will be on health education to provide mothers with the benefits and risks of each intervention. Education and breastfeeding support should also be enforced in the early postpartum days to ensure successful breastfeeding.

Table 1

Best Practice Recommendations for Breastfeeding Mothers Experiencing Nipple Soreness

Recommendation	Rationale	References	Level of Evidence
Education on Proper Breastfeeding Positions	Correct positioning allows for effective breastfeeding and nutrition delivery.	Joshi, H., Magon, P., Raina, S. (2016). Effect of mother-infant pair's latch-on position on child's health: A lesson for nursing care. <i>Journal of Family Medicine and Primary Care</i> , 5(2), 309-313. doi: 10.4103/2249-4863.192373	Level II
	Proper positioning and latch can prevent nipple soreness.	Tamilselvi, S. (2017). A study to assess the effectiveness of breastfeeding technique in prevention of nipple soreness among primipara mothers. <i>International Journal of Pharma and Bio Sciences</i> , 8(1), 515-518. http://dx.doi.org/10.22376/ijpbs.2017.8.1.b515-518	Level III
	Poor positioning increases the risk of developing nipple trauma (such as cracked nipples, mastitis, and sore nipples).	Goyal, R. C., Banginwar, A. S., Ziyoo, F., & Toweir, A. A. (2011). Breastfeeding practices: Positioning, attachment (latch-on) and effective suckling - A hospital-based study in Libya. <i>Journal of family & community medicine</i> , 18(2), 74-79. https://doi.org/10.4103/2230-8229.83372	Level II

Use of HPA lanolin to treat painful and damaged nipples	Lanolin has anti-inflammatory, antimicrobial, skin-protecting, and barrier repair properties.	Abou-Dakn, M., Fluhr, J.W., Gensch, M., Wöckel, A. (2011). Positive effect of HPA lanolin versus expressed breastmilk on painful and damaged nipples during lactation. <i>Skin Pharmacology and Physiology</i> , 24, 27-35. doi: 10.1159/00021822	Level III
	Lanolin reduces the risk of developing mastitis and new skin defects.	Abou-Dakn, M., Fluhr, J.W., Gensch, M., Wöckel, A. (2011). Positive effect of HPA lanolin versus expressed breastmilk on painful and damaged nipples during lactation. <i>Skin Pharmacology and Physiology</i> , 24, 27-35. doi: 10.1159/00021822	Level III
	Lanolin promotes a moist healing environment and reduces overall nipple pain.	Abou-Dakn, M., Fluhr, J.W., Gensch, M., Wöckel, A. (2011). Positive effect of HPA lanolin versus expressed breastmilk on painful and damaged nipples during lactation. <i>Skin Pharmacology and Physiology</i> , 24, 27-35. doi: 10.1159/00021822	Level III
	Lanolin increases women's satisfaction with their breastfeeding experience.	Jackson, K. T., & Dennis, C.L. (2017) Lanolin for the treatment of nipple pain in breastfeeding women: a randomized controlled trial. <i>Maternal & Child Nutrition</i> , 13(3). doi: https://doi.org/10.1111/mcn.12357	Level II

	Nipple shields provide pain relief for breastfeeding mothers.	Kronborg, H., Foverskov, E., Nilsson, I., & Masstrup, R. (2016). Why do mothers use nipple shields and how does this influence duration of exclusive breastfeeding? <i>Maternal & Child Nutrition</i> , 13(1). doi: https://doi.org/10.1111/mcn.12251	Level IV
The use of nipple shields under supervision	Nipple shields are helpful for women with nipple trauma.	Hanna, S., Wilson, M., & Norwood, S. (2013). A description of breastfeeding outcomes among U.S mothers using nipple shields. <i>Midwifery</i> , 29(6), 616-621. https://doi.org/10.1016/j.midw.2012.05.005	Level III
	Nipple shields can provide a proper latch for the infant to provide a more effective breastfeeding experience.	Chow, S., Chow, R. Popovic, M., Lam, H., Merrick, J., Ventegodt, S., Milakovic, M., Lam, M., Popovic, M., Chow, E., & Popovic, J. (2016). The use of nipple shields: a review. <i>Frontiers in Public Health</i> . https://doi.org/10.3389/fpubh.2015.00236	Level I
Provide education to mothers about the benefits and risks of nipple shield use	Nipple shields provide short term relief of breastfeeding complications, but it can cause reduced milk output.	Hanna, S., Wilson, M., & Norwood, S. (2013). A description of breastfeeding outcomes among U.S mothers using nipple shields. <i>Midwifery</i> , 29(6), 616-621. https://doi.org/10.1016/j.midw.2012.05.005	Level III

Lactation consultants follow up	Providing education and support to postpartum women improves the rates of initiation and duration of breastfeeding, as well as exclusive breastfeeding compared to usual practices.	Patel, S., & Patel, S. (2015). The effectiveness of lactation consultants and lactation counselors on breastfeeding outcomes. <i>Journal of Human Lactation</i> . https://doi.org/10.1177/0890334415618668	Level II
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According to the studies synthesized in chapter 2, it can be concluded that education and support should be provided to mothers experiencing breastfeeding complications. Proper positioning and attachment education could be provided through a visual aid. The first line intervention is to provide education on proper positioning and latch. Positioning education will be provided by the bedside nurse to postpartum women. Both nipple shields and lanolin oil can be used to provide pain relief and aid women with nipple trauma. Lanolin oil will be the secondary intervention to help relieve nipple soreness. Lastly, nipple shields will be used as a tertiary treatment if the mother is in need of further support. Nipple shields should be used short term and under supervision. If nipple shields are needed, the bedside nurse will provide education about the importance of working with lactation consultant for guidance due to the possible risks of decreased milk output caused by nipple shields. Lactation consult will also provide continuous support to enhance their breastfeeding outcomes. Chapter 4 will be discussing the hypothetical implementation and evaluation of these interventions.

CHAPTER 4

The previous chapters of this thesis introduced possible interventions to treat breastfeeding complications such as nipple trauma, pain, and soreness. This chapter will explore hypothetical implementations involving proper positioning, lanolin oil, and nipple shields to assist postpartum mothers experiencing breastfeeding complications. The implementation will be framed around a Plan-Do-Study-Act (PDSA) model. The PDSA model consists of four stages that tests a change by “developing the change (Plan), carrying out the test (Do), observing and learning from the consequences (Study), and determining what modifications should be made to the test (Act)” (Institute for Healthcare Improvement, para. 1, 2021).

Implementation

I. Plan

In order to implement these interventions, the planning stage will include assembling a team of knowledgeable personnel. This team will consist of bedside nurses, nursing educators, lactation consult, director of the women/children department, and nursing managers. They will work together to provide the best care to postpartum women to enhance breastfeeding outcomes. The aim statement focuses on reducing and preventing breastfeeding complications through the use of proper positioning, lanolin oil, and nipple shields. This education will be provided through an infographic. The bedside nurse will present this infographic to the team during morning huddle and explain that the interventions are evidence informed. The participants will be focused on all postpartum women to prevent or reduce breastfeeding complications. The front side of the infographic will detail the importance of exclusive breastfeeding for the first six months after birth and the benefits and risks of all three interventions. The backside of the infographic will go into detail about proper positioning and attachment; this includes directions and pictures to guide

the patient. The resources needed to complete this includes a computer, colored printer, and a software program to make the infographic. A sample infographic has been made available and is attached in Appendix B. Information found on the infographic was from the Center for Disease Control and Prevention. The software program that was used to complete this infographic was Canva. Canva is a free software program, and the hospital will only need to cover the cost of printing. The average price for one double-sided color copy is about 30 cents. Most hospitals have colored printers, and colored ink is about \$70 for 350 pages double-sided. Printing paper costs around \$10 for 500 sheets. This averages to 22 cents per copy. The cost of ink should already be included in the hospital's budget as they need to print patient information. The infographic will be an extra resource that is included in the patient's discharge packet.

The infographic will need to be aesthetically pleasing in terms of color, font, and pictures. The infographic should also be legible, easily understandable, and usable for the patients. The team will need to consider organizational health literacy, which is the "degree to which organizations equitably enable individuals to find, understand, and use information to inform health-related decisions and actions" (CDC, 2021c). The team's focus should be providing education based on evidence-informed research, to the patients to enhance their ability to use the health information and make "well-informed" decisions. Considering patient health literacy, the infographic will be written at a 4th grade level. The infographic can be translated into other languages to suit the literacy needs of the patient. A translator can be used to assist the bedside nurse when they are providing education to the patient to ensure understanding.

II. Do

In the next step, the bedside nurse will implement the interventions. This will be implemented during patient discharge teaching. This hypothetical implementation will occur

over the duration of six months. The bedside nurse will first educate the patient on the importance of exclusive breastfeeding for the first six months after birth. While providing postpartum care, the bedside nurse can demonstrate how to properly position the infant for breastfeeding to have proper positioning and latch. After the education, the nurse will watch for a return demonstration from the patient to ensure understanding. Then, the bedside nurse should hand the patient the infographic to read and take home for reference. At this point, the bedside nurse will briefly describe the infographic's contents and ask the patient if they have any questions. If the patient is experiencing nipple pain and soreness, the nurse will provide education and instructions on the application of lanolin oil. Lanolin oil is an intervention to treat nipple soreness, rather than a prevention method. If the mother continues to have nipple trauma, the nurse can suggest using nipple shields with the assistance and supervision of the lactation consultant. Nipple shields could also be suggested if the mother has flat or inverted nipples (CDC, 2020a). Nipple shields can also be used as a preventative measure for nipple trauma. The nurse will encourage the mother to work with lactation through an outpatient service post-discharge to ensure that they are receiving proper breastfeeding support. If the mother decides to use nipple shields, the nurse should emphasize the importance of following up with lactation as nipple shields should be used with supervision due to the possible risks mentioned earlier.

III. Study

To evaluate the intervention, the bedside nurse will document on the patient's chart stating whether they provided education to the mothers. The documentation will detail any breastfeeding complications the patient may be having, how the nurse provided the education, and whether they provided the patient with the infographic. The documentation will also include the patient's reception of the information and whether they were able to perform a return

demonstration of the proper positioning and attachment. This documentation will be stored in the patient's electronic health record (EHR) and it can be audited monthly to track the progress throughout the study. In addition, the infographic will be evaluated to determine if it was understandable, easy to read, and whether the information was useful. The evaluation of the infographic will be determined through a survey provided to every patient who received the infographic. A sample survey is attached in appendix C. The nurse will ask every patient who received the infographic during the 6 months, to complete a survey. Specifically, the bedside nurse will provide education on breastfeeding interventions, give the patient the infographic, and explain that the patient can choose to fill out an optional survey about the infographic. If the patient opts to fill out the survey, the nurse will hand them the survey and return in 15 minutes to collect it.

IV. Act

Lastly, in the act stage, the bedside nurse will consult with the team to determine if the implementation resulted in success. They will analyze the aspects that were successful and unsuccessful to standardize a new implementation to use regularly for all patients. Any changes to the implementation protocols are refined and new plans are made for another PDSA cycle (Institute for Healthcare Improvement, 2021). The team members can return to the planning stage to re-examine the process to learn where it can be further improved. Then, they can develop a new plan that might result in success. Changes will eliminate what did not work and improve on what was successful. Furthermore, these changes will be made based on current research.

Strengths, Limitations, and Recommendations for Future Research

This thesis project contains a detailed implementation plan to deliver the implementations to postpartum women. The PDSA model encompasses all aspects that are needed to deliver the infographic effectively to the target population. Furthermore, this thesis provided a strong review of articles. The articles concluded that proper positioning, lanolin oil, and nipple shields were beneficial to enhancing breastfeeding outcomes, which supports the best practice recommendation that was proposed in this thesis paper.

There are limitations to this thesis project. The articles that were evaluated were not strong in terms of demonstrating the benefits of each intervention to breastfeeding outcomes. Since studies in the past have established the efficacy of proper positioning, lanolin oil, and nipple shields, recent studies are looking at possible complications with each of these interventions.

More research is needed to be done on the benefits of proper positioning, lanolin oil, and nipple shields. These studies should focus on the relationship of these interventions with enhancing breastfeeding outcomes, preventing nipple trauma, and lowering breastfeeding complications. A larger number of randomized control trial studies are needed to further support the efficacy of these interventions. Furthermore, other possible interventions, such as breast massage, could be explored to reduce breastfeeding complications.

Summary

This thesis developed evidence-informed best practice recommendations for nurses, postpartum mothers, and other obstetric healthcare professionals when trying to reduce and prevent breastfeeding complications in mothers who are breastfeeding. The ultimate goal is to promote exclusive breastfeeding for the first six months after birth to promote optimal nutrition

delivery. This benefits the mother, the infant, and the healthcare system. The best practice recommendations presented in this thesis are supported by evidence-informed research. Education on proper positioning, nipple shields, and lanolin oil have the potential to reduce and prevent nipple trauma, pain, and soreness. Nurses have a unique position in advocating for patients to enhance their postpartum experience. They have the ability to provide proper education to allow patients to make well-informed decisions about their healthcare. Providing education and support is one way that nurses and obstetric healthcare professionals make a positive impact on the patient's postpartum care.

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Appendix A: Levels of Evidence

Level of Evidence	Description
Level I	Evidence from a systematic review or meta-analysis of all relevant RCTs.
Level II	Evidence obtained from well-designed RCTs.
Level III	Evidence obtained from well-designed controlled trials without randomization.
Level IV	Evidence from well-designed case control and cohort studies.
Level V	Evidence from systematic reviews of descriptive or qualitative studies.
Level VI	Evidence from single descriptive or qualitative studies.
Level VII	Evidence from the opinion of authorities and or reports of expert committees.

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Appendix B: Infographic Visual

(Center for Disease Control and Prevention, 2020a)

Prevention and Management of Breastfeeding Complications

Importance of Breastfeeding

- Supplies necessary nutrients to the baby
- Contains disease-fighting antibodies and digestive enzymes not found in formula
- Protects the baby against diseases, infections, allergies, and sickness
- Reduce health risks for mothers, such as Type 2 diabetes, high BP, and cancer

POSITIONING AND LATCH

Benefits	Risks
<ul style="list-style-type: none"> • Promotes comfort • Reduces the risk of nipple trauma and pain • Allows enough milk delivery to the baby 	<ul style="list-style-type: none"> • Poor positioning can block the baby's nose, causing difficulty breathing • A shallow latch can cause poor milk transfer/nipple pain

LANOLIN OIL

Benefits	Risks
<ul style="list-style-type: none"> • Restore moisture and soothe cracked nipples • Treat nipple pain and trauma • Non-toxic for mother and baby, no need to wipe off 	<ul style="list-style-type: none"> • Unpurified lanolin can cause allergic reactions, diarrhea, and vomiting to the baby when ingested

NIPPLE SHIELDS

Benefits	Risks
<ul style="list-style-type: none"> • Prevent nipple pain/trauma • Protects sensitive nipples while they heal • Help flat or inverted nipples achieve proper positioning 	<ul style="list-style-type: none"> • Reduce overall milk production from the mother due to decrease nipple stimulation • Difficult for baby to wean off

Information Source: <https://www.cdc.gov/breastfeeding/data/facts.html> BY: WENDY YAN

Proper Positioning & Latch

CRADLE POSITION

Lay the baby sideways, facing you. You can use a pillow to support your elbows. Support your breast with a "U" or "C" hold.

CROSS-CRADLE POSITION

Bring baby across the front of your body, tummy to tummy. Hold baby in the crook of the arm opposite the breast you're feeding from.

FOOTBALL HOLD

Use the clutch position to support the baby's head and back along your arm. Support your breast with a "C" hold. Baby is facing you, feet and legs tucked under your arm.

LAID BACK POSITION

Lean back on a pillow, with the baby's front against yours. The baby's body will be held by yours.

SIDE-LYING POSITION

You and baby lie on your sides facing each other. Baby's chest should face your chest and mouth level with nipple.

HOW TO GET A GOOD LATCH

Position baby with nose to nipple, and press against the chin with the breast

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As the baby's mouth opens wide, roll the nipple in. The baby's mouth should cover most of the areola with lips flanged out.

Appendix C: Survey of the Infographic

Survey Statement	Strongly Agree (5)		Neutral (3)		Strongly Disagree (1)	
The infographic was easy to read and is visually appealing	5	4	3	2	1	
The information was clear	5	4	3	2	1	
I understood all of the information presented in the infographic	5	4	3	2	1	
I plan to follow all the guidelines on the infographic to prevent breastfeeding complications	5	4	3	2	1	