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Measuring Changes in Knowledge and Attitudes of Neonatal Intensive Care Unit Providers After Receiving an Educational Intervention About the Value of Human Milk in the Preterm Infant

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Submitted as Partial Fulfillment for the Doctor of Nursing Practice Degree

Regis University

Executive Summary

Measuring Changes in Knowledge and Attitudes of NICU Providers after Receiving an Educational Intervention about the Value of Human Milk in the Preterm Infant

Problem Identification

Human milk is proven to decrease morbidities and mortality in extremely low birth weight neonates. Health care providers must approach the mothers of these infants and explain the need for own mother's milk or consent for the use of donor milk in these infants. Providers may lack the knowledge about the importance of human milk in NICU infants, or may hold negative attitudes about human milk's contribution to the health of these infants (Agostoni & Manzoni, 2013; Ahrabi & Schanler, 2013).

Purpose

The purpose of this project was to examine an educational intervention's effectiveness in increasing knowledge and changing attitudes of health care providers with regard to the importance and value of human milk for the infants in the NICU.

Goals

The goals of the capstone project were to provide an educational intervention aimed at health care providers and to increasing knowledge and changing attitudes of those professionals.

Objectives

Objectives were increasing and substantiating knowledge, and evaluating the effect of the intervention of those objectives. Short-term objectives were to heighten awareness, and long term objectives to increase the use of human milk in the NICU.

Plan

Institutional Review Boards of both Regis University and the clinical site, University of Louisville, approved the proposed project. A time line was developed, and the project was implemented. The educational intervention was developed using a PowerPoint presentation on "Human Milk for Human Babies" and was presented in three different educational sessions to health care providers using the inclusions in the proposal.

Outcome and Results

Participants completed the pre-tests and post-tests and data was imputed into the SPSS statistical software. Paired t-tests for dependent groups were conducted. The independent variable was pre-exposure and post-exposure to the educational intervention on the value of human milk, The dependent variables were responses to pre-test questions as compared to post-test questions. After analysis of the pre-test and post-test results, using two-tailed paired t-tests, statistical significance was noted at the < 0.05 level, both for knowledge and attitude differences. The results suggest increased knowledge and changed attitudes in those who participated. The value of this conclusion indicates that more education would be valuable to all NICU providers.

Acknowledgements

This work is dedicated to my husband Bill who spent his lifetime encouraging our children and grandchildren to get as much education as possible, and proved it by completing his Bachelor's degree at age 62. Sadly, our son accepted his diploma for him at graduation, as he died suddenly the day he completed his last final and received the letter admitting him to the Master's program at the University of Wyoming. His sudden and unexpected death led me to question my resolve in completing my Doctorate in Nursing Practice. My decision was supported by the encouragement and compassion I received from family, friends, co-workers and the faculty at Regis University Loretto Heights School of Nursing, Graduate Program.

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My parents, long gone from this world, I hope that they are proud of me.

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Measuring Changes in Knowledge and Attitudes of Neonatal Intensive Care Unit Providers after Receiving an Educational Intervention about the Value of Human Milk in the Preterm Infant

Problem Recognition and Definition

This paper presents the capstone project on measuring changes in knowledge and attitudes on Neonatal Intensive Care Unit (NICU) providers after receiving an educational intervention about the value of human milk in the preterm infant. The purpose of this study was to examine the impact of an educational intervention in increasing current knowledge and changing attitudes of health care providers.

Human milk has been identified as a positive element in reducing mortality and morbidities in preterm infants (AAP Section on Breastfeeding, 2012; Ahrabi & Schanler, 2013; Arslanoglu et al., 2013; Bertino et al., 2013; Ganapathy, Hay, & Kim, 2011). Little research has been done addressing the attitudes of the health care providers toward the utilization of human milk, nor the process for requesting or obtaining human milk in the NICU. Providers must approach mothers and request that they provide milk, or obtain consents to use donor milk; and the health care provider's personal knowledge and attitudes affect if, and whether these procedures occur (Bernaix, Beaman, Schmidt, Harris, & Miller, 2010; Bertino et al., 2013; Handa & Schanler, 2013; Hillenbrannd & Larsen, 2002). Cost is a secondary but real consideration as processes to identify and protect mother's own milk for their babies require extra nursing time, policies and procedures, and specialized equipment. Additionally, in the current healthcare environment, hospitals have to bear the cost of donor milk, and human milk-based fortifier. Many medical facilities are reluctant to undertake this cost citing a lack of

difference when comparing artificial milk products, free to the hospital, and donor milk, obtained at a cost (Perrine & Scanlon, 2013; Jones, 2003).

The history of the value and importance of human milk is as old as recorded time and depicted in visual images as well as documented history (Doolan, 2008). Ancient history is replete in both references to breastfeeding, depictions of breastfeeding in art work, and historical commentary regarding the length of time for breastfeeding, (generally two years) as well as wet-nursing, where one woman breastfeeds another woman's infant (Doolan, 2008; Jones, 2003). In early human history there were no other options for infant feeding. The mother or another woman breast fed the infant, or the infant died. While the historical record is incomplete, it is acknowledged that there have been a number of attempts to create new ways of feeding infants to provide for those infants whose mothers were unable to breastfeed and no wet-nurse could be found. A cloth dipped in cow or goat milk has been written of, but the life expectancies for infants fed in this manner were limited (Doolan, 2008).

In the late 19th century, the invention of a rubber teat and the development of evaporated milk allowed a possible way to feed an infant without a woman (Doolan, 2008; Jones, 2003). There have been, over the years, adverse consequences to methods of artificial feeding; many reported in the media; but those consequences did not change the direction of breastfeeding (Doolan, 2008; Newton, 2000). Some physicians and other health professionals recognized that breast milk was superior to artificial sources and encouraged women to donate and "bank" their extra milk so that those infants needing human milk could have it, without a wet-nurse (Jones, 2003; Thorley, 2008). In the last 60 years, infant formula feeding has been equated to breast feeding by health care providers; with one considered equal to the other. Until recently there has been little evidence to challenge the belief in equality of breastmilk and formula (Miracle &

Freland, 2007; Miracle, Szucs, Torke, & Helft, 2011; Schanler, O'Connor, & Lawrence, 1999; Watkins & Dodgson, 2010).

By the 1960's, breastfeeding in the United States was at an all-time low, and artificial infant formulas proliferated (Jones, 2003; Carroll, 2014; Doolan, 2008). While full-term infants seemed to thrive on artificial formula, preterm infants were not as fortunate. Necrotizing enterocolitis, digestive issues, and other negative physiological responses were noted to increase with the lack of human milk feeding (Ganapathy et al., 2011;Perrine & Scanlon, 2013).

Challenging the Norm

Changes in the norms of the healthcare systems are being promulgated by many sources. Evidence-based practice is but one of the sources of these changes (Rosswurm & Larrabee, 1999). Clinical research and access to those findings provide evidence for changes from traditional, intuition and praxis-based custom, to evidence-based practice. Healthcare providers can become disconnected from evidence and their practice, and much of that dissonance has to do with personal attitudes and experience (Zhou, Stolzfus, Houldin, Parks, & Swan, 2010).

According to Perrine & Scanlon (2013), even with the increasing use of human milk in NICU's nationwide, only a third report that they routinely supply human milk to most of the infants in the NICU (Perrine & Scanlon, 2013, p. 1066; AAP Section on Breastfeeding, 2012; Centers for Disease Control and Prevention [CDC], 2013). A large number of preterm infants admitted to the NICU in the United States will experience their first feed with a high calorie, high protein artificial milk, fortified by a bovine protein base fortifier (Alles, Scholtens, & Bindels, 2004; Closa-Monasterolo et al., 2013). Given evidence that shows benefit from the exclusive use of human milk and human milk based fortification, and conversely a lack of similar benefit from artificial infant formula, many of these fragile and vulnerable infants. Being

fed formula, are not being given evidence-based care (Perrine & Scanlon, 2013; Quigley, Henderson, & Anthony, 2007).

The use of human milk in the NICU is well researched, and research shows that its use in decreases mortality and morbidities in the NICU preterm infants regardless of gestation (Ahrabi & Schanler, 2013; AAP Section on Breastfeeding, 2012; Agostoni & Manzoni, 2013; Bertino et al., 2013; Downard et al., 2012; Ganapathy et al., 2011). Based on the Centers for Disease Control and Preventions (CDC) National Maternity Practices in Infant Nutrition and Care (mPINC), Perrine & Scanlon (2013) reported that only a third of NICUs in the United States routinely provided human milk to > 90% of NICU infants receiving feedings (Perrine & Scanlon, 2013). This is a concerning statistic as research demonstrates the positive impact of the use of human milk with these infants (Kim, Chan, Vaucher, & Stellwagen, 2013). Furthermore, human milk is accessible to all medical facilities in the United States whether the infant's own mother's milk (OMM) or donor milk (DM) obtained through a human milk bank (Human Milk Banks of North America HMBNA) or a commercial vendor (Jones, 2003; Medo, 2013; Miracle et al., 2011).

Current practice in most NICUs includes a combination of feeding solutions for neonates. Extremely premature infants, who lack the ability to digest and have an alimentary tract that is subject to injury, are often kept NPO (Latin: "nil per os" meaning "Nothing by mouth") for several weeks after birth (Kim et al., 2013). Once enteral feedings are begun, they are accomplished by feeding tube, due to a combination of the infant's inability to suckle without burning needed calories and the difficulty of suck, swallow, and breathe coordination in the premature infant. When feedings are accomplished in this manner, the infant loses the benefits of immunological exposure as this manner of feeding bypass the oral-pharyngeal mucosa, which is

associated with better absorption and distribution of immunological factors (Gephart & Weller, 2014; Montgomery, Baer, & Christensen, 2010; Rodriguez, Groer, & Engstrom, 2010; Rodriguez et al., 2011). In a pilot study, conducted by Rodriguez et al. (2010) the safety of administering own mother's colostrum to extremely low birth weight infants established that the administration was safe, and that the infants tolerated the administration well (Rodriguez, Groer, & Engstrom, 2010). Specifically, these infants were <1000 grams, < 28 weeks gestation, and were determined to be appropriate for gestational age (AGA) (Rodriguez et al., 2010, p. 208). With this study, the indications were that the infants "tasted" their mother's milk and responded to the experience without dropping oxygen saturation, or decompensating in any way (Rodriguez et al., 2010).

While the evidence is clear that human milk is the best choice for feeding all infants, and particularly those who are premature, the question of why NICU infants are not routinely offered human milk continues. Human milk is beneficial to human infants; NICU infants receive the greatest benefit from a diet of human milk, but a gap in translating the evidence to practice remains (Bernaix et al., 2010; Ganapathy et al., 2011; Handa & Schanler, 2013; Hillenbrannd & Larsen, 2002; Hylander, Strobino, & Dhanireddy, 1998; Johnson, Correll, Greene, Hein, & McLaughlin, 2013; Kim et al., 2013; Kim & Froh, 2012; Lee et al., 2012; Matthew-Maich, Ploeg, Jack, & Dobbins, 2012; McGrath, 2007; Miracle & Freland, 2007; Neifert & Bunik, 2013; Perrine & Scanlon, 2013; Tudehope, 2013; Walker, Keene, & Patel, 2014; Watkins & Dodgson, 2010).

PICO Statement and research basis

PICO

PICO is an acronym that represents population (P) under study or observation; (I), the issue or intervention; (C) represents the comparison being studied, and (O) is the outcome that will result, or is anticipated to be the result of the study. When exploring a question of interest, a PICO is one of the first steps in developing the study. The problem statement resulting from this PICO is: "Among clinical healthcare providers in the Neonatal Intensive Care (NICU) setting, does participation in an educational intervention directed at increasing knowledge affect attitudes as well?"

The populations (P) explored in this study are those healthcare individuals who impact the decision of whether or not a mother is approached for supplying breast milk to her infant, or approached for consent to use donor milk for her infant. For this study, postings discussing the study were placed in the NICU, Mother/Baby Unit, and Labor and Delivery, as those are the places NICU healthcare providers might see them and consider participating in the study (Appendix B). The intervention (I) was based on an extensive review of the literature, and developed using a theoretical basis for the curriculum. Reviewing the literature assisted the investigator in identifying those factors that contribute to the current knowledge, evidence base, and reality of practice. From that review an educational intervention was developed using PowerPoint as a delivery tool. The pre-test and post-test were modified from a prior study and used with permission (Siddell, Marinelli, Froman, & Burke, 2003). The comparison (C) in this study was not holding the intervention and the NICU providers continuing to work as they had in the past. The outcome (O) was anticipated to be measurement of a change in knowledge and attitude in those providers for which change was a possibility.

Participants in the study were drawn from individuals in a Maternal Infant Department who provided direct care to NICU infants. These are healthcare providers in an academic

medical center Hospital X. The volunteers saw the posting which advertised the study (Appendix B) and became involved by answering a pre-test and placing it in a sealed box. Pre-testing was conducted for 10 days, allowing for all shifts and degree of providers to participate. Twenty days after the pre-tests were collected, the educational intervention began. Between shifts in the NICU, the PowerPoint was shown and questions were answered. This occurred four times over a two week period. The providers who participated in the educational intervention had the opportunity to take a post-test which was included in the handouts given to the participants during the intervention. Post-tests were place in a box at the end of the intervention and the box remained sealed throughout the period of the intervention. Once the last educational offering was concluded, the boxes containing the pre-test and post-tests were opened and the tabulation of data began.

Theoretical Framework

Theoretical Foundation

The theoretical foundation for this capstone project was originally suggested by two secondary sources; Ismail, et al. (2014), "Intention of pregnant women to exclusively breastfeed their infants: the role of beliefs in the theory of planned behavior". Reading this article supported a broad assumption that personal attitudes of healthcare providers inform their behavior, and "A theory of health promotion for preterm infants based on Levine's Conservation Model of nursing" by Mefford (2004), provided a nursing theory by which to create a theoretical foundation.

The investigator in this study wished to evaluate knowledge and attitudes in healthcare professionals, and chose to use both a behavioral and a nursing theory in the development of the theoretical framework. Zaccagnini & White (2011) suggest that research requires a framework

about which to build the investigation (Zaccagnini & White, 2011). Green (2014) discusses the framework as the set of relationships that exist between the concepts of interest (Green, 2014).

Behavioral Theory

As the foundation of the paper is addressing knowledge, attitudes, and behaviors that are a result of attributes, focusing on behavioral theory was essential to the framework. The theory of reasoned action and its extension, the theory of planned behavior were explored to create a viable model for the behavioral basis of the project. Ismail's (2014) article discusses the intention of mothers to breastfeed, and examines how intention affects behavior. This theory recognizes the translation of intention into behavior. Intention is developed from sources often unrecognized by the individual. Those influences include societal, cultural, childhood and adult experiences, personal beliefs and biases (Ismail, Muda, & Bakar, 2014). Fishbein and Ajzen (2010) recognized that intention (attitude) determines behavior (Ismail, Muda, & Bakar, 2013; Fishbein & Ajzen, 2010). Knowledge of evidence-based practice does not necessarily inform implementation. It is essential to understand why evidence is not always implemented. Therefore, the researcher poses the question; is it possible that clinicians are affected by intentions that unknowingly affect their behavior?

Observing the processes used to inform mothers of the need for their milk, or to obtain consent for donor milk, the researcher wondered if the processes were affected by clinicians' personal beliefs. According to Godin et al. (2008) in "Healthcare professionals' intention and behaviours: a systematic review of studies based on social cognitive theories", individual clinical decisions are central to adoption of evidence-based practices, and those decisions are filtered through a personal lens (Godin, Belanger-Gravel, Eccles, & Grimshaw, 2008). This particular

theory was chosen to partially explain the delay in implementation as well as the human factors that create the environment which prevents implementation.

Nursing Theory

Levine's conservation model is the nursing theory chosen for this project. Levine stresses the melding of the internal and the external environment, to meet the needs of the subject, in this case the preterm infant (Mefford, 2004; Mefford & Alligood, 2011). Human milk administration, as the positive internal influence, substantiated by multiple studies, applies to the goal of nursing under the Levine Conservation Model, promoting wholeness of the patient (Levine, 1969). The internal environments, including the "physiologic and pathophysiologic" processes, are directly affected by the use of human milk with these infants (Mefford, 2004, p. 260; Mefford & Alligood, 2011). Mefford's work (2008) supports the need for NICU providers to have a framework for their care. Levine's Conservation Theory espouses the belief that premature infants have multiple requirements to preserve the optimal environment in which they must live after being ejected from the uterus. Human milk supports the health of these premature infants by supplying a multitude of factors that assist the premature infant in meeting its physiologic needs, and decreasing morbidities associated with prematurity (Ahrabi & Schanler, 2013; Agostoni & Manzoni, 2013; Gephart & Weller, 2014; Hylander et al., 1998; Kim & Froh, 2012; Kotey & Spatz, 2013; Lanari et al., 2013; Martin et al., 2003; Seigel et al., 2013; Sisk, Lovelady, Dillard, Gruber, & O'Shea, 2007).

Both the behavioral theory and the nursing theory meld to meet the needs of this project, developing the knowledge using evidence and current research, and supporting a conservation model through supporting the preterm infant and the use of human milk to aid in decreasing physiologic stresses associated with artificial feedings (McCrory & Murray, 2013; Ghandehari,

Lee, & Rechtman, 2012; Hylander et al., 1998; Kotey & Spatz, 2013; Lanari et al., 2013; Manzoni et al., 2013; Schanler, 2007; Sisk et al., 2007; Sullivan et al., 2010; (Tudehope, 2013) .

Review of Evidence

Human milk consumption by preterm infants has been demonstrated in multiple trials to be the optimal choice for nutrition (AAP Section on Breastfeeding, 2012; Agostoni & Manzoni, 2013; Ahrabi & Schanler, 2013; Bertino et al., 2013; Ganapathy et al., 2011; Hylander et al., 1998; Kotey & Spatz, 2013; Manzoni et al., 2013; McCrory & Murray, 2013; Schanler, 2007; Sisk et al., 2007). There is a wealth of sources in the literature supporting the exclusive use of human milk and human milk products for the premature infant. The sources include medical, nutritional and biopsychosocial.

Premature infants are especially vulnerable to morbidities based on their immature vascular, pulmonary, gastrointestinal, and neurological systems. They are also subject to neglect and abuse due to the emotional toll prematurity takes on families and the financial toll these infants, their needs and disabilities create for the future. The evidence is profoundly persuasive enough that it is the belief of this investigator that to not use human milk exclusively with premature infants borders on the criminal. Much morbidity can be avoided or substantially decreased with the use of human milk and human milk based products. These morbidities include necrotizing enterocolitis (NEC), retinopathy of prematurity (ROP), ventricular bleeds, and diminished cognitive functioning (Ahrabi, 2013; Rodriguez, 2010; Sisk, 2007). Long term, the benefits of supporting premature infants with human milk include a decrease in obesity, an increase in intelligence, and preventing child abuse (Spatz, 2014; Kotey, 2013; McCrory, 2013). With this extensive evidence, it is notable that only a third of hospitals in the Unites States

provide human milk, either mother's own milk, or donor milk, routinely to their infants (Perrine & Scanlon, 2013). This evidence raises the question: What are the existing barriers to using human milk?

Databases used for the literature review included Academic Search Premier, CINAHL with Full Text, ERIC, MEDLINE, PsycINFO, and PubMed. **U**sing the keywords; preterm infants, human milk, infant nutrition, breast milk, NICU, and phrases combining these words, the search yielded multiple articles. One such article was a Cochran Review from 2007 reviewing articles on formula versus donor breast milk for preterm infants (Quigley, Henderson, Anthony, & McGuire, 2007). The Cochran review suggested other articles which were retrieved and reviewed. A search of literature using the terms NICU and breast milk offered articles of great interest to the issue of human milk and the NICU infant. Most of these articles yielded references which led to other articles. While it is strongly recommended that all scholarly articles be peer reviewed and current within the last five years of publication, it was necessary to explore articles much older to gather enough data to encompass the historical data needed for a full assessment of the current practice dictates (Zaccagnini & White, 2011). Review of the literature was extensive, comprehensive, and international in scope, and included nursing, medical, social, psychological, and nutritional works. Specific areas of interest developed from this review of the literature: nutritional aspects of human milk, including donor milk once pasteurized; decreases in morbidities in the premature infant population with the use of a human milk diet; and the use of colostrum in decreasing late onset sepsis and necrotizing enterocolitis in premature infants.

Nutritional Aspects of Human Milk

Several studies identify specific nutritional aspects of human milk. Human milk is continually evaluated and new factors in human milk are continually being discovered. Martin,

(2003) discussed the discovery of lactic acid bacteria in human milk and its benefit to the preterm infant. Tudehope (2013), writing for Mead Johnson, (a formula producing company), discussed the nutritional needs of preterm infants; the needs met by human milk, and the role of human milk in the nutritional support of the preterm infants growth and development. Surprisingly, not all of the constituents in human milk can be identified. Every mother produces slightly different milk for every feed. Like snowflakes, no two mothers' milk is alike. (Martin et al., 2003; Tudehope, 2013; Ahrabi & Schanler, 2013; Ballard & Marrow, 2013; Boersma, Offrings, Muskiet, & Chase, 1991; Gephart & Weller, 2014; Kim & Froh, 2012; Schanler, 2007).

Human milk and the effect on morbidities

Concerning the topic of reducing morbidities in the NICU population, McCrory & Murray (2012) discussed how breastfeeding in general affects neuro-development, and Kotey & Spatz (2013) explore human milk and its role in white matter injury in preterm infants. White matter injury is a common morbidity in preterm infants, especially extremely preterm infants at < 28 weeks gestation. As medical technology has advanced survivability of extremely premature infants, survival of infants on the very edge of viability has increased; and along with the survival we have seen more white matter (cerebral) injury. Human milk may be protect infants from white matter injury.

Necrotizing enterocolitis (NEC) is another morbidity associated with prematurity. McGuire & Anthony (2003); Ganapathy, Hay, & Kim (2012); Sullivan et al. (2010); Sisk et al. (2007); and Martin, et al. (2003) have all studied and discuss at length the role of human milk in preventing NEC. Sullivan, et al, (2010) discusses the specifics of the effect human milk has on decreasing and possibly preventing the occurrence of NEC in the preterm population. NEC is a common and serious, potentially life threatening morbidity associated with the premature gut and

the diseased gut when the infant has suffered a hypoxic injury. The article compares human milk and human milk products and bovine–based products. The conclusion is that human milk is superior to bovine milk-based products in the prevention of NEC. As NEC is occasionally seen in late preterm infants (those infants 34 6/7 – 36 6/7 weeks gestation), as well as early term infants (37 – 38 6/7 weeks gestation), and research suggests that since it is rarely seen in exclusively breastfed infants, researchers propose that human milk may help prevent the incidence of NEC in all infants.

Hylander et al.(1998) wrote of the decreased incidence of septic infection noted in very low birth weight infants fed a diet of human milk, and Manzoni et al. (2013) saw a decrease in retinopathy of prematurity (ROP) in infants fed a diet of human milk and discusses vascular injury prevention as a contributing factor.

Human milk's ability to prevent vascular injury in preterm infants, specifically retinopathy of prematurity (ROP) is explored in an Italian study completed by Manzoni, et al. (2013). These are some of the morbidities that have been well researched with regard to the positive effects of an exclusive human milk diet in premature infants. Arslanoglu et al. (2010) summarized the clinical benefits of human milk, including donor milk, in preterm infants and discusses common concerns. They conclude their article by stating that human milk is a human right and recommend its use, second only to own mother's milk, in the NICU population.

Strathearn, et al. (2009) looked at child abuse and neglect in an extensive 15 year cohort and suggested that breastfeeding appears to decrease the incidence of maternal abuse and neglect over a long period of time. Spatz (2013) posits that using human milk, and breastfeeding infants could contribute to a decrease of obesity, contributing to population health.

Colostrum

In 2009 Rodriguez, et al. published an article in the Journal of Perinatology about using colostrum in extremely low birth weight, extremely premature infants as oral care preventing infection and supporting the immune system. While revolutionary at the time of publication, oropharyngeal administration of mother's colostrum has become widely accepted as evidence-based practice. It is practiced in many NICUs as a preventive and supportive therapeutic adjunct to other medications and has demonstrated no harm and positive benefit to preterm infants. Seigel et al. (2013), Montgomery et al. (2010), Gephart & Weller (2014) have duplicated, validated and published their own findings on the use of colostrum as therapy.

The study of the advantages of using human milk in the preterm population is an ongoing focus for neonatal, bacteriological, and nutritional research. The history of breastfeeding in the United States has created beliefs and behaviors that do not necessarily benefit the population which stands to profit most from exclusive human milk use; the premature infant. These beliefs and behaviors are a factor in how the use of human milk is addressed the NICU.

To summarize the literature review results, all involved stakeholders are positively impacted when an organization seeks to implement evidence-based practice. Using the evidence available and providing an educational intervention to promote the use of human milk in the NICU based on the evidence, stakeholders benefit. Developing an awareness of the potential unconscious factors that impact their attitudes, and consequently impact their behavior will benefit the providers who care for these infants. The mothers and the infants benefit by having the opportunity for an informed, compassionate choice of feedings. Ultimately, as knowledge grows and attitudes change, population health may be impacted by the decrease in morbidities prevented by the use of human milk with the preterm infant population.

Project Plan and Evaluation

Market/Risk Analysis

This project is an attempt to identify barriers to the delivery of human milk to infants in the NICU. One of the risks identified is the mother, her desire, willingness and /or ability to provide milk to her infant while in the NICU. This risk also involves NICU healthcare providers. For mother's to provide milk, they must be educated as to the need, how to go about providing their milk, the effect of human milk on their infant, and if needed, give consent for the use of donor milk to supplement their own milk. This is a risk that is provider dependent. Mothers may be fearful or uncomfortable with the idea of donor milk, and the explanations to the mothers must be sensitive and encompass risks and benefits to both the mother and the infant (Arslanoglu et al., 2013; Bertino et al., 2013; Ganapathy et al., 2011; Gephart & Weller, 2014; Johnson et al., 2013; Kim & Froh, 2012; Kim et al., 2013; Lee et al., 2012; Maayan-Metzger, Avivi, Schushan-Eisen, & Kuint, 2012; Manzoni et al., 2013; McCrory & Murray, 2013; McGrath, 2007; Miracle & Freland, 2007; Montgomery et al., 2010; Neifert & Bunik, 2013; Nelson, 2013; Parish & Bhatia, 2008; Parker, Krueger, Sullivan, Kelechi, & Muller, 2012; Quigley et al., 2007; Rechtman, 2012; Rodriguez et al., 2010; Rodriguez et al., 2011; Rodriguez, Meier, Groer, & Zeller, 2009; Seigel et al., 2013). Occasionally mothers of infants present with social complications that prevent use of their milk, for example HIV positive or recreational drug positive women, and the staff must deal with these women in a sensitive and caring manner, weighing what is best for the infant and mother. Sporadically, the values of the provider conflict with those of the mother and another risk develops (Johnson et al., 2013; Kim et al., 2013; Matthew-Maich et al., 2012; McGrath, 2007; Schanler et al., 1999).

SWOT Analysis: Strengths and Weaknesses

The noted internal strengths of this project are that the project is being conducted in a

research-intensive practice setting utilizing cutting edge technology; the clinical facility is a Magnet and Baby Friendly Hospital designation seeking organization. These strengths assist in the conduct of research.

The internal weaknesses identified include the location of the facility. The downtown location and lack of public transportation impacts the mother's ability to return to the facility and bring milk for her infant. There is often a lack of family support, an attitude of the needlessness of providing milk when formula is available to the infant. The facility lacks space to house the mother desiring to directly or indirectly breastfeed her infant necessitating travel to and from the facility; and there are no child care accommodations, if the mother has other children (Chertok, McCrone, Parker, & Leslie, 2014). These are a few of the considerations related to the mother and the provision of breast milk. Another identified weakness related to this project is the demographics of the healthcare providers. Physicians receive little if any formal instruction regarding the importance and value of human milk for the preterm infant (Handa & Schanler, 2013; Hillenbrannd & Larsen, 2002; Johnson et al., 2013; Godin et al., 2008). Many of the nurses working in the NICU, (20 of the 26 involved in the project) have been in their positions for greater than ten years. The impact of this seniority can be stifling when trying to introduce new concepts to the staff. Often new learning is viewed with a jaundiced eye by the senior and most experienced staff, creating hesitancy on the part of other staff to pursue new ideas (Godin et al., 2008; Kim et al., 2013; Levine & Lowe, 2014; Matthew-Maich et al., 2012; Meier, Patel, Bigger, Rossman, & Engstrom, 2013; Neifert & Bunik, 2013; Siddell, Marinelli, Froman, & Burke, 2003;Watkins & Dodgson, 2010).

Patient cultural experience is also a factor and weighed as a weakness in this facility. This inner-city facility serves a high-risk population and draws from uninsured and underinsured

populations. Among those are many women from many different ethnic origins who see American culture as a formula feeding culture and desire to meet that mainstream ideal for their infants, and thus request formula for their babies. The facility is older, has a crowded footprint in the NICU and the ward style rooms do not promote privacy. Lastly the facility is an academic medical center in the South and remains very traditional in the medical/nursing environment. This hierarchal environment does not lead itself to less traditional ideas about infant care.

These particular weaknesses are pointed out for a range of reasons: the downtown location makes it difficult for NICU moms to return to the hospital if they happen to lack reliable transportation, or have other children at home and are in need of child care. The facility is space limited and there are not provisions for childcare, or a safe child care environment. There are no border facilities, although the facility attempts to provide free space for mothers who are supplying milk for their infants. Cultural considerations are very important to note as the facility serves a very diverse population and many of the families have limited English proficiency, and even with the use of translators have some suspicion of the safety of donor milk, may not understand its value, and some staff lack the desire to spend the time to explain to these patients what they can offer their vulnerable infants.

Long term staff, while a great advantage in knowledge and skill proficiency, often has preconceived beliefs that effect their communication and adoption of newer practices.
The traditional, hierarchal nature of the facility means that the medical provider must be in support of providing human milk to the infant, and the nursing staff can have difficulty communicating EBP to the medical staff.

Cost of donor milk is also an identified weakness, the average cost per ounce of frozen donor milk from a certified milk bank is $4.50 an ounce, and the cost of all human milk and

human milk products are born by the hospital, creating an impact on the budget, while suppliers of infant milk formula provide that free to the hospital (personal knowledge of budget processes in this facility). While the identified risks are not singular to this facility, they are some of the internal risks to the success of the project.

External strengths identified include substantial medical, nursing and public health evidence favoring the value of human milk. One of the external weaknesses identified is the community culture, which is non-breastfeeding.

SWOT Analysis: Opportunities and Threats

The current robust evidence in favor of human milk is the greatest identified opportunity. National and international professional organizations support the use of human milk for infant nutrition, and public health professionals including the Surgeon General of the United States have formally determined that the public health of infants is best supported by a diet of human milk (AAP Section on Breastfeeding, 2012; CDC, 2013; U.S. Department of Health and Human Services, 2011).

Threats to the use of human milk include the aforementioned cost of donor milk and human milk-based fortifier, as well as a community in which the standard is formula rather than breastfeeding.

Driving and restraining forces

Driving and restraining forces include the identified gaps in evidence-based practices, public health considerations, and patient care outcomes. Restraining forces include patient and provider perceptions of the importance of a human milk-based diet for NICU infants, cost to the facilities involved in a drive for increased human milk intake, and finally the providers who face different standards of care in multiple facilities.

In order to address these needs it is necessary to evaluate the feasibility of a change in practice. Promoting human milk-based diet requires commitment on the institutional level, strong evidence, and provider investment in change of practice (Handa & Schanler, 2013; Kim et al., 2013). Magnet hospital designation is predicated on the use of evidence-based practices, and Baby Friendly Hospital designation mandates that at least 80% of birthing mothers be educated and encouraged to breastfeed their infants. These are strong incentives for medical facilities to support current evidence-based practices (EBP) including the provision of human milk to NICU infants. Once committed to these EBP, sustainability is no longer at issue. Educating staff is initially daunting but once hardwired into the culture it will be sustained with on-boarding expectations.

Stakeholders and Project Team

This is a project which is in the hands of one primary investigator. Support is given by the facility, the providers and staff of the facility. Stakeholders include the mothers of infants cared for in the NICU, the preterm infants under care, the providers, (Doctors, Fellows, neonatal nurse practitioners (NNP's), nurses and milk techs), and the general public who, although they may be unaware help to bear the cost of the preterm infant, both in the initial hospitalization, and often for years to come.

Cost-Benefit Analysis

The PI for this project incurred little cost in the creation of the project; the estimated cost for the project to be reproduced in a similar setting is approximately $5600.00 (Appendix G). This estimate includes the cost of paper materials, rental of an educational space and equipment to provide the education, as well as the salaries for the participants, where applicable.

Another cost that would be an indirect result of this project should it be successful, is that of donor milk which costs $4.50/oz., the average infant moves from consuming 4 oz./day to 188 oz/day creating a substantial, non-reimbursable cost to the hospital that provides the donor milk. Human milk-based fortifier costs this individual facility $6.44/mL (Personal communication Prolacta, 2014). There is only one company in the United States from which human milk-based fortifier can be obtained, and for many hospitals the cost is prohibitive. Ideally, a 23 week infant would use 1mL of colostrum every 3-4 hours; by the time the infant is 2 weeks old, (gestational age 25 weeks) that amount might rise to 6 mL every 3 hours. By the time an infant is on full feeds, they will consume 60 – 120 mL/every 2 -3 hours, for the same micro-preemie, that would be 14 mL every 3 hours. The total of all oral feeds by week 38 of gestation is 14,193 mL or 1473 ounces. The cost, between mother providing colostrums an her own milk for two weeks (free), using donor milk and Prolacta (human milk-based fortifier) as needed to supplement and fortify as appropriate for gestational age and nutritional needs, comes out to approximately $5000 – $7000. The cost of one case of NEC can be $50,000 (or greater) in addition to the other charges the hospitalization of the infant incurs. This is especially significant when formula companies provide infant formula to hospitals at little or no cost. By providing infant formula, the formula companies are subliminally encouraging hospitals to use formula (free) instead of human milk (at a cost) (Hodek, Von der Schulenburg, & Mittendorf, 2011; personal communication with NICU dietician).

Benefits, should the intervention be successful, are not measurable, but can be estimated. Decreasing morbidities to infants who benefit from the administration of human milk and human milk-based products, could top $50,000.00 average per infant benefiting (Ganapathy et al., 2011; Maayan-Metzger et al., 2012; McCrory & Murray, 2013; Parker et al., 2012). The public benefits

because the cost of infants in the NICU and the long term effects of prematurity are massive in comparison to a term infant. The mother reaps a benefit that cannot be quantified as she gives her baby the one medicine that no one else can give, her milk, created for her infant (Chertok et al., 2014; Lanari et al., 2013; Rodriguez et al., 2010).

Mission, vision and goals

The mission for this project dovetails nicely with the mission of the involved NICU. The project mission is: to provide current, evidence based education promoting and validating the importance of the use of human milk in the NICU premature infant population, while the mission of the unit is: to provide inpatient and outpatient hospital based services which meet patient and community needs, while supporting the educational and research missions of the University of Louisville's Health Sciences Center. The chosen vision for this project is: all premature infants will receive human milk in the NICU, their Own Mothers Milk (OMM) or Donor Milk (DM), for the length of the NICU stay. This vision is based on the evidence that human milk is best for human infants, and while only a vision, it is the vision the PI would hope that the future will bring. Objectives for the project were 1) Present an educational intervention which will offer evidence-based information to a voluntary group of participants; 2) Examine the outcome of the data specific to areas of biases in attitude; and 3) Determine if educational preparation of participants influences knowledge and attitudes. The overarching goal for this undertaking was to determine knowledge deficits, and attitude focuses with a plan to share this information with the educational leadership of the unit.

Capstone Project Process

This project seeks to measure changes in knowledge and attitudes following an educational intervention. After extensive review of the research, a draft proposal was created

which eventually became the project proposal, and then the IRB proposal. A curriculum, pre and post-test were developed from the literature, and encompassed the emotional aspects of the provider's interactions with mothers, evidence that should guide practice, and the goals of increasing and sustaining increased human milk use in the NICU.

The questionnaire used for the project was developed by the primary investigator (PI) based on a questionnaire developed by Siddell, et al. (2003) (used with permission, Appendix D) and modified to include terms commonly used in the research population. An announcement was posted on the bulletin boards of the units of Hospital X announcing the need for volunteers (Appendix B) for the capstone project. Five days after the announcement was posted, folders were posted that contained the pre-test, sealable envelopes, and instructions to participants, as well as sealed boxes posted in the three units for the pretest. Pre-testing was given 14 days, then the folders, pretests, and boxes were collected. The boxes containing the pre-tests were placed in a locked office to be opened after the educational intervention and the post-testing was completed. Three weeks after the collection of the pre-tests, the educational interventions began. Four educational intervention sessions were conducted; post-tests were collected after each session. Once the final educational intervention was completed, the boxes were opened, and pre and post-tests were matched. Thirty- seven pre-tests were returned, and twenty- six post tests could be matched using demographic questions. Once the twenty-six pre and post-tests matched in all areas of demographics, the unmatched tests were set aside. The pre-test/post-test pairs were labeled pre-test 1 – 26, post-test 1-26, and reviewed for matched demographics, and evaluation began. The balance of the un-matched tests were shredded to prevent possible inclusion in the study.

The first step in evaluation was to develop an Excel spreadsheet with the comparison of the pre-and post-tests. Columns were divided into the demographic questions. Question 1 asked for the participant to give a response of age in years, the choices being 22-29, 30-39, 40 – 49, and greater than 50 years. Question 2 asked for educational level at the time of participation in the study; choices included Associate Degree (ADN), Diploma, Bachelor Degree (BSN), Master's Degree (MSN) and Medical Degree, (MD), as all of these educational levels of individuals are employed in the care of infants in the NICU and have direct patient care contact with the mothers of those infants. The next question, question 3 asked the participant to indicate the years in their current position, 0-5 years, 6-10 years, 11-15 years, 16-20 years and greater than 20 years. Question 4 asked for self-identification of professional certification, this was to be responded to in either yes or no response. The next two questions were asked as they would be used as definers in the matching process. Question 5 asked if the respondent had personal breastfeeding experience. Question 6 asked that positive respondents to question 5 indicate if they were satisfied with their personal breastfeeding experience. These demographics were used to match pre-tests to post-tests thus supplying matched documents for the study. Once the pre and post-tests were matched and labeled, those pre and/or post-tests that did not have matches were shredded to prevent accidental inclusion in the test results.

Next was the tabulation of results. The matched tests were placed in academic degree order first and all responses tallied for each degree level. The results were then added for each question in each degree level and the answers tabulated into the mean of those answers to normalize and equalize the results. The raw results were visually reviewed and re-tabulated to avoid errors in addition and division. Once this had been done by hand, the results were entered into the excel spreadsheet and the calculation re-created in excel.

Once all of the answers to all questions were tabulated and reviewed, the questions and responses were sorted into the primary variables of knowledge and attitude. The knowledge questions numbered 7,1,15, 19, 22, 24 and 15; were tabulated and divided into pre and post- test responses according to educational levels. The balance of the questions were attitude questions, and those were divided into breastfeeding focused questions, baby care focused questions, and nurse care focused questions, and were also separated into pre and post- test responses by educational degree. The attitude division was based on a similar division in the Siddell et al. (2003) study and complimented the behavioral theory used in this study (Siddell, Marinelli, Froman, & Burke, 2003).

Logic Model

Creating a logic model for the project involved looking at the steps of the process. Identification of a practice issue or problem, evaluating the practice environment, examination of the literature, assessment of the local statistics, analyze the benefits derived if the project is implemented, and asking the question that leads to the project. Once that is completed, it is necessary to look at the driving and restraining forces and focus on outcomes. This logic model drives the shape the project takes and assists with focus for the researcher (Appendix F).

Population and Sampling Parameters

The populations involved in this project includes clinical providers in a Level III Neonatal Intensive Care Unit (NICU); Associate, Bachelors, Masters prepared registered nurses, Neonatal Nurse Practitioners, (MSN and DNP), Doctors of Medicine specializing in neonatology and pediatrics, MD Fellows (post-graduate), and medical residents. Also included are Mother/Baby, and Labor and Delivery nurses who float to the NICU and care for infants. The secondary population includes the mothers and families of the infants in the NICU, and the

infants who may benefit from the project. Sampling is accomplished by the voluntary participation of individuals who qualified by inclusions and self-selected into the project.

Appropriateness of Setting for Evidence-based Practice Project

The setting for this capstone evidence-based practice project is located in a southeastern regional academic medical and trauma care facility. This acute care setting provides clinical learning opportunities for the students of a state-funded and research-intensive university. The NICU has a 24 bed capacity, 16 Level III beds and 8 Level II beds. Admissions to the NICU are neonates from as early as 23 weeks, at the edge of viability, to term infants with complications. Nurses at this location care for an underserved population with disparate health care access, which can be a challenging situation. As an innovative and research-focused level-one trauma center, this clinical practice setting is ideal for this capstone project.

Evidence-based Practice Project: Design Methodology

Design methodology for this project is pre-test/post-test repeated measures. The results will be used to inform gaps in practice and beliefs. IRB approvals were sought from the clinical institution and Regis University. Both institutions gave IRB approval to the project. The instrument was adapted and modified (with permission; Appendix D) from a study of a similar nature by Sidell et al. (2003). The instrument was validated in the prior study, and for purposes of this study a response of agree to a positive question or disagree to a reverse worded question indicated a positive response. The primary purpose of this project was to evaluate the impact of an educational intervention on NICU clinical providers. The investigator hopes the education offered in the intervention will affect knowledge and attitudes among participants. Ultimately this information will become evidence-based practice, creating an environment in which the use of human milk is supported and encouraged. It is hoped also that through efforts of the medical

and nursing community, human milk provision will become standard of care in NICU's. The investigator also looks at the educational preparation of the participants to determine if education is a factor in knowledge of the value of human milk, and attitudes about the use of human milk in the NICU.

Evidence-based Practice Project: Measurement of Results

Descriptive statistics were used for statistical analysis. Paired *t*-tests were used to look at pre and post test results and evaluate the effectiveness of the intervention. The demographic portion of the questionnaire was used to separate responses into educational levels for evaluation as groups. Test results were then compared for outcomes of interest (Appendix H).

Protection of Human Rights: Procedure

After completing the CITI training modules on this topic, the author understood that this study was exempt due to the de-identified nature of the questionnaire. All appropriate cautions were added to the announcement of the project, including the description of the project, and what is needed to participate. Information including contact information for the investigator and the Capstone Chair was prominent on the flyer, and posted prior to the collection of pre-tests (Appendix B).

D**ata Collection and Treatment Procedure**

After all Institutional Review Board approvals were obtained by the student author's academic University and the practice setting site, the data collection process began. Five days after the announcement was posted, folders were displayed in the various target areas, which contained the pre-test, sealable envelopes, and instructions to participants. At the same time the folders were put out on the units, sealed boxes for collection of the pre-tests were placed in target

and highly visible locations. Fourteen days after the folders were placed on the units, pre-testing was considered complete. Folders, pretests, and boxes were collected. Four boxes containing the pre-tests were placed in the investigator's locked office. Three weeks after the collection of the pre-tests, the educational interventions began. Four educational intervention sessions were conducted; post-tests were collected after each session. When the final educational intervention was completed, and those post-tests collected, the boxes were opened. Pre-tests were removed from their envelopes, and matching the tests began. A total of thirty-seven pre-tests were returned and twenty- six posttests. Matching demographics involved comparing the seven demographic questions on the pre-test with those on the posttests and matching them precisely. Once the twenty-six pre and post-tests matched in all areas of demographics, the unmatched tests were set aside. The pre-test/post-test pairs were labeled pre-test 1 – 26, post-test 1-26, and reviewed for matched demographics, and evaluation began. The un-matched tests were shredded to prevent accidental inclusion in the study. The final step in preparation for the results was to create an excel spreadsheet with the comparison questions and divided into rows for each educational level.

Instrumentation Validity and Intended Statistics

The questionnaire used was designed to evaluate basic breastfeeding knowledge and understanding of the properties of human milk. Attitude questions were designed to determine if the respondent was breastfeeding focused, baby focused, or nurse task focused. Several questions were asked in reverse requiring the participant to think through the question, and respond in the negative to indicate a positive attitude. Paired *t*-tests are used to compare the pre and posttest results, to determine if there is an overall change, and then to compare educational levels to ascertain if there are differences between them.

Project Findings and Results

Objective I: Present an educational intervention which will offer evidence-based information to a voluntary group of participants. For this objective, a curriculum of current evidence was compiled and a PowerPoint presentation was developed. Four presentations were scheduled and completed for voluntary participation. The first presentation was well attended the other three moderately attended. All participants were asked to complete a posttest, but not all did. The presentations were well received and the questions asked following were balanced between attitude type questions, "What about the drug addict? She may be clean when she delivers, but what if she starts using again?", and knowledge questions and statements, "I had no idea colostrum was so important". When evaluating the posttests, only nurses completed them even though at least one physician, two fellows and two NNP's attended presentations.

Objective II: Examine the outcome of the data specific to areas of biases in attitude. Twenty-six matched pre and posttest were used in the tabulation of data. From those, sixteen were BSN graduates, six were Associates degreed, and four were Diploma graduates. Age rages included 22-29 (N=5), 30-39 (N=5), 40-49 (N=6) and >50 (N=10); years of experience, 0-5 years (N=6), 6-10 years (N=7), 11-15 years (N=3), 16 – 20 years (N=1) and > 20 years (N=9). Attitude questions included four question directed at a breastfeeding focus (N=4), baby focused (N=5), and nurse task focus, (N=3). The results of the attitude questions, pre-test compared to the posttest data demonstrated significance ($p \leq 0.001$) in all areas, except on the baby focused data which demonstrated significance ($p \leq 0.05$). This was an interesting finding as one of the observations noted in discussions with NICU staff include statements that show a sense of possession of the babies in the NICU, "That's my baby", as opposed to "that's my patient" this is

a phenomena often seen with infant patients, and can create a sense of competition with the natural mother. Knowledge data demonstrated significance ($p<0.001$) when pretest and posttest data was compared using 2 tailed paired *t*-tests.

Objective III: Educational preparation of participants influences knowledge and attitudes. The most interesting finding was the comparison of data with regard to educational preparation. Using the paired t-test, significance is demonstrated for the overall scores at 95% confidence interval. Individual group results fail to show significance for Diploma and BSN prepared nurses in the knowledge focused questions, suggesting that educational information presented has been previously internalized by these nurses. The results also suggest that Associates Degree prepared nurses demonstrate less knowledge-based information on the value and importance of human milk, and may benefit from further educational opportunities. The clinical site has not hired A.D.N.'s in more than five years, causing the investigator to conclude that the six A.D.N.'s are likely to be older, and perhaps less open to new knowledge. This finding would suggest an opportunity for further research in this area.

Validity of Statistical Data Analysis

The study's design included the use of descriptive statistics for this evidence-based practice project. Measurement of changes in knowledge and attitude are the focus of this project. Extraneous variables impact knowledge and attitude, some of these variables cannot be accounted for in statistical analysis. In an attempt to balance variables, however, demographic data captured age, personal experience with breastfeeding (yes N=15, no N=11), and satisfaction with personal breastfeeding experience (yes N=14, no N=1). Variables that cannot be quantified easily include cultural and personal beliefs and feelings. Based on the obtained results, this project demonstrates a positive impact on attitudes and knowledge when given information.

Significance is determined by the results of the pre-test/post-test data. Furthermore, it can be assumes that the educational intervention had an impact on the participating staff at this clinical site, as outlined in the PICO question.

Evidence-based Practice Question: Discussion of Results

A project of this nature, designed to evaluate a change in knowledge and attitudes, leads to more questions than it offers answers. While the factual information is gleaned from current and significant evidence, attitudes are developed over long periods of time, and influenced by personal experiences. Support from the evidence address the influence of personal experience (Carroll, 2014: Bernaix et al., 2010; Fishbein & Ajzen, 2010; Godin et al., 2008; Hillenbrannd & Larsen, 2002; Ismail et al., 2014; Johnson et al., 2013; Kim et al., 2013; Levine & Lowe, 2014). Since the intention of this project was to offer information, and see if information affected attitudes, it was of great interest to note that only the Associates nurses showed significance in knowledge based question. That information begs the question of the basic education; are associates prepared nurses given any information concerning breastfeeding or human milk in their content? Or, do nurses who fail to obtain advanced degrees assimilate new information differently? One of the results from this study validated the clinical site's decision to no longer hire A.D.N.'s, but also suggests that information about the importance of breastfeeding and the use of human milk be added to the orientation of all nurses in this clinical site. It would be interesting to revisit this study with staff in five years' time to evaluate those results compared with the results obtained in this study.

Limitations/Recommendations/Implications for Practice Change

In any study, threats to the reliability and validity in the analysis of the outcomes data being reviewed are a consideration. Low statistical power related to the small sample size is a

factor of interest for this capstone project. The noted limitations of this study include the small sample size, (N=26), and the low statistical power. Power analysis recommended a sample size of 67 to meet power and significance.

Education and orientation of nurses needs to include information on personal beliefs and the effect those beliefs have on behavior, body language, and perhaps the choice of words and actions. It is not enough to simply talk about communication. Breastfeeding, and the use of human milk in the NICU are sensitive and personal issues to many people and must be discussed openly and frankly to influence the actions of nurses. Another recommendation is that education needs to be updated frequently. It is not enough to orient staff to the norms of the unit, it is vital that those norms be reviewed and changed as evidence dictates. Staff needs to have the opportunity to discuss their personal beliefs and attitudes openly. Finally, further study of this cohort would be valuable. Most medical facilities will have a similar mix of education, experience, age, and personal belief systems; it is valuable to dissect these factors to improve evidence-based care.

Another recommendation prompted by this capstone project is the thought that donor milk should be reimbursable to the hospital. One of the barriers to the use of human milk is the cost, and if the cost were factored into the chargeable items for care in the NICU, there might be a significant increase in the use of donor milk in the United States. This recommendation was not included in the original planning for the project, but developed out of the extensive review of the literature and the realization that morbidities could be greatly reduced with an increased use of human milk with these very fragile, vulnerable infants.

Conclusion

This project was developed following a discussion with NICU staff about breastfeeding.

A Journal Club presentation regarding oral care with colostrum further fostered interest in the topic (Montgomery et al., 2010). Analysis of the trends in breastfeeding and the use of donor milk in the NICU at this clinical site, suggested the opportunity for this capstone project. The information was well received by the staff and the month after the education presentation use of human milk in this clinical site NICU went from 64% to 91%. While there is no way possible to determine if this increase was due to the education, an improvement in documentation, or a temporary increase, it is of interest and this statistic will continue to be monitored.

Appendices

Appendix A

Systematic review of the Literature

Student Name: Frances Smith

Systematic Review Evidence Table Format [adapted with permission from Thompson, C. (2011). Sample evidence table format for a systematic review. In J. Houser & K. S. Oman (Eds.), *Evidence-based practice: An implementation guide for healthcare organizations* (p. 155). Sudbury, MA: Jones and Bartlett.

Author/Year Article Title and Journal	**Database and Keywords Funding Source**	**Research Design and Level of Evidence**	**Study Aim/Purpose**	**Population Studied/Sample Size/Criteria/ Power**	**Methods/Study Appraisal/ Synthesis Methods**	**Primary Outcome Measures and Results**	**Author Conclusions/ Implications of Key Findings**	**Strengths/ Limitations**	**Comments**
Ajzen, I. (2002). Perceived Behavioral Control, Self-Efficacy, Locus of Control, and the Theory of Planned Behavior. *Journal of Applied Social Psychology, 32* , 665-683.	CINAHL: Theory of planned behavior, attitudes and behavior	Level VII	N/A	N/A	N/A	N/A	Individuals perceive that they control their behavior when in fact there are many contributing factors to behavior.	Authors own theory is being discussed	Foundational article for theoretical framework
American Academy of Pediatrics(AAP)(2012) Policy Statement: Breastfeeding and the use of human milk. *Pediatrics 129,* 827-841. 10.1542/peds.2011-3552	CINAHL: Breastfeeding, human milk	Policy Statement Level VII	AAP recommendation based on research evidence	N/A	Compilation of evidence	N/A	AAP recommends the use of human milk in the nutrition of human infants, confirming that this is a health issue	Excellent support for the use of human milk; only a recommendation and no mandate	This is an issue explored in the research for the capstone project. The AAP recommends the use of human milk, why does formula remain the mainstay of nutrition in NICU's?

Student Name: Frances Smith

Agostoni, C. & Manzoni, P.(2013). Nutrition and neurocognitiative development. *Early Human Development, 89S1* , s1-s3.	CINAHL; breast milk, nutrition, infant nutrition	Editorial Level VII	Discussion on the role of nutrition in neurocognitive development; comparing breast milk to infant formula.	N/A	N/A	N/A	Supports the goal of developing nutritional plans for preterm infants to maximize growth and prevent metabolic impairments.	Factual data presented and well referenced	
Alles, M.S., Scholtens, P.A., & Bindels, J.G. (2004). Current trends in the composition of infant milk formulas. *Current Pediatrics, 14* , 51-63.	CINAHL: Infant nutrition, infant formula, composition of infant formula	Paper outlines new developments in infant formulas Level VII	Exploration of composition of infant formulas	European Union requirement	N/A	N/A	Vitally important to develop standards for infant formulas beyond those currently in place	Well documented and referenced support of infant formulas as second choice for human nutrition.	Excellent explanation of the composition of infant formulas, determines that breast milk is best source of nutrition but that infant formulas have to mimic as closely as possible.

Student Name: Frances Smith

Arslanoglu, S., Corpeleijn, W., Moro, G., Braegger, C., Campoy, C., Colomb, V., Decsi, T., Domellöf, M., Fewtrell, M., Hojsak, I., Mihatsch, W., Mølgaard, C., Shamir, R., Turch, D., & van Goudoever, J. ESPGHAN Committee on Nutrition, (2013). Donor human milk for preterm infants: Current evidence and research directions. JPGN, 57, 4, 535-542.	CINAHL: Infant nutrition, Donor milk, human milk, preterm infant nutrition	Society Commentary Level VII	Position Paper	N/A	Literature review includes multiple studies with conclusions on each aspect of Review of the literature	Donor milk is superior to formula in prevention of NEC	Donor milk is second best to own mothers milk, but nutritionally superior to infant formula in protecting against NEC, associated with slower growth	Well reviewed studies and findings, well referenced	Full recommendation of own mothers milk as the preferred choice for infant nutrition; supports the use of donor human milk as a second choice and formula, properly fortified as a third.
Arslanoglu, S., Ziegler, E.E., Moro, G.E., & WAPM working group on nutrition (2010). Donor milk in preterm infant feeding: evidence and recommendations. *Journal of Perinatal Medicine, 38* , 347-351.	CINAHL: Infant nutrition, Donor milk, human milk, preterm infant nutrition	Recommendations and guidelines for perinatal practice Level VII	Summarizes clinical benefits of Donor human milk, and discusses concerns	N/A	Review of literature and current recommendations	Summarized the clinical benefits of donor milk in preterm infants and discusses common concerns	Authors concluded that human milk feeding (own mother milk or donor milk) is a human right. Recommends donor milk as a standard of care in preterm infants.	Demonstrates evidence in support of human milk while discussing the legitimate concerns about it s use.	Excellent support article

Student Name: Frances Smith

Ballard, O. & Morrow, A.L. (2013). Human milk composition: Nutrients and bioactive factors. Pediatric Clinics of North America 60, 49-74. 10.1016/j.pcl.2012.10.002	CINAHL: Composition of human milk	Level VII	Review of bioactive factors and the composition of human milk	N/A	Study of other research studies and analysis	Recommends further research while acknowledging the limitations of knowledge of human milk	Need for further research	Well documented and referenced. Author is associated with a major formula producing company	Good article for composition of human milk
Bernaix, L.W., Beaman, M.L., Schmidt, C.A., Harris, J.K., & Miller, L.M. (2010). Success of an educational intervention on maternal/newborn nurses' breastfeeding knowledge and attitudes. JOGGN 39, 658-666.	CINAHL:Breast feeding, knowledge of breastfeeding, attitudes, human milk	Quasi-experimental, pre-test/post-test design Level IV	Test the effect of an educational intervention on increased support of breastfeeding mothers	Maternity units of 13 hospitals; 9 experimental and 3 control sites, convenience sample size of 240 RN's, 206 RN in the experimental sites and 34 in the control sites	Participation in the experimental group included completion of two questionnaires before the study module then again after. Control groups completed 2 questionnaires with a 4-6 week gap without the study module, then completed the questionnaires again.	Nurses' breastfeeding knowledge, Attitude, beliefs and intentions to support breast feeding mothers.	Self-paced, self study packet may work best and be less intimidating than a classroom, may also fit the schedule of nurses better	Limitations: convenience sample, self-selection into experimental /control groups. Nursing practice following intervention was not measured.	Use as example when developing curriculum and intervention.

Student Name: Frances Smith

Bertino, E., Giuliani, F., Baricco, M., Di Nicola, P., Peila, C., Vassia, C., Chiale, F., Pirra, A., Cresi, F., Martano, C., Coscia, A., (2013). Benefits of donor milk in the feeding of preterm infants. Early Human Development, 89, S3-S6.	CINAHL: Donor milk, Human milk, breastfeeding, infant nutrition.	Recommendations for educating healthcare providers in breastfeeding and human milk feeding support. Level VII	Review benefits of donor milk	N/A	N/A	Lack of Human Milk feeding of preterm infants contributes to mortality and morbidity, and increases costs of prematurity. If this issues is addresses it has the potential to address inequalities in health.	The curve of post-natal development and growth for the very low birth weight infant (VLBWI) has not been determined. Early nutrition should address not just growth but potential effects. Some of the unfavorable consequences of early postnatal growth are related to infant formula as opposed to positive outcomes but slower growth from Human milk .	Review of donor milk/human milk importance	Supportive article

Student Name: Frances Smith

Bin-Nun, A., Bromiker, R. Wilschanski, M., Kaplan, M., Rudensky, B., Caplan, M., & Hammerman, C. (2005). Oral probiotics prevent necrotizing enterocolitis in very low birth weight neonates. *Journal of Pediatrics,* 192-196. 10.1016/j.jpeds.2005 .03.054	CINAHL, PubMed Probiotics, human milk, neonates	RCT Level II	Test the hypothesis that adding probiotics to infant nutrition will normalize intestinal floors leading to lower incidence of NEC	preterm infants <1500 grams, N=145; power 0.80, α 0.05	Infants randomly assigned to one of two groups Study group received regular feeds plus a probiotic feed, control group received regular feed plus mothers milk or infant formula	No differences detected between groups	Risk factors for NEC identified and reviewed, use of probiotics recommended. Future study needed to determine which probiotics and the ideal amount needed	Well designed study small sample size	Probiotics might be helpful in preventing NEC, also Mother's milk provides some natural bioactive substances which could use support in the instances of decreased milk supply.
Boersma, E.R., Offrings, P.J., Muskiet, F.A., & Chase, W.M. (1991). Vitamin E, lipid fractions, and fatty acid composition of colostrum, transitional milk, and mature milk: An international study. American *Journal of Clinical Nutrition, 53* , 1197-1204.	CINAHL Composition of human milk	Review of the literature, study of human milk Level VII	Purpose to define nutritional adequacy of human milk in developing countries'	African women living in St. Lucia; 13 women actively breastfeeding; milk analysis	Analysis of human milk for contents and the levels in differing stages of milk development	Diet of the mother affects the composition of human milk which in turn effects the development of the infants.	Mature human milk in the tested women exceeds the recommendations of the AAP; which the authors concluded is an effect of the local diet which is overall superior to the diet of most American women	No direct comparative data	Very interesting nutritional testament to the diet of fish and vegetables when compared to western women diets

Student Name: Frances Smith

Carroll, K. (2014). Body dirt or liquid gold? How the 'safety' of donated breast milk is constructed for use in neonatal intensive care. *Social Studies of Science, 44(3)* , 466-485.	CINAHL: Donor milk, Human milk, breastfeeding, infant nutrition.	Ethnographic study of two milk banks and two NICU's in the US, 73 interviews with donors, NICU providers and parents. Level VI	N/A	N/A	Interviews with 73 individuals with a primary question of "What are the underlying processes and practices that have enabled donor milk to be endorsed as a safe and legitimate feeding option in neonatal intensive care units?"	Evaluation of Latour's critique method	Recommends use of the critique method to inform science	Interesting reading	Study questions the sociological implications of getting consent for donor milk and not bovine based formula in the NICU. There are a number of Sociological issues brought up interesting reading.
National Center for Chronic Disease Prevention and Health Promotion (2013). *Breastfeeding Report Card, CDC.*	CINAHL: Breast feeding, infant feeding, current statistics	US Government Report Level VII	Case Study	Review of Breastfeeding practices reported to the CDC in the US.	Data collected through mPINC survey	Slow, steady increases in breastfeeding in the US		Limited to data set given in mPINC surveys	Good baseline review of where we are in 2011
Chertok, I.R., McCrone, S., Parker, D., & Leslie, N. (2014). Review of interventions to reduce stress among mothers of infants in the NICU. *Advances in Neonatal Care, 14* 30-37.	CINAHL, PubMed: NICU stress, preterm delivery, preterm infants	Review of the literature, 17 research studies, 12 RCT, 3 Quasi-experimental, 1 repeated measures, 1 pilot Level I	Review of ethical issues in Newborn Care	Multiple	N/A	Parental stress in the NICU is global	Identifies numerous interventions used to deal with parental stress in the NICU, vital to address this stress as it effects all aspects of infant and parental wellness	Strong studies, more research and more directed research needed	Vital information which overshadows the health and care of infants in the NICU, reinforces the dyad concept.

Student Name: Frances Smith

Closa-Monasterolo, R., Gispert-Llaurado, M., Luque, V., Ferre, N., Rubio-Torrents, C., Zaragoza-Jordana, M., & Escribano, J. (2013). Safety and efficacy of insulin and oligofructose supplementation in infant formula: Results from a randomized clinical trial. Clinical Nutrition, 32, 918-927.	CINAHL, PubMed: Infant formula, composition of infant formula	RCT Level II	Identify interventions used to decrease level of stress in mothers of preterm infants admitted to the NICU	252 newborn infants for month study	Double-blind, randomized, placebo controlled & parallel trial, infants fed formula with supplementation and with out; evaluated for Anthropometry, water balance, blood parameters, adverse events and compared to BF infants.	Supplemented infants showed a microbiota composition closer to that of a breastfed infant with no different in assorted counts or adverse events	Supplement is safe and effective and promotes microbiota closer to BF than unsupplemented formula	Well designed study, limitations include high drop out rate, and possible time of initiation into the study	If you have to feed formula this is worth reviewing
Cutler, B.D., & Wright, R.F. (2002). The U.S. infant formula industry: Is direct-to-consumer advertising unethical or inevitable? *Health Marketing Quarterly, 19* , 39-54.	CINAHL, PubMed, Ebsco Host: Formula, infant formula, ethics, advertising, Nestle scandal	Background on the history of Infant formula in the US.	Demonstrate efficacy, safety and tolerance of supplemented formula	N/A	N/A	N/A	Concludes that the formula companies are being unfairly disadvantaged by laws that reframe how sales people need to behave	Rather one sided evaluation with a sense of responsibility	As the ethics of this discussion are in question, the conclusion that the government is somehow to blame for slowing formula sales, and thus direct to consumer advertising is ineviable.

Student Name: Frances Smith

Deshpande, G., Rao, S., Patole, S. & Bulsara, M. (2010). Updated meta-analysis of probiotics for preventing necrotizing enterocolitis in preterm infants. Pediatrics, 125, 921-930. 10.1542/peds.2009-1301; http://pediatrics.aappublications.org/content/125/5/921.full.html	CINAHL: human milk, infant nutrition, probiotics, preterm infants	Review of RTC's Level I	Update current evidence	11 (N=2176), 4 new 9N=783) trials were included in meta-analysis	Cochran Central Register, Medline, Embase and CINAHL databases searched, included were RCT's of any enteral probiotic supplementation that started within the first 10 days and continued for ≥ 7 days, and report on stage 2 or greater NEC based on modified Bell staging	No adverse effects noted, 30% reduction in NEC (α = 0.05 and 0.01, power 80%)	Significant benefits of probiotic supplements in reducing morbidities and mortalities in VLBW infants	Probiotic study, needs to be broader, but demonstrates the immaturity of the VLBW premature infants, and explains the creation of NEC with prematurity,	Probiotics are rapidly becoming important in the developing knowledge of premature infant nutrition
Doolan, P. (2008) Nursing times. *History Today, 58,* 24-30.	CINAHL: history of wet nursing, we nursing, co-nursing, milk-sharing, breastfeeding practices, co-feeding	History of wet nursing Level VII	N/A	N/A	History	N/A	Wet nursing is the early support of donor feeding	Well developed historical perspective	N/A

Student Name: Frances Smith

Downard, C.D., Renaud, E. St. Peter, S.D., Abdullah, F., Islam, S., Saito, J.M., Blakely, M.L. Huang, E.Y., Arca, M.J., Cassidy, L. Aspelund, G. (2012). Treatment of Necrotizing enterocolitis: An American Pediatric Surgical Association Outcomes and Clinical Trials Committee systematic review. *Journal of Pediatric Surgery 47* , 2111-2122.	CINAHL: Necrotizing enterocolitis, NEC, EBP NEC,	Review of the literature Level VI	Review and evaluate evidence in surgical care of NEC	Review of current literature	Compilation of data in the prevention and intervention in the progress of NEC	Note the support of probiotics for the prevention of primary or secondary NEC; discusses surgical intervention for existing NEC	Probiotics are advised to decrease the incidence of NEC, human milk used whenever possible; not enough evidence-based data to support a specific surgical intervention	Recommendation for further study	Well designed, well referenced article
Dumm, M., Hamms, M., Sutton, J., & Ryan-Wenger, N. (2013). NICU breast milk warming practices and the physiological effects of breast milk feeding temperatures on preterm infants. *Advances in Neonatal Care, 13,* 279-287.	CINAHL; breastmilk, warming human milk, prematurity,	Randomized descriptive, correlational design Level III	Currently there are no evidence-based standards for the warming of human milk, or determining the optimal temperature for human milk before administration to preterm infants	Randomly selected NICU nurses (N=61), α 0.05, power 0.80, medium effect size of *r= 0.35*	Measures the temperature of the water baths and the breast milk at the beginning and end of warming. Physiological responses of 33 preterm infants before, 5 minutes into and 30 min after the start of the feeding, gastric residuals measured 3 hours after feeds	Temperatures for water baths ranged from 23.3C to 45.5C at the start of warming, and a bit higher at completion, time varied; infants showed no significant psychological changes over time.	Further research is needed to determine if milk needs warming, and if so, what temp and for how long.	Explores an interesting and seldom explored topic	interesting article, opportunity for further research.

Student Name: Frances Smith

Ganapathy, V., Hay, J.W., & Kim, J.H. (2012). Cost of Necrotizing Enterocolitis and cost-effectiveness of exclusively human-milk products in feeding extremely premature infants. *Breastfeeding Medicine, 7,* 29-37.	CINAHL, Pub-Med: NEC, necrotizing enterocolitis, human milk feeding,NEC and breast milk, NEC and Human milk feeding	RCT, compare the NICU cost of infants fed human milk, bovine products Level II	Cost evaluation		Net expected cost calculator developed to compare costs in the NICU between bovine fortified human milk and human milk-based fortified human milk, based on NEC risk assessment	Decrease LOS for infants fed with 100% human milk, decrease in morbidity from NEC - results in a net cost savings	Feeding ELBW infants a diet of 100% Human milk may result in a cost savings on medical expenses by preventing NEC	Costs have changes since this article was published, it still has application. In the US there is currently only one company that produces a human milk fortifier made of human milk, while multiple companies produce bovine based human milk fortifiers skewing cost analysis for HMF	Excellent support for argument of 100% human milk diet
Gephart, S.M. & Weller, M.,(2014). Colostrum as oral immune therapy to promote neonatal health. *Advances in Neonatal Care, 14,* 44-51.	CINAHL, PubMed: breastmilk, colostrum, oral care, human milk, NICU, oral immune therapy	Review of literature Level VI	Study to determine the cost effectiveness of an all Human milk diet as compared to a bovine fortified human milk feedings	5 research studies, and 2 research reports were evaluated	Reports were evaluated for size and power as well as results	Colostrum for oral care is safe and may reduce days to full feds	Increasing exposure to human milk in the NICU infants must become standard of practice, but further stud needs to be done	Several small studies reviewed, limitations include the absences of RCT's with great power	Great potentials for more study

Student Name: Frances Smith

Ghandehari, H., Lee, M.L., & Rechtman, D.J. (2012). An exclusive human milk-based diet in extremely premature infants reduces the probability of remaining on total parental nutrition: a reanalysis of the data. *BioMed Central Research Notes.* S188.	CINAHL, PubMed: premature infants, infant nutrition, human milk feeding, human milk	Review of previous date with regard to exclusive human milk diet and its effect on TPN, as opposed to the effect on NEC. Level III	Reevaluated data from a different statistical perspective	207 premature infant randomized into three groups; control, and 2 experimental	Data drawn for earlier trials worldwide, different statistical analysis completed	Human milk diet reduces need for TPN 11- 14%, when compared to control diet (p=0.0001 and = p = 0.001, respectively).	A completely human milk-based diet reduces the need for TPN long term in extremely premature infants as compared to a diet including bovine products	One of the authors is with Prolacta BioScience	Posssible bias due to affiliation
Gibbins, S., Wong, S.E., Unger, S. , & O'Connor, D. (2013). Donor human milk for preterm infants :Practice considerations. *Journal of Neonatal Nursing 19* , 175-181.	CINAHL:Preterm infants, breast milk, human milk, donor milk, nutrition	N/A Level VII	Review paper highlights advent of donor milk banks and the benefits of donor milk	N/A	Meta-analysis of 8 trials of donor vs infant formula	Use of human milk benefits infants, mothers and society	Human milk is vital to the development of the premature infant, OMM is preferred but donor mil (DM) is useful when fortified.	Noted review of costs and societal expectations as well as nursing considerations	North American trials, more research is needed, Canada appears to be further along in support of human milk practices.
Handa, D. & Schanler, R.J. (2013) Role of the pediatrician in breastfeeding management, Pediatric Clinics of North America 60, 1-10.	CINAHL, PubMed, Medline: Breastfeeding support, pediatrician role in BF support	N/A Level VII	Compared clinical outcomes before and after implementing a protocol	Pediatricians	Review of the problem, skills needed and support	Pediatrician need encouragement, knowledge and skills to support mothers in breastfeeding	Pediatricians are not always comfortable in this role of advisor in this particular area	Reviews the issues and emphasizes the effect that healthcare providers have on decisions and support of decisions	Baby Friendly Hospital Initiative, if used for more than just a feather in the cap of the facility can help change the dynamic of provider reluctance to assist mothers in their support of BF

Student Name: Frances Smith

Hillenbrand, K.M. & Larsen, P.G. (2002). Effect of an educational intervention about breastfeeding on the knowledge, confidence, and behaviors of pediatric resident physicians. *Pediatrics, 110* , e59. 10.1542/peds.110.5.e59	CINAHL: Education of doctors, breastfeeding, educational intervention	Quasi-experimental, pre-test/post-test design Level IV	Pediatric residents report inadequate training to feel knowledgeable and confident with advising mothers to breastfeed	Pediatric residents (N=49), α = 0.05, power 0.80	4 educational session intervention, pre/post test design, behaviors evaluated by interviewing mothers after intervention	Increases notes in mean knowledge score pre vs. post intervention; 92% of the residents believe that breastfeeding promotions is important and reported increased confidence post intervention	Pediatricians are well placed to intervene and support struggling mothers to breast feed, and more educations is worthwhile.	Small study size, small numbers of mothers to interview post intervention	Good basis for interventions; currently (2014) pediatric residents get more and better training in some institutions, but there is room for more study and education.
Hoyos, A.B. (1999). Reduced incidence of necrotizing enterocolitis associated with enteral administration of *Lactobacillus acidophilus* and *Bifidobacterium infantis* to neonates in an Intensive Care Unit. International *Journal of Infectious Diseases, 3* , 197-202.	CINAHL, Medline, PubMed: Breast milk, probiotics, infant feeding, formula	Quasi-experimental without randomization, Level III	Examine hypothesis that oral administration of *Lactobacillus acidophilus* and *Bifidobacterium infantis* to all infants in NICU would decrease NEC when compared to infant hospitalized in the prior year who did not receive treatment.	All infants admitted to the NICU over 1 year (N=1237), control group N=1282	Daily doses of *Lactobacillus acidophilus* and *Bifidobacterium infants* were administered to all infants	No complications to the administration noted; Control group had 85 NEC cases compared to experimental group 34 cases (P<0.0002) and in the control group there were 35 fatalities as compared to 14 fatalities in the experimental group(p< 0.005)	Positive results indicate the need for further study	Very old study in an environment where mortality and morbidity are common in preterm infants, but as an early study it prompted much continued interest.	Conceptually interesting - old study, but indicates the need for bacteria to coat the immature infant gut.

Student Name: Frances Smith

Hylander, M.A., Strobino, D.M., & Dhanireddy, R. (1998). Human milk feedings and infection among very low birth weight infants. Pediatrics, 102, e38.10.1542/peds.102.3.e38	CINAHL: Human milk, infection, sepsis, low birth weight	Quasi-experimental without randomization, Level III	Examines the effects of human milk feedings on subsequent infection	212 consecutive VLBW infants received either human milk feedings or infant formula	Infants were observed and cultures for evidence of infection	Incidence of infection differed by type of feeding. Infants who received exclusive human milk feeding had less overall infection	The incidence of any infection and sepsis/meningitis are reduced in infants who receive a diet of human milk, compared to formula fed infants	Small and old study. Well designed for this group	Basis of much research into the value of Human milk in this population
Innis, S.M. (2014). Impact of maternal diet on human milk composition and neurological development of infants. *American Journal of Nutrition; 99* , 734S-741S.	CINAHL,PubMed: Human milk, composition of human milk, nutrition of mother, effect of diet on breast milk	N/A Level VII	Review of the composition and variances in composition of human milk in relation to the maternal diet and the effects on the neuro development of infants	N/A	N/A	N/A	With relationship to the developing human infant brain, human milk reflects the quality of the maternal diet and the fatty acids in that milk varies.	Not conclusive of anything, reinforces that a good diet is important for good human milk and that is important to the development of the infant brain.	
Jackson, K., Ternstedt, B, & Schollin, J. (2003) From alienation to familiarity: experiences of mothers and fathers of preterm infants. *Journal of Advances Nursing 43* , 120-129.	CINAHL: Preterm infants, support for preterm infants, NICU,	Qualitative study		Interview with 7 sets of parents of infants born at < 34 weeks gest.	Interviews and analysis phenomenological method				Vague, no real conclusions. Human milk is good, but is it always good enough?

Student Name: Frances Smith

Janvier, A., Lantos, J. & Barrington, K. (2012). The politics of probiotics, necrotizing enterocolitis and the ethics of neonatal research. *Acta Ped ædiatrica, 102,* 116-118/10.1111.apa12083	CINAHL, Medline, PubMed: Breast milk, probiotics, infant feeding, formula	Opinion piece	N/A	N/A	N/A	N/A	The authors support the use of probiotics in the nutrition of NICU infants but recognize the problems associated with the use of an un-proven, not FDA approved product, the ethics of randomization are discussed	Very informed piece, no obvious downside	At one place there is the following statement " Even the strongest detractors realize that probiotics are the only promising therapy for prevention of NEC that we currently have (other than breast milk)" Interesting that they don't simply support the use of human milk in the NICU.
Johnson, A.M., Correll, A., Greene, J.F., Hein, D., & McLaughlin, T. (2013). Barriers to breastfeeding in a resident clinic. Breastfeeding Medicine, 8, 273-276.10.1089/bfm.2012.0020	CINAHL: Education of doctors, breastfeeding, educational intervention	Survey, Level VI	The goal of the study was to survey resident clinic OB patients to determine their knowledge of the benefits of breastfeeding, and identify barriers that patients experience in achieving exclusive breastfeeding. The aim was to use the survey to target educational practices designed to improve exclusive breastfeeding rates	Patients in a voluntary study took the survey which asked questions in both English and Spanish and took approximately 5 minutes to complete. Inclusion were pregnant patients attending the clinic (n=188) primarily Hispanic women 76%, 88% of respondents were enrolled in WIC	Patients were asked if they would like to fill out the survey, data were collected for 2 months.	Healthcare providers were considered influencers' in all groups surveyed, the need for lactation counseling and support was identified	High WIC enrollment was associated with low breastfeeding rates when the participant received free formula; lactation support is vital to the initiation of breastfeeding and formulating a way to manage breastfeeding after discharge	Strong research that shows where barriers lie for this cohort	This is research that should be conducted in clinics everywhere and fairly easy research to conduct.

Student Name: Frances Smith

Jones, F. (2003). History of North American donor milk banking: One hundred years of progress. *Journal of Human Lactation, 19* , 313- 318. 10.1177/0890334403255857	CINAHL:Preterm infants, breast milk, human milk, donor milk, nutrition	History of Donor Milk banking in North America	N/A	N/A	N/A	N/A	N/A	Good historical synopsis	Interesting read especially about the Dionne quintuplets who received 8000 oz. of donor milk.
Kim, J. H., Chan, C.S., Vaucher, Y.E., & Stellwagen, L.M. (2013). Challenges in the practice of human milk nutrition in the neonatal intensive care unit. *Early Human Development 89,* S35-S38.	CINAHL: Human milk, prebiotics, human milk feeding, human milk in the NICU	N/A Level VII	N/A	N/A	N/A	N/A	Discusses the various challenges associated with the use of human milk in the NICU. Recommends standardization around support of Human milk use in the NICU. Limited discussion.	N/A	Interesting overview.
Kim, J.H, & Froh, E.B. (2012). What nurses need to know regarding nutritional and immunobiological properties of human milk. *JOGNN, 41* , 122-137. 10.1111/j.1552-6909.2011.01314.x	CINAHL, PubMed: Preterm infants, infant nutrition, breastfeeding, preterm breastfeeding, preterm infant nutrition	N/A Level VII	Educational	N/A	Discussion	N/A	Lactation and nursing support and knowledge are instrumental in increasing human milk feedings. Research dissemination from "Bench to bedside" is of the utmost importance as knowledge is need to teach.	Excellent overview of knowledge needs.	Useful information to include in curriculum development for intervention.

Student Name: Frances Smith

Klingenberg, C., Embleton, N.D., Jacobs, S.E., O'Connell, L.A., & Kuschel, C.A.(2012). Enteral feeding practices in very preterm infants: an international survey. *Arch Dis Child Fetal Neonatal Ed 97* , F56 - F81.	CINAHL, PubMed: Preterm infants, infant nutrition, breastfeeding, preterm breastfeeding, preterm infant nutrition	Survey Level VI	The purpose was to evaluate the incidence and type of enteral feedings practiced in different countries	Web based survey of 127 NICU's in Australia, Canada, Denmark, Sweden, Ireland, New Zealand, Norway and the UK	Web-based survey	98% of the units receiving the survey responded demonstrating a lack of uniformity in feeding practices	Supports further research and EBP standards for Preterm infant feeding practices.	Limited in survey scope, would have been more interesting had it been extended to third world and developing countries.	Interesting study.
Kotey, F.O., & Spatz, D.L.(2013). White matter injury in preterm infants. *Advances in Neonatal Care 13,* 89-94	CINAHL: Preterm infants, breast milk, human milk, donor milk, nutrition	N/A Level VII	Article proposes potential importance of human milk in decreasing the incidence of white matter injury in preterm infants..	N/A	N/A	At this point it is unknown how human milk positively affects the prevention of white matter injury. Human milk exclusivity and duration are positively correlated with neurologic development in healthy term infants.	Advocates for further research, concludes that there is no harm in supporting exclusive human milk feeding and while the science is still unclear as to why, there is evidence that infants fed an exclusive human milk diet appear to be less prone to white matter injury.	Good foundation in animal science	Loved this research, it brings many possibilities out and supports the premise that we don't know what we don't know!

Student Name: Frances Smith

Lanari, M., Prinelli, F., Adorni, F., DiSanto, S., Faldella, G., Milvestri, M., Musicco, M., & Collaborators on behalf of the Italian Neonatology Study Group on RSV Infections. (2013). Maternal milk protects infants against bronchiolitis during the first year of life. Results from an Italian cohort of newborns. *Early Human Behavior 89S1* ,S51-S57.	CINAHL: Preterm infants, breast milk, human milk, donor milk, nutrition, benefits of breast milk, maternal milk feeding	Prospective cohort study Level III	To examine the effect of breastfeeding on the occurrence of bronchiolitis in the first year of life.	1814 newborns in 30 NICU's, followed in one year. The risk of hospitalization for bronchiolitis was evaluated with survival analysis and hazard ratios with 95% CI calculated	Participants were grouped into 'never breastfed', and 'ever breastfed', the ever breastfed group was further stratified into exclusive and NF with formula.	After evaluation the risk of hospitalization for the never breastfed group was the highest at a hazard ratio (HR) of 1.57, 95% CI: 1.00 - 2.48; breastfed associated with formula and exclusively BF were at similar risk of hospitalization	Breastfeeding , even when associated with Formula reduces the risk of hospitalization for bronchiolitis in the first year of life. Exclusive BF might be a preventative measure for lower respiratory infection in infancy.	Strong study, adds strength to the growing body of evidence in support of human milk as a positive factor in infant health.	Loved this evidence, even though it is with an older group of infants .> 33 wks gestation, it still adds support to the evidence to promotes exclusive use of human milk.

Student Name: Frances Smith

Lee, H.C., Kurtin, P.S., Wight, N.E., Chance, K., Cucuniotta-Forbes, T., Hanson-Timpson, T.A., Nisbet, C.C., Rhine, W.D., Risingsun, K., Wood, M., Danielsen, B.H. & Sharek, P.J. (2012). A quality improvement project to increase breast milk use in very low birth weight infants. *Pediatrics 130* , 1679 - 1687.10.1542/peds.2012-0547	CINAHL: Preterm infants, breast milk, human milk, donor milk, nutrition, benefits of breast milk, maternal milk feeding	Quality Improvement Level IV	To evaluate multihospital collaborative designed to increase breastmilk feeding in premature infants	11 NICU's participated studied breast feeding rates as primary and secondarily studied NEC rates and Length of stay; hospitals not participating served as control	California Perinatal Quality of Care members participated in a IHI-style collaboration to increase NICU breastfeeding rates. Multiple interventions were proposed and the facilities selected their own interventions.	BF in the intervention sites improved from baseline (54.6%) to intervention period (61.7% P=0.005), with sustained improvement over 6 months (64.0%; P=0.003). NEC rates decreased from baseline (7.0%) through sustainability (2.4%; P=0.0001).	Implementation of a breast/nutrition change led to an increase in breastfeeding and a decrease in NEC.	No formal compliance with individual elements of the change package; pre-post intervention design limits ability to assign causality; and the selected participants were underperforming in breastfeeding rates as comparted to the control at the start of the study.	Excellent evidence of what a collaborative can do!
Levine, M.E.(1969). The pursuit of Wholeness. *American Journal of Nursing,* 93-98.	CINAHL: Nursing Theory, Infants, prematurity	N/A Level VII	N/A	N/A	N/A	N/A	Excellent nursing care support wholeness in care, and is essential to the holistic care of all patients.	N/A	Nursing Theory

Student Name: Frances Smith

Levine, M. S., & Lowe, N.K. (2014). Nurse attitudes towards childbirth: A concept clarification. Nursing Forum, 49, 88- 99.	CINAHL: Nurse attitudes, attitudes and behavior	Concept analysis Level VII	Purpose of this article is to clarify the concept of "nurses attitudes toward childbirth"	Review of literature	Norris's model of concept clarification	Nursing literature has not defined "nursing attitudes" but psychological literature has reviewed and studied the concept of attitude and behavior for a long time.	Individual attitudes do exist amongst nurses, and measurement of these attitudes may predict nursing care intentions and behaviors.	Strong concept analysis, helped me review concept analysis for my theoretical framework	While the topic was not one I was pursuing when reading the article, being a long time L&D nurse it spoke to me and that translated in clarification of my framework, attitudes do affect intention and behavior.
Maayan-Metzger, A., Avivi, S., Schushan-Eisen, I., & Kuint, J. (2012). Human milk versus formula feeding among preterm infants: Short-term outcomes. American Journal of Perinatology 29, 121-126. 10.1055/s-0031-1295652	CINAHL, PubMed: human milk, premature infants, benefits of human milk	Retrospective study, Level III	The aim of the study is to evaluate short term outcomes among preterm infants based on type of feeding to determine possible advantages of human milk in preterm infants.	400 Preterm infants, Gestational Age < 32 weeks; retrospective review; study included 400 infants < 32 weeks who survived to discharge	Groups were chosen and compared based on feeding type, complications, specifically NEC and ROP were then assessed	NEC was decreased in human milk fed infants, ROP III was significantly lower in the human milk fed infant group	Findings do not support an advantage of exclusive HM feeds over partial HM feeds for short-term outcomes, only 54 infants out of 400 were exclusive, so the study may not be accurate, however HM is advantageous to all infants and efforts to support HM feedings should continue.	Short term outcomes are being studied, and by the authors own admission it is difficult to randomize a feeding study of this type. There was no short-term finding of significance in blood borne infections feeding dependent.	Interesting, because the evidence continues to support full HM feedings to the best outcomes.

Student Name: Frances Smith

Matthew-Maich, N., Ploeg, J., Jack, S., & Dobbins, M. (2012). Leading on the frontlines with passion and persistence: a necessary condition for Breastfeeding Best Practice Guid3eline uptake. *Journal of Clinical Nursing 22*, 1759-1770.	CINAHL, Pub Med: Breastfeeding, teaching, supporting providers, guidelines, theory of support, Evidence based practice breastfeeding	Constructivist grounded theory used to explore social processes and strategies in facilitating Breastfeeding Best Practice Guidelines. Level VII	To determine the safety of oropharyngeal administration of own mother's colostrum to ELBW infants in the first days of life, secondary purpose investigate the feasibility of delivering therapy to infants in the first days of life, and measuring concentrations of secretory immunoglobulin A (sIgA) and lactoferrin in tracheal aspirate secretions, and urine of these infants.	Professionals and client sin postpartum, birthing, special care nurseries and pediatric units in three hospitals in Ontario, Canada. N=112, 58 professionals and 54 mothers - interviews were conducted and data extrapolated	data were collected through interviews, demographic questionnaires. Responses were coded, defined and coded again, when themes emerged further reviews and interviews were conducted to flesh out responses. Rigor was increased by using multiple sites for gathering information, multiple reviews of data	N/A	Nursing leaders are best situated to enforce, supply and teach desired practice in nursing units.		This is the article that sent me on this journey. I read this and wondered why we weren't giving all infants in the NICU OMC and OMM - obviously it is beneficial, and more beneficial that bovine products. This started me thinking about why providers don't encourage all mothers to provide OMM.

Student Name: Frances Smith

Manzoni, P., Stolfi, I., Pedicino, R., Vagnarelli, F., Mosca, F., Pugni, L., Bollani, L., Pozzi, M., Gomez, M., Tzialla, C., Borghesi, A., Decembrino, L., Mostert, M., Latino, M.A., Priolo, C., Galletto, P., Gallo, E., Rizzollo, S., Tavella, E., Luparia, M., Corona, G., Barberi, I.,Tridapalli, E., Faldella, G., Vetrano, G., Memo, L., Saia, O.S., Bordignon, L., Messner, H., Cattani, S., Casa, E.D., Laforgia, N., Quercia, M., Romeno, M., Betta, P.M., Rinaldi, M., Magaldi, R., Maule, M., Stronati, M., Farina, D., on behalf of the Italian Task Force for the study and prevention of Neonatal fungal in Infections, & the Italian Society of Neonatology. (2013).	CINAHL, PubMed: human milk, premature infants, benefits of human milk	Multicenter RCT's Level II	Secondary analysis of data collected in two multicenter RCT's, over years 2004 through 2008, while looking at prevention of fungal infections hypothesis developed to determine if human milk feeding was associated with prevention of ROP as compared to formula	Eleven tertiary NICU's in Italy.	Analyzed database from both trials, screening for ROP was part of protocols for both trials for which data was collected. Univariate analysis was preformed to find significant association between and ROP and type of feeding. When an association was indicated by p< 0.005, multiple logistic regression was used.	314 infants (combined trials) received exclusively human maternal milk, and 184 received preterm formula. ROP incidence was significantly lower in human maternal milk fed group (11 of 314; 3.5%) as compared to the formula fed group (29 of 184; 15.8%) (RR 0.14; 95% CI 0.12 - 0.62; p=0.004)	Exclusive human maternal milk feeding from birth may prevent ROP of any stage in VLBW infants in the NICU.	Limitation: no identification of the threshold needed to determine the protective effect, threshold used was > 50ml/kg/day vs. no human milk. Speculation that the protective effect may vary with the freezing/ thawing process.	Substantiates the value of human milk in the preterm infant.

Student Name: Frances Smith

McCrory, C., & Murray, A. (2012). The effect of breastfeeding on neuro-development in infancy. *Maternal Child Health, 17* , 1680-1688.	CINAHL: Breastfeeding, Human milk, infant development, neuro-development, human milk feeding	Questionnaire; use of standardized measure of infant development, n= 11,134 infants Determine if breast feeding influences neuro-development, and reaching developmental milestones	Evaluate the current beliefs that breastfeeding positively affects cognitive development.	This study attempts to build on the current evidence base by using data from the first wave of the Growing up in Ireland Birth Cohort Study to examine the relationship between indices of the children's neuro-development using the Ages and Stages Questionnaire, at 9 months of age in a large population based study of infants born in Ireland. 11,134 families consented front he original data base of 41, 185 children; response rate was 64.5%.	Growing up in Ireland (GUI) used items from the Ages and Stages Questionnaire (ASQ, 2nd ed) to assess developmental progress in five skill areas, communication, gross motor, fine motor, problem solving, and personal-social. The instrument used parent report on specific mile-stones of development.	A statistically significant benefit of breastfeeding was found on four of the five indices. Those who had been breastfed had 1.2 times the odds of achieving developmental milestones as compared to those who did not breastfeed. Any breastfeeding was found to be favorable to no breastfeeding.	Breastfeeding in any amount strengthens cognitive development in the infant.	Study promotes questions of other, non-measurable confounders. Strength is the large sample size.	Brought up a great many questions.

Student Name: Frances Smith

McGuire, W., & Anthony, M.Y. (2003). Donor milk versus formula for preventing necrotizing enterocolitis in preterm infants: systematic review. Arch Dis Fetal Neonatology 88, F11 - F14.	CINAHL, PubMed: premature infants, infant nutrition, human milk feeding, human milk	Systematic review and meta analysis of RCT's Level II	To determine if enteral feeding with donor human milk as opposed to infant formula reduces the incidence of NEC in preterm infants	Four small trials all 20 years old or greater were included, none of the trials individually found statistical significance in the incidence of NEC. Meta-analysis found that feeding with donor human milk, was associated with a significantly reduced relative risk (RR) of NEC.	Randomized and quasi-RCT's comparing donor human milk with formula were included. The donor or formula feed had to be the total feed, not supplementation of own mothers milk; included NEC as defined by the trials, and confirmed NEC	Infants who received donor human milk were three times less likely to develop NEC (RR 0.34; 95% Confidence Interval (CI) 0.12-0.99) and four times less likely to have confirmed NEC (RR 0.25, 95% CI 0.06 to 0.98) than infants who receive formula.	Larger trials of donor human milk vs formula in the prevention of NEC are needed,	Well designed study, but review is old	Supports premise, but based on studies that were old when evaluated.
McGrath, J.M. (2007). Breast-feeding success for the high risk infant and family. Nursing attitudes and beliefs. *Journal of Perinatal and Neonatal Nursing*. 183 - 185.	CINAHL: Breastfeeding, neonates, high-risk infants	Expert Opinion	N/A	High risk infant and family	N/A	N/A	Breastfeeding is considered adjunct rather that primary in the NICU. There are a variety of reasons for this, but nurses play a large part in the initiation and sustainability of BF in the NICU.	N/A	This is an excellent article that gives a great overview to the barriers to providing breast milk in the NICU regardless of the evidence that supports the practice to the benefit of the infant.
Medo, E. T. (2013). Increasing the global supply and affordability of donor milk. Breastfeeding Medicine, 8, 438 - 441. 10.1089/bfm.2013.0089	CINAHL: Human milk, breastfeeding, human milk feeding, donor milk, donor milk history	Opinion piece	N/A	N/A	N/A	N/A	Solutions to the shortage of donor milk must be found, and those solutions should benefit the donors and the infants receiving the donor milk.	N/A	Author discloses that she is the founder of Prolacta Bioscience, but no longer a shareholder, among other financial interests.

Student Name: Frances Smith

Meier, P.P., Patel, A. L., Bigger, H.R., Rossman, B., & Engstrom, J.L. (2013). Supporting breastfeeding in the neonatal intensive care unit: Rush Mother's Milk Club as a case study of evidence-based care. Pediatric Clinics of North America, 60, 209-226. 10.1016/j.pcl.2012.10.007.	CINAHL: Donor milk, Human milk, breastfeeding, infant nutrition	Evidence-Based Practice Case Study Level VI	This article summarizes creation of a culture to support breast feeding in the NICU	The Rush Mothers' Milk Club is an evidence based lactation program in the NICU, 57 beds, where 98% of the mothers supply breast milk to their infants.	Addresses many of the issues and barriers, case study	Noted that 98% of the mothers supply breast milk to their infants in the NICU.	This case study supports the value of human milk in the NICU but acknowledges that there must be a standardized approach for success.	All healthcare practioners who are in contact with the mothers' receive and disseminate the same evidence based information. One limitation is the lack of demographic information.	A great sample for NICU progress to increase the use of human milk in the NICU
Miracle, D.J., Szucs, K.A., Torke, A.M., & Helft, P.R. (2011). Contemporary ethical issues in human milk-banking in the United States. *Pediatrics, 128* , 1186 - 1191	CINAHL: Human milk, breastfeeding, human milk feeding, donor milk, donor milk history	N/A Level VII	Evaluation of attitudes and beliefs of caregivers influencing the practice of breastfeeding for high risk infants.	N/A	N/A	N/A	Human milk needs are growing as science is demonstrating the value of human milk.	N/A	Supports the use of donor milk, also supports acknowledging the donors, and indicates that this is a valuable resource.

Student Name: Frances Smith

Miracle, D.J. & Freland, J.D. (2007). Provider encouragement of breastfeeding: Efficacy and ethics. Journal of Midwifery & Women's Health, 52, 545-548. 10.1016/j.jmwh.2007.08.013.	CINAHL: Donor milk, Human milk, breastfeeding, infant nutrition.	Commentary Level VII	N/A	N/A	N/A	N/A	EBP includes providers being aware of current evidence, current professional policy statements and willingness to disseminate appropriate evidence based education and support to their patients.	N/A	More support of EBP as well as knowledge and educational opportunities.
Montgomery, D.P, Baer, V.L, Lambert, D.K., & Christensen, R.D. (2010). Oropharyngeal administration of colostrum to very low birth weight infants: Results of a feasibility trial. *Neonatal Intensive Care, 23,* 27- 30.	CINAHL, PubMed: colostrum, breast milk, human milk, use in NICUs, benefits of colostrum, prematurity, extremely low birth weight infants	Prospective, non-masked, single-centered pilot Feasibility analysis Level VI	Determine the feasibility of administration of colostrum orally every 3 hours times seven consecutive days	VLBW infants admitted to the NICU over a 12 month period	Mother's gave colostrum and every three hours from the initial colostrum collection, the nurse swabbed the inside of the infants mouth with mother's colostrum (approximately 0.2ml per swabbing.	Found difficult to obtain colostrum and swab in the first 24 hours	Some mothers will be unable or unwilling to give colostrum (estimated 10 - 20%), colostrum will not be available in many cases until day two of life, colostrum will be available for 75-80% of the 3 hour planned swabbing's.	Evaluations of a unit's experience	Determined that is feasible, but more study, education and planning will have to be done to make this a standard.

Student Name: Frances Smith

Neifert, M. & Bunik, M. (2013). Overcoming clinical barriers to exclusive breastfeeding. Pediatric Clinics of North America, 60, 115-145. 10.1016/j.pcl.2012.10.001	CINAHL, PubMed: Breastfeeding, barriers, human milk feeding	Level VII	N/A	N/A	N/A	N/A	Lack of evidence based practice, education and knowledge impacts maternal interest and willingness to breastfeed.	N/A	Good review of the barriers, some solutions.
Nelson, M.M. (2013). The benefits of human donor milk for preterm infants. *International Journal of Childbirth Education 28,* 84-89.	CINAHL: Donor milk, Human milk, breastfeeding, infant nutrition.	Review of issues surrounding Donor milk and its benefits to infants. Level VII	Explore clinical benefits and concerns of donor milk	N/A	N/A	N/A	There is empirical evidence that the benefits of human milk is superior to formula. Mother's milk, followed by donor milk in that order of preference before any formula is recognized as best for infants.	N/A	Discussion of human milk banking including reasons for using human milk, and safety issues
Parish, A., & Bhatia, J. (2008). Feeding strategies in the ELBW infant. *Journal of Perinatology 28,* S18 - S20	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity, Vermont Oxford Database results								

Student Name: Frances Smith

Parker, L.A., Krueger, C., Sullivan, S., Kelechi, T., Mueller, M. (2012).Effect of breast milk on hospital costs and length of stay among very low-birth-weight infants in the NICU. *Advances in Neonatal Care* *12*, 254-259.	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	Descriptive comparative study Level III	Evaluate current evidence regarding the feeding strategies in the extremely low birth weight infant.	80 infants weighing ,<1500gm, born prior to 32 weeks gestation and who remain in the home hospital NICU until discharge	Retrospective chart review, independent t tests used to compare data	No statistically significant differences in length of stay or cost of care were found between infants fed at least 50% breast milk, and those who were exclusively formula fed.	Long-term correlation of breast milk feedings on the cost of care following hospitalization may provide evidence for additional lactation support in the NICU. It is a valuable consideration that cost is evaluated in light of the cost-benefit ratio in health care.	Mixed birth weights results in mixed results.	While there is evidence for many of the decisions made in the NICU, many choices of feeding are based on historical rather than current evidence.

Student Name: Frances Smith

Perrine, C.G. & Scanlon, K.S. (2013). Prevalence of use of human milk in US advanced care neonatal units. *Pediatrics, 131,* 1066 - 1071.	CINAHL: Breast milk, human milk, donor milk,NICU use of human milk	Survey of reports from CDC Level VII	Using mPINC data determine the prevalence of human milk use in NICU's in the United States	CDC national maternity practices in infant nutrition (mPINC) for years 2007,2009, and 2011 - analyzed 2 questions to determine nutritional practices in Level II and III NICU's - use of human milk including breast milk,	Review of CDC data	in 2011, 30.8 % of maternity hospitals reported that >90% were routinely using human milk, compared with 26.7% in 2009 and 21.2% in 2007 (trend p< 0.001)	The use of human milk in the US NICU's is increasing, but less than half are routinely providing human milk.	STRENGTHS/LIMITATIONS: Census design and high response rate, Children's Hospitals, where maternity care is not included were not assessed; a single respondent per hospital, usually in a leadership position - may not accurately reflect the actual work flow. Dose of Human milk, Mothers milk as opposed to donor milk is not defined.	Solid factual research
Quigley, M., Henderson, G., Anthony, M.Y. & McGuire, W. (2007). Formula milk versus donor breast milk for feeding preterm or low birth weight infants (review). *The Cochrane Collaboration Review,* 1-53 http://wwww.the cochranelibrary.com.	CINAHL, PubMed: breast milk, colostrum, oral care, human milk, NICU, formula, donor milk	Level I	To determine the effect of formula vs. donor milk on growth and development in preterm or low birth weight infants.	RCT's comparing formula to donor milk	Extracted using Cochrane Neonatal Review group standard methods	8 RCTs met inclusion criteria. Growth was greater in the formula fed group, NEC was greater in the formula fed group. Relative risk 2.5 (95% CI)	In preterm and LBW infants feeding with formula when compared with donor milk feeding resulted in greater growth in the formula fed group, bus associated with a higher rate of NEC.	Small groups of data, but through review of the available data	Excellent resource.

Student Name: Frances Smith

Rechtman, D. (2012). The use of a 100% human milk diet in the Neonatal Intensive Care Unit, Neonatal Intensive Care 25, 24 - 25.	CINAHL, PubMed: breast milk, colostrum, oral care, human milk, NICU, oral immune therapy	Opinion piece Level VII	Informational	N/A	N/A	N/A	Human milk diet for infants in the NICU has been proven to be clinically significant, HM will provide support to the health of these infants.	Author is CMO of ProLacta BioScience	Bias noted, but the clinical evidence is accurate.
Rodriguez, N.A., Meier, P.P., Groer, M.W., & Zeller, J.M. (2009).Oropharyngeal administration of colostrum to extremely low birth weight infants: theoretical perspectives. *Journal of Perinatology 29,* 1-7.	CINAHL, PubMed: breast milk, colostrum, oral care, human milk, NICU, oral immune therapy	Evidence from a variety of studies Level V	Demonstrates safety of oropharyngeal route and safety and efficacy support for the administration of colostrum	N/A	N/A	Literature review supports the use of own mothers colostrum (OMC) as potential immune therapy for the extremely low birth weight (ELBW) infants.	The research into the evidence shows an indication for using OMC as potential therapy, recommends further studies.	Strong evidence but theoretical in nature	Fascinating possibilities - colostrum has some amazing qualities and the human body is designed for survival. We simply must find a way to bring these two together.

Student Name: Frances Smith

Rodriguez, N.A., Meier, P.P., Groer, M.W., Zeller, J.M., Engstrom, J.L., & Fogg, L. (2010). A pilot study to determine the safety and feasibility of oropharyngeal administration of own mothers colostrum to extremely low birth weight infants. *Advances in Neonatal Care 10,* 206-212.	CINAHL, PubMed: colostrum, breast milk, human milk, use in NICUs, benefits of colostrum, prematurity, extremely low birth weight infants	Pilot Study: Quasi experimental, one group, pretest-posttest design. Level III	To determine the safety of oropharyngeal administration of own mother's colostrum to ELBW infants in the first days of life, secondary purpose investigate the feasibility of delivering therapy to infants in the first days of life, and measuring concentrations of sIgA	Five ELBW infants (mean BW and gestational age= 657 grams and 25.5 weeks respectively.	Infants received 0.2 ml of OMC every two hours, administered oropharyngeal, for 48 hours beginning at 48 hours of age. Concentrations of sIgA and lactoferrin were measured initial in baseline, at the end of the intervention and then 2 weeks after the intervention.	All infants completed the therapy, each received 24 treatments. 14 urine specimens were sufficient for analysis. Wide variation of concentrations were noted, several results were outside the limits of the assay. All infants began to suck on the ET tube during the administration of OMC. O2 sats remained stable or increased during administration, and there were no episodes of apnea, bradycardia, hypotension or other adverse effects during the administration of OMC.	Oropharyngeal administration of OMC is easy, inexpensive and well tolerated. Further research is needed to determine best form of administration, dose and clinical outcomes including ventilator-associated pneumonia (VAP).	Data were limited, small sample size, unable to obtain sufficient tracheal aspirates to analyze. Lack of reference sample values for immune markers for ELBW infants in the first few days of life.	One of the two articles that initially triggered this authors interest in use of human milk exclusively in NICU's

Student Name: Frances Smith

Rodriguez, N.A., Groer, M.W., Zeller, J.M., Engstrom, J.L., Fogg, L., Du, H., & Caplan, M. (2011).A randomized controlled trial of oropharyngeal administration of mother's colostrum to extremely low birth weight infants in the first days of life. neonatal Intensive Care 24, 31-35.	CINAHL, PubMed: colostrum, breast milk, human milk, use in NICUs, benefits of colostrum, prematurity, extremely low birth weight infants	RTC Level II	The stated purpose is to determine if colostrum has an immunostimulatory effect when administered to ELBW infants in the first days of life	16 ELBW NICU infants, birth weight <1000g and/or gestational age <28 weeks, and appropriate weight for gestational age.	Infants were randomly assigned to receive either 0.2 mL of own mothers colostrum (OMC) every 2 hrs. for 48 hrs., or the placebo, same amount of sterile water. Secretory immunoglobulin A (sigA) and lactoferrin (Lf) were then measured in the tracheal aspirates and serum, pre and post treatment.	No statistical significant differences in immune markers between or within groups, a large and moderate effect size for urine Lf and sigA for the treated group; the OMC group started full feed 10 days earlier than the placebo group	OMC may have a maturational effect on the intestines and a potential immunostimulatory effect when administered oropharyngeal to ELBW infants	Well designed trial but small numbers, if larger numbers may have shown more significance	Exciting findings that imply that some of the health protections ELBW infants can receive come from their mother's milk.
Rosenbaum, K. (2012). Implementing donor milk in the hospital setting: implications for nurses. *Nursing for Women's Health 16,* 202-208.	CINAHL: Breast milk, human milk, donor milk,NICU use of human milk	Level VII	What are the processes and strategies used by leaders to support Breastfeeding guideline in practice?	N/A	N/A	N/A	When OMM is not available, donor milk is the next best choice. Barriers exist in implementing a donor milk program, this article helps to navigate those barriers to the benefit of infants.	Suggestive of best practices	Good exploration on implementing a practice in a unit.
Schaefer, K.M & Pond, J.B (1994).Levine's Conservation Model as a guide to nursing practice. Nursing Science Quarterly, 7, 53-54.	CINAHL: Levine's conservation theory	Level VII	N/A	N/A	N/A	N/a	Case review with application of theory	Well defined example of application of Levine's Conservation Theory	Good description of application.

Student Name: Frances Smith

Schanler, R.J. (2007). Evaluation of the evidence to support current recommendations to meet the needs of premature infants: the role of human milk. American Journal of Clinical Nutrition, 85, 625S - 628S.	CINHAL, pubMed: Human milk, pre-term infants, nutrition, breast milk	Level VII	Explore nutritional factors in various forms of infant nutrition.	N/A	N/A	N/A	Acknowledges host-defense benefits from the feeding of mothers milk to preterm infants, recognizes that there is no dose effect determined	Brief review of milk compositions and effects - more study needed	Acknowledges that we just don't know, much of what we do is based on what we have always done and we need more study.
Schanler, R.J. , O'Connor, K.G. & Lawrence, R.A., (1999). Pediatricians' practices and attitudes regarding breastfeeding promotion. Pediatrics, 103, e35. 10.154/peds.103.3.e35.	CINAHL: Breastfeeding, attitudes, knowledge, attitudes, NICU, lactation, Lactation support, nursing education, physician education, beliefs, myths	Survey Level VI	To identify the educational needs of pediatricians regarding breastfeeding in order to meet guidelines of the AAP	1602 active Fellows of the American Academy of Pediatrics, $P \leq 0.01$; X^2 tests performed to evaluate response by demographics	30th survey, self-administered, forced choice mailed to 1602 randomly selected Fellows of the AAP. Response rate was 71%	Only 65% of the respondents acknowledged that they advised 6 months of exclusive BF (as recommended by AAP, CDC and WHO), only 37% recommended for 1 year. The majority stated that breast milk and formula are equivalent in value, 72% were unfamiliar with the Baby Friendly Hospital Initiative.	The majority of pediatricians stated they had little if any education and wanted to know more.	Shows where the pediatric community is with regard to breast feeding and indicates need for further education.	In the years since this survey, there has been some movement in education, Baby Friendly Hospital Initiative (BFHI) has helped a great deal. Unfortunately the attitude that formula and abreast milk are equal has not really changed.

Student Name: Frances Smith

Schanler, R.J., Lau, C., Hurst, N.M., Smith, E.O. (2005). Randomized trial of donor human milk versus preterm formula as substitutes for mother's own milk in the feeding of extremely premature infants. Pediatrics, 116, 400-405. 10.1543/peds.2004-1974.	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	RT Level II	Compares donor milk to formula as a substitute when mother's milk is not available	Premature infants ≤ 30 weeks gestation, randomly assigned to receive donor milk (DM) or premature formula (PM).	Infection related events reviewed by feeding group were compared, if no differences found they were then combined and compared to the mother's milk group	Of 243 infants, 70 received only mothers milk (MM) 29%, donor milk group included 81 infants and preterm formula included 92 infants. Poor weight gain caused the DM group to be combined with PF group. MM group had less sepsis, NEC, infection related events, and overall shorter LOS.	In this randomized, blinded study, DM is not found to have the same effect as MM, and offered little advantages over PF. MM fed infants did best.	Good study, lots of complicated statistics that too a lot of time to try to wade through	If it weren't for the synopsis and conclusion, I might not have understood much in this study. Mad me fee stupid, but once I read and re-read it started to make some sense.
Schanler, R.J. Shulman, R.J. & Lau, C. (1999). Feeding strategies for premature infants: beneficial outcomes of feeding fortified human milk versus preterm formula. Pediatrics, 103, 1150-1157.	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	RT Level II	Determine if fortified HM vs. premature formula provided the best nutrition	Preterm infants, (N=108) fed either mothers milk fortified or fortified preterm infant formula	Parents choice for feeding, study spanned entire hospital stay. Growth, feeding tolerance and health status were evaluated	Infants fed FHM were discharged earlier, but had slower weight gain, incidences of NEC and late onset sepsis were less in the fortified human milk group (FHM)	The unique properties of human milk provide protection against infections including NEC, benefits of protection outweigh the risk of slower growth in the FHM group, findings suggest that FHM should be promoted as the choice in preterm infants.	Again, many complicated statistics, difficult to suss out actual findings, but once those were found it proved to validate information in other articles.	I keep seeing this repeated theme of slower weight gain in HM fed infants, does that slower weight gain correlate to decreased in obesity in later years?

Student Name: Frances Smith

Seigel, J.K., Smith, P.B., Ashley, P.L., Cotton, C.M., Herbert, C.C., King, B.A., Maynor, A. R., Neill, S., Wynn, J., & Bidegain, M. (2013).Early administration of oropharyngeal colostrum to extremely low birth weight infants. Breastfeeding Medicine, 8, 491-494. 10.1089/bfm.2013.0025	CINHAL, pubMed: Human milk, pre-term infants, nutrition, breast milk	Retrospective cohort study. Level IV	Compare clinical outcomes before and after implementing oropharyngeal colostrum (COL) protocol	ELBW infants admitted 1/2007 through 11/2011, N=369.	Reviewed medical records of infants included in study, statistical significance at p< 0.05	Mortality and percentage of surgical NEC and perforations was similar between groups; colostrum cohort had greater weight gain at 36 weeks than Pre-colostrum group	Using oral colostrum is feasible and may be beneficial; may facilitate earlier exposure to immune modulators and enable critically ill neonate to benefit	Comprehensive data set analysis, infants all in one medical center, documentation consistency. Weakness is the lower BW of the precolostrum group, which may effect mortality and morbidity	More evidence in support of human milk and the benefits derived from human milk
Siddell, E., Marinelli, K., Fromna, R.D., & Burke, G. (2003). Evaluations of an educational intervention on breastfeeding for NICU nurses. *Journal of Human Lactation19, 293-302.*	CINAHL: Breastfeeding, attitudes, knowledge, attitudes, NICU, lactation, Lactation support, nursing education, beliefs, myths	Pre-test/post-test design Level VI	To test the effect of an educational program on knowledge ant attitudes toward breastfeeding in maternal and newborn nurses	NICU Nurses (experimental group, pediatric nurses (control)	Breastfeeding questionnaire, both groups answered the questionnaire on 2 occasions, the NICU group responded the second time after completing and educational intervention.	Outcome measures were 1) breastfeeding knowledge, 2) pro breastfeeding attitudes, 3) baby focuses attitudes, 4 nurse focused attitudes. A significant increase (p<.001) occurred in the NICU nurses' breastfeeding knowledge after the educational intervention.	Findings suggest that education may increase knowledge but may not effect Attitude	Limitations: convenience sample, self-selection into experimental /control groups. Nursing practice following intervention was not measured.	This is the basis for my project. There are several studies that came from this - and it had a easy format to modify and follow.

Student Name: Frances Smith

Sisk, P.M., Lovelady, C.A., Dillard, R.G., Gruber, K.J., & O'Shea, T.M. (2007). Early human milk feeding is associated with a lower risk of necrotizing enterocolitis in very low birth weight infants. Journal of Perinatology, 27, 428-435. www.nature.com/jp	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	Prospective cohort study Level III	To determine if high proportions of Human milk (HM) feeding (50% >) within the first 14 days of life are protective from incidences of NEC	202 Low birth weight infants 700 - 1500 g. P=0.01	Infants grouped according to high human milk (HHM) > 50% and low human milk (LHM) < 50%, in the first 14 days of life with relationship to the development of NEC	Confirmed NEC occurred in 10.6% of the LHM fed group, compared with 3.2% of the HHM fed group.	HHM feds > 50% for the first 14 days of life was associated with a six-fold decrease in the odds of NEC.	Consistent results to other studies	Support for HM feeding in preterm infants.
Spatz, D.L. (2013). Preventing obesity starts with breastfeeding. Journal of Perinatal and Neonatal Medicine 28, 41-50. www.jpnnjournal.com.	CINAHL, pubMed;Human milk, breast milk, benefits	N/A Level VII	N/A	N/A	N/At.	Examines major findings all that conclude any breastfeeding will protect infant from obesity and being overweight.	Prevention of obesity begins with breastfeeding	Well designed	Supports use of human milk in infancy as preventative for a major health problem in the population.
Spatz, D.L. (2012). Innovations in the provision of human milk and breastfeeding for infants requiring intensive care. JOGNN, 41, 138-143.10.1111/j.1552-6909.2011.01315	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	N/A Level VII	N/A	N/A	N/A	N/A	It is imperative that nurses know enough and care enough to support mother's who are wanting to breastfeed their infants in the NICU	Good opinion piece, well educated and well documented piece	Supportive article, mostly supports the fact that more education and more emphasis need be placed on the vale of breast milk and human milk feeding in the NICU.

Student Name: Frances Smith

Strathearn, L., Mumun, A.A., Najman, J.M., O'Callaghan, M.J. (2009). Does breastfeeding protect against substantiated child abuse and neglect? A 15-year cohort study. Pediatrics, 123, 483-493. 10.1542/peds.2007-3546.	CINAHL, PubMed; human milk, abuse, child abuse	Prospective longitudinal study, Level IV	Does breastfeeding protect infants from maternal child abuse during their life	7223 Mother-infant pairs monitored over 15 years	Based on substantiated child protection reports, logistic regression used to compare no maltreatment to maternal maltreatment and non-maternal maltreatment.	Of the 512 children with substantiated maltreatment reports, ≥ 60% experienced ≥ 1 episode of maternal maltreatment. The odds ratio for maternal maltreatment increased when breastfeeding time decreased, with the odds of maternal maltreatment for nonbreastfed infants being 4.8 times the odds for breastfed infants > 4 months.	Breastfeeding may help protect children from maternally perpetrated maltreatment and neglect.	well designed longitudinal study	Wish there were studies of the long-term effects of breastfeeding on the mental health and physical status of children who have had this relationship.
Stube, A. (2009). The risks of not breastfeeding for mothers and infants. Reviews in Obstetrics & Gynecology, 2, 222-231. www.ncbi.nim.nih.gov/pmc/articles/PMC2812877/	CINAHL, PubMed: Breastfeeding, human lactation, infant feeding	N/A Level VII	N/A	N/A	N/A	N/A	In the US the Baby Friendly Hospital Initiative, has not been widely accepted. Author posits that US physicians and hospital are not supportive of BF, and concludes that OB/GYN's have a role in promoting and supporting BF.	Well documented and well researched	Supportive of BF and helps with facts to emphasize with staff and providers.

Student Name: Frances Smith

Sullivan, S., Schanler, R. J., Kim, J.H., Patel, A.L., Trawöger, R., Kiechl-Kohlendorfer, U., Chan, G.M., Blanco, C.L., Abrams, S., Cotton, M.,Laroia, N., Ehrenkranz,R.A., Dudell, G., Cristofalo, E.A., Meier, P.,Lee, M.L., Rechtman, D.J., & Lucas, A. (2010). An exclusive human milk-based diet is associated with a lower rate of necrotizing enterocolitis than a diet of human milk and bovine milk-based products. Journal of Pediatrics, 156, 562-567. www.jpeds.com	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	RCT Level II	To evaluate the health benefits of exclusive human-milk based diet compared with a diet of both human-milk and bovine-based products in extremely premature infants.	NICU admitted infants birth weight 500 - 1250 g Power 90%, two-sided α error of 2.5%; 2 way comparisons Wilcoxon rank-sum test, ANOVA for normally distributed data	Infants were divided into groups according to feeding and fortification; outcomes included duration of parenteral nutrition, morbidity and growth	The 3 groups (N=207) were similar in demographics, duration of parental nutrition, rates of Late onset sepsis (LOS), and growth. The groups receiving HM exclusively had lower incidences of NEC (P=0.02) and NEC requiring surgical intervention (P= 0.007).	For extremely preterm infants, a diet of exclusively human milk leads to decreased rates of NEC, when compared to a diet of human milk fortified with bovine based products.	Randomization and stratification achieved balance. Limitations included lack of complete blinding	Another very supportive article which gives emphasis to the benefits of exclusive human milk and human milk-based fortification.

Student Name: Frances Smith

Taylor, S.N., Basile, L.A., Ebling, M., & Wagner, C.L. (2009). Intestinal permeability in preterm infants by feeding type: Mother's milk versus formula. Breastfeeding Medicine, 4, 11-15. 10.1089/bfm.2008.0114.	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	Prospective study Level VI	Identifies relationship between feeding type and intestinal permeability measured by lactulose to mannitol ratio in the first prenatal month	Preterm infants ≤ 32 weeks gestation (N= 62), power 80%, α = 0.05	each infant was administered lactulose/mannitol solution via NG tube, and measurement of residual in urine assessed.	Infants who received any human milk demonstrated significantly decreased L/M ratios when compared to those who received formula only (p= 0.006).	Feeding type was associated with gut permeability with a 2.8 fold high composite median L/M ratio of formula fed infants compares to those who were fed human milk. Human milk promotes closure of the intestinal leakage at an earlier stage than will infants fed formula.	Good cohort sudy, no real cause of NEC known or defined	Excellent article
Thompson, A.M. & Bizzarro, M.J. (2008). Necrotizing entrocolitis in newborns: pathogenesis, prevention and management. Drugs 2008, 68, 1227-1238.	CINAHL: Premature infant feeding, Extremely Low Birth Weight infants, prematurity	Review Level VII	N/A	N/A	N/A	Review of the known science of Necrotizing Enterocolitis	Many factors lead to NEC, and there are no known preventives, but there are things that seem to ameliorate the risk including uses of human milk feeds	Review article defines NEC, no real new science	Recommends more studies

Student Name: Frances Smith

Thorley, V. (2008). Sharing breastmilk: wet nursing, cross-feeding and milk donations. Breastfeeding Review, 25-29.	CINAHL, PubMed: Breastfeeding, human lactation, infant feeding	Author review Level VII	N/A	N/A	N/A	Historical review, with definitions	Understanding human milk feeding, wet-nursing and cross feeding is necessary to be culturally sensitive in caring for breastfeeding women.	Good historical review and synopsis of a little discussed issue	Women buy untested breast milk on the internet, but cross-feeding is a common practice
Tudehope, D.I. (2013). Human milk and the nutritional needs of preterm infants. *The Journal of Pediatrics 162,* S17-S25.	Medline, CINAHL; Advocate, Human milk, nutritional content	Review Level VII	Explores what is known about the composition of Human milk	N/A	N/A	N/A	Supports mothers milk but also expressed belief that infant formula is an appropriate option.	Gives information about breastmilk, recommendations about caring for breast milk and the use of donor milk	Author discloses the receipt of an honorarium from Mead-Johnson for this presentation.
Walker, T.C., Keene, S.D.,& Patel, R.M. (2014). Early feeding factors associated with exclusive versus partial human milk feeding in neonates receiving intensive care. Journal of Perinatology, 34, 606-610. 10.1038/jp.2014.63 www.nature.com/jp.	CINAHL, PubMed: Breastfeeding, human lactation, infant feeding	Retrospective cohort study. Level IV	To evaluate early feeding factors associated with exclusive human milk feeding versus partially human milk fed infants	264 infants who received either exclusive or partial human milk feedings, what they were fed with at discharge; power 80%, P=0.05	Compares baseline neonatal and maternal variables between sets.	If the fist feed is human milk, the infant is likely to be exclusively breastfed at discharge, while if the first feed is other, they are less likely to be exclusively breast fed.	It is difficult to establish and maintain mother's milk feedings exclusively in the NICU, but worthwhile to ensure that infants receive the greatest amount of human milk	Consecutive samples used, increasing generalizability, the study was able to determine actual discharge feeding status, and able to adjust for confounding. Limitations include not knowing exclusivity of feeding after discharge	Mothers of NICU infants need to be encouraged to provide breastmilk

Student Name: Frances Smith

Watkins, A.L, & Dodgson, J.E. (2010). Breastfeeding educational interventions for health professionals: A synthesis of intervention studies. *Journal for Specialist in Pediatric Nursing 15,* 223-232.	CINAHL, PubMed: Breastfeeding, human lactation, infant feeding	Review and synthesis of the literature; Level V	To evaluate the effect that an educational intervention has on breastfeeding in the NICU	87 studies were initially identified, 27 articles met inclusion criteria. 12 articles were excluded as they involved intervention with the mother; Fourteen articles identified and included is the review.	Coopers five stages of research synthesis were used to analyze and synthesize the articles. Each article was read and re-read. Key components were identified and used to create tables.	12 of the studies measured attitude and knowledge of healthcare providers before and after the intervention. There was no long term follow up for the duration of breastfeeding in any of the intervention articles.	Breastfeeding information and knowledge increase practitioners confidence. The more seasoned nurses in NICU's had the least favorable attitudes toward breastfeeding, and a positive personal experience with breastfeeding influenced breastfeeding attitudes.	Strong review of literature	When looking for curriculum data this provided a good guideline.
US Department of Health and Human Services, (2011), The Surgeon General's call to action to support breastfeeding. *Http://www.surgeongeneral.gov/library/calls/breastfeeding/index.html.* Accessed November 2011.	CINHAL, PubMed: Human milk, pre-term infants, nutrition, breast milk	N/A Level VII	The purpose of this call to action is to increase exclusive breastfeeding in the US.	N/A	N/A	Reviews known benefits of breastfeeding	Population health starts with prenatal and immediate postnatal care. Breast feeding needs to be encouraged as a factor contributing to population as well as individual health.	Strongly support breastfeeding, no governmental commitment to support breastfeeding women or mandate employer or insurer compensation or support	Happy that the government wants to take a stand in support of breastfeeding, but without mandates, there will be little overall improvement of post-discharge breast feeding.

Appendix B

Recruitment Advertisement

Volunteers Needed for Research Study

We need participants for a research study:
"Measuring changes in knowledge and attitudes of NICU providers after receiving an educational intervention about the value of human milk in the NICU preterm infant."

Description of Project: We are researching knowledge and attitudes about the use of human milk in the preterm infant. Your participation will consist of taking a pretest, attending an educational offering, and taking a post test, a total of approximately 4 hours.

To participate: You must be currently an RN, NNP, Ped Resident or MD actively caring for infants in the NICU.

To learn more, contact the principle investigator of the study, Libby Smith, at 502-562-6519 or fsmith002@worldclass.regis.edu.

This research is conducted under the direction of Dr. Lora Claywell, Capstone Chair, and has been reviewed and approved by the UofL and Regis University Institutional Review Board.

INSTRUCTIONS FOR PARTICIPANTS

Please complete one pre-test, place in envelope, seal, place in sealed box. Boxes are located in NICU and Mother/Baby. On September 10 pretesting will be completed. Educational Interventions will begin October 1 and will be complete October 8. Thank you for your participation in this research study.

INSTRUCTIONS FOR PARTICIPANTS

Please complete one pre-test, place in envelope, seal, place in sealed box. Boxes are located in NICU and Mother/Baby. On September 10 pretesting will be completed. Educational Interventions will begin October 1 and will be complete October 8. Thank you for your participation in this research study.

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Appendix C

Pre/Post-test

Questionnaire – Please circle

1. Age (1) 22-29 (2) 30-39 (3) 40-49 (4) 50 years or older
2. Educational level (1) A.D. N. (2) Diploma (3) BS/BSN (4) MS/MSN (5)MD/DNP/PhD
3. Certification (1)Yes (2)No
4. Years in position (1)0-5 (2) 6-10 (3)11-15 (4) 16-20 (5) >20
5. Personal Breastfeeding Experience (1)Yes (2) No
6. Satisfied with personal experience (1)Yes (2)No

Please answer on a 1-5 scale

1=strongly disagree 2=Disagree 3=neutral 4=Agree 5=Strongly agree

7. Breast milk is more nutritious than formula
   1.....2.....3.....4.....5
8. Breast feeding promotes closeness between mother and baby
   1.....2.....3.....4.....5
9. Mothers who insist on breastfeeding aren't considering the baby's needs
   1.....2.....3.....4.....5
10. I don't have time to work with a mother helping her breastfeed
    1.....2.....3.....4.....5
11. Formula supplementation may interfere with a mother's ability to breastfeed
    1.....2.....3.....4.....5
12. I am interested in learning new methods of helping mother's successfully breastfeed in the NICU
    1.....2.....3.....4.....5
13. Gavage feeding a baby with a strong gag reflex simply to avoid giving a bottle is unfair to the baby
    1.....2.....3.....4.....5
14. Babies are fed according to the preferences of the nurse when the mother isn't available.
    1.....2.....3.....4.....5
15. Skin-to-skin contact (kangaroo care) helps preemies get started with breastfeeding.
    1.....2.....3.....4.....5
16. I am willing to attend in-services about breastfeeding at least once a year if offered.
    1.....2.....3.....4.....5
17. Bottle feeding is physiologically easier and less stressful for a preemie than breastfeeding.
    1.....2.....3.....4.....5
18. If given the choice between working with a breastfeeding mother, or referring her to a lactation consultant, I would wait for the lactation consultant.
    1.....2.....3.....4.....5
19. Introducing bottles before a baby is well established at breast feeding will not interfere with a mothers long term breastfeeding success.
    1.....2.....3.....4.....5

Pre/Post-test cont.

20. I think healthcare providers can make a difference in mothers' breastfeeding success.
    1.....2.....3.....4.....5
21. Allowing preemies to supplement formula with a bottle will mean earlier discharge from the NICU.
    1.....2.....3.....4.....5
22. There are other alternatives to formula that may help mother's succeed at breastfeeding.
    1.....2.....3.....4.....5
23. Babies should be bottle fed when mother is not available for breastfeeding.
    1.....2.....3.....4.....5
24. Healthy preemies are better adapted to suckle at breast than drink from a bottle.
    1.....2.....3.....4.....5
25. Breastfeeding offers preemies immunological and developmental benefits that bottle/formula feeding does not.
    1.....2.....3.....4.....5

Appendix D

Copyright Clearance

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Title: Evaluation of an Educational Intervention on Breastfeeding for NICU Nurses:

Author: Erica Siddell, Kathleen Marinelli, Robin D. Froman, Georgine Burke

Publication: Journal of Human Lactation

Publisher: SAGE Publications

Date: 08/01/2003

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Logged in as:
Frances Smith

LOGOUT

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Appendix E

DNP Project Proposal Timeframe

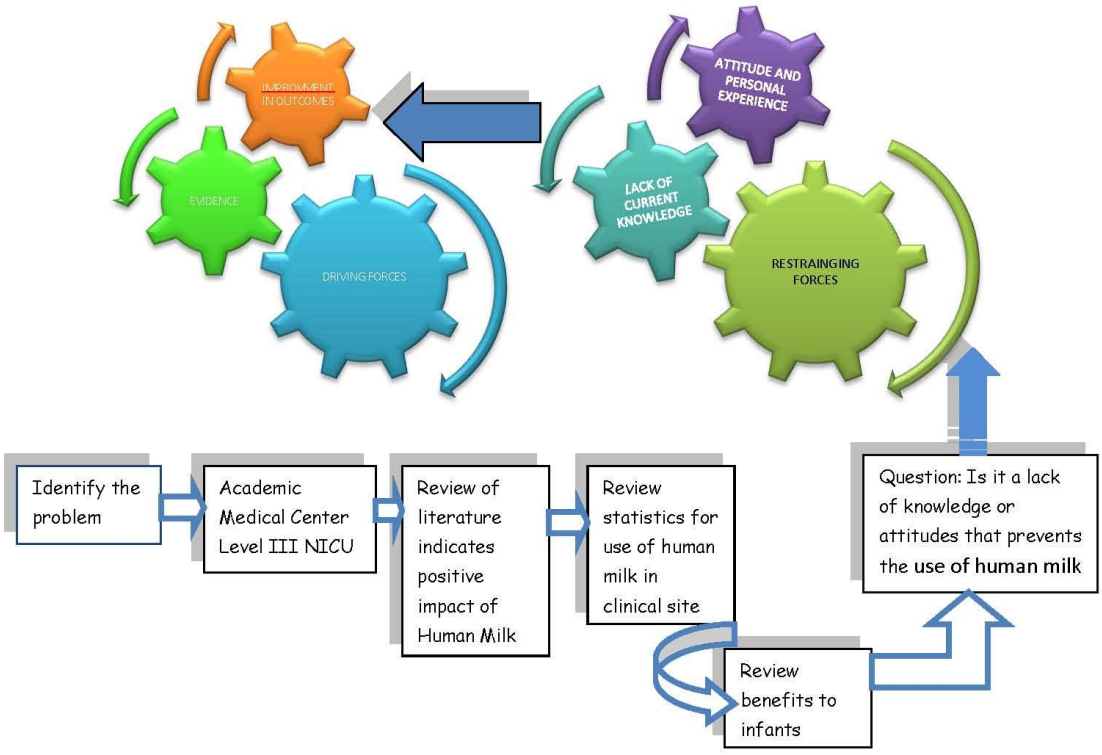
	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Step 1 Problem Recognition	C											
Identify issue	C											
Problem Statement	O	C										
Approvals	O	C										
Literature Review	O	O	O	O	O	O	O	O	O	O	C	
Step II Needs Assessment	O	O	O	O	O	O	O	O	O	C		
Identify Population	O	C										
Identify Stakeholders	O	O	O	O	O	C						
Assess Resources	O	O	O	O	O	C						
Desired Outcomes	O	O	O	O	O	C						
Cost/Benefit Analysis	O	O	O	O	O	C						
Define Scope of project	O	O	O	O	O	C						
Obtain approvals	O	O	O	O	O	C						
Step III Goals, Objectives, Mission & Vision				C								
Develop Goals				C								
Develop process plan/outcome objectives				C								
Develop Mission &Vision					C							
Step IV Theoretical Underpinnings									C			
Behavioral Theory	C											
Nursing Theory									C			
Obtain Approvals					C							
Step V Work Plan			C									
Project Plan			C									
Project Time Line			C									
Develop cost analysis					C							
Step VI Planning for Evaluation	O	O	O	O	O	O	O	O	O	O	C	
Adapt Instrument								C				
Develop Logic model								C				

DNP Project Proposal Timeframe (cont.)

	Jan	Feb	Mar	Apr	May	June	Jul	Aug	Sep	Oct	Nov	Dec
Step VII Implementation									**O**	**O**	**C**	
IRB Approval Regis University						**C**						
IRB Approval UofL								**C**				
Determine Threats and Barriers								**C**				
Implementation Plan								**O**	**O**	**O**	**C**	
Completion												**C**

Appendix F

Logic model



Appendix G

Budget and Resources

Budget	Cost
Printing materials	$50
Room Rental	$250
Equipment Rental	$100
Cost of Participation per/participant	$5200
Total	$5600.00

Appendix H

Statistical Analysis

Demographics

Age years	N=	BSN	DIPLOMA	A.D.N.
22-29	5	5	0	0
30-39	5	3	1	1
40-49	6	5	0	1
50 >	10	3	3	4
Education Level	N= 26	16		
Associates	6			
Diploma	4			
BSN	16			
MSN	0			
MD	0			
Years in present position	N= 26			
0-5	6			
6 yr - 10 yr	7			
11 yr - 15 yr	3			
16 yr - 20 yr	1			
> 20 yr	9			
Personal BF exp	N = 26			
yes	15			
NO	11			
Satisfied with personal experience	N= 15			
Yes	14			
NO	1			

Statistical Analysis cont.

KNOWLEDGE						
	ADN		DIPLOMA		BSN	
Knowledge n=7	Pre	Post	Pre	Post	Pre	Post
7	4.33	5	3.75	5	3.5	4.37
11	3.83	4.33	3.5	4	2.37	3.68
15	4.5	4.83	4.5	4.5	4.43	4.75
19	3.66	3.83	3	3	2.18	3.56
22	3.83	4.66	2.5	4.25	3	4.25
24	4.16	4.5	3.5	3	2.93	4.06
25	4.5	4.66	4.5	4.75	4.12	4.56
Sum	28.81	31.81	25.25	28.5	22.53	29.23
MEAN	4.11	4.54	3.6	4.07	3.21	4.17
ATTITUDE Questions						
BREASTFEEDING FOCUSED n=4						
8	4.33	5	3.5	4.75	3.75	4.68
12	3.5	4.66	2.75	3.75	2.65	4.43
16	3.33	4.66	2.5	3.75	2.25	4.37
20	3.83	4.66	3.25	4.75	3.5	4.75
Sum	14.99	18.98	12	17	12.15	18.23
Mean	3.74	4.74	3	4.25	3.03	4.55
BABY FOCUSED n=5						
9	3.33	4.83	2.75	4.5	3.06	4.5
13	2.5	2	4.25	2	3.87	2.18
17	3.16	4.5	3	4.5	2.68	4
21	2.83	4.5	3	3.75	1.87	3.93
23	1.5	3.16	1.75	2.75	1.62	2.81
Sum	13.32	18.99	14.75	17.5	13.1	17.42
Mean	2.66	3.79	2.94	3.5	2.62	3.48
NURSE FOCUSED						

n=3						
10	3.5	4.66	2.5	4.75	2.87	4.5
14	3.66	4.16	3	3.5	2.68	4.31
18	2.66	3.83	2	3.25	1.93	3.25
Sum	9.82	12.65	7.5	11.5	7.48	12.06
Mean	3.27	4.21	2.5	3.83	2.49	4.02

Paired Samples Statistics						
Pre/Post Pairs	Mean	Std Dev.	t	sig (2 tail)	p <0.05	Significant?
Pair 1 Knowledge all	-0.61667	0.56486	-5.003	0.000	p <0.001	yes
ADN KNOW	-0.38	0.33066	-3.041	0.023	p <0.05	yes
Diploma KNOW	-0.46429	0.0783	-1.569	0.168	p > 0.05	no
BSN KNOW	-0.56286	0.93943	-1.585	0.164	p > 0.05	no
Pair 2 Attitude All	-1.16147	1.05082	-6.445	0.000	p <0.001	yes
BF all	-1.25583	0.40363	-10.778	0.000	p <0.001	yes
Baby Focus all	-0.08493	1.28976	-2.55	0.023	p <0.05	yes
Nurse task all	-1.26778	0.55118	-6.9	0.000	p <0.001	yes

Institutional Review Board Letter of Approval

REGIS UNIVERSITY

Academic Grants

3333 Regis Boulevard, H-4
Denver, Colorado 80221-1099

303-458-4206
303-964-5528 FAX
www.regis.edu

IRB – REGIS UNIVERSITY

June 17, 2014

Frances Smith
4904 Forest Park Drive
Louisville, KY 40219

RE: IRB #: 14-221

Dear Ms. Smith:

Your application to the Regis IRB for your project, "Measuring Changes in Knowledge and Attitudes of NICU Providers After Receiving an Educational Intervention About the Value of Human Milk in the NICU Preterm Infant," was approved as an exempt study on June 17, 2014. This study was approved per exempt study category of research 45CFR46.101.b(#2).

The designation of "exempt" means no further IRB review of this project, as it is currently designed, is needed.

If changes are made in the research plan that significantly alter the involvement of human subjects from that which was approved in the named application, the new research plan must be resubmitted to the Regis IRB for approval.

Sincerely,

Patsy Cullen

Patsy McGuire Cullen, PhD, PNP-BC
Chair, Institutional Review Board
Professor & Director
Doctor of Nursing Practice & Nurse Practitioner Programs
Loretto Heights School of Nursing
Regis University

cc: Dr. Claywell

Academic Institutional Review Board Approval

UNIVERSITY OF LOUISVILLE

Human Subjects Protection Program Office
MedCenter One – Suite 200
501 E. Broadway
Louisville, KY 40202-1798
Office: 502.852.5188 Fax: 502.852.2164

DATE: August 13, 2014

TO: Frances E Smith, RN, MSN, Ph.N.

FROM: The University of Louisville Institutional Review Board

IRB#: 14.0789

STUDY TITLE: **IAA - Measuring changes in knowledge and attitudes of NICU Providers after receiving an educational intervention about the value of human milk in the NICU preterm infant.**

REFERENCE #: 337725

DATE OF REVIEW: 08/13/2014

IRB STAFF CONTACT: Becky Higgins, BS, CIP, Director
Human Subjects Protection Program

The Regis University IRB is the IRB of Record for this study. The study documents were reviewed on 08/13/2014 and determined to be exempt according to 45 CFR 46.101(b) under category Category 2: Educational tests unlinkable to individuals and no risks from disclosure.

Documents/Attachments reviewed and approved:

Submission Components			
Submission Form			
Form Name		Outcome	
Initial Review Submission Packet		Approved as Submitted	
Study Application			
Form Name		Outcome	
IRB Study Application		Approved as Submitted	
Study Document			
Title	Version Number	Version Date	Outcome
Exempt site approval	Version 1.0	06/02/2014	
Exempt approval	Version 1.0	06/19/2014	
CITI Modules	Version 1.0	08/13/2014	
Letter of approval Regis	Version 1.0	06/17/2014	
Final Approved application	Version 1.0	06/14/2014	
Regis Exemption Letter	Version 1.0	06/17/2014	
Letter of support	Version 1.0	06/02/2014	
Exempt application	Version 1.0	06/03/2014	
Study Consent Form			
Title	Version Number	Version Date	Outcome
CITI modules	Version 1.0	08/13/2014	
Recruitment Ad	Version 1.0	08/13/2014	

Libby Smith
Page 2

Please be advised that any study documents submitted with this protocol should be used in the form in which they were approved.

Since this study has been approved under the exempt category indicated above, no additional reporting, such as submission of Progress Reports for continuation reviews, is needed. If your research focus or activities change, please submit an Amendment to the IRB for review to ensure that the indicated exempt category still applies. Best wishes for a successful study. Please send all inquiries to our office email address at hsppofc@louisville.edu

Thank you for your submission.

Sincerely,

Rebecca H. Higgins

Rebecca H. Higgins, BS, CIP, Director
Human Subjects Protection Program

CITI Training Certificate

COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

THE RCR FOR SOCIAL & BEHAVIORAL CURRICULUM COMPLETION REPORT

Printed on 12/09/2013

LEARNER	Frances Smith (ID: 3202321)
DEPARTMENT	Nursing
EMAIL	fsmith002@regis.edu
INSTITUTION	Regis University
EXPIRATION DATE	11/12/2015

THE RCR FOR SOCIAL & BEHAVIORAL : This course is for investigators, staff and students with an interest or focus in **Social and Behavioral** research. This course contains text, embedded case studies AND quizzes.

COURSE/STAGE:	RCR/1
PASSED ON:	11/12/2012
REFERENCE ID:	9160978

REQUIRED MODULES	DATE COMPLETED
Introduction to the Responsible Conduct of Research	11/12/12
Research Misconduct (RCR-SBE)	11/12/12
Case Study - Truth or Consequences (RCR-Physical Sciences)	11/12/12
Case Study - In the Field, No One Will Know (RCR-Humanities)	11/12/12
Case Study Plagiarism (RCR-SBE)	11/12/12
Research Involving Human Subjects (RCR-Interdisciplinary)	11/12/12

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Paul Braunschweiger Ph.D.
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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

Printed on 12/09/2013

LEARNER	Frances Smith (ID: 3202321)
DEPARTMENT	Nursing
EMAIL	fsmith002@regis.edu
INSTITUTION	Regis University
EXPIRATION DATE	11/13/2015

SOCIAL BEHAVIORAL RESEARCH INVESTIGATORS AND KEY PERSONNEL

COURSE/STAGE:	Basic Course/1
PASSED ON:	11/13/2012
REFERENCE ID:	9165522

REQUIRED MODULES	DATE COMPLETED
Introduction	11/13/12
History and Ethical Principles - SBE	11/13/12
The Regulations - SBE	11/13/12
Assessing Risk - SBE	11/13/12
Informed Consent - SBE	11/13/12
Privacy and Confidentiality - SBE	11/13/12
Regis University	11/13/12

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CITI CONFLICTS OF INTEREST CURRICULUM COMPLETION REPORT

Printed on 12/09/2013

LEARNER	Frances Smith (ID: 3202321)
DEPARTMENT	Nursing
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INSTITUTION	Regis University
EXPIRATION DATE	11/11/2016

CONFLICTS OF INTEREST

COURSE/STAGE:	Stage 1/1
PASSED ON:	11/12/2012
REFERENCE ID:	9160979

REQUIRED MODULES	**DATE COMPLETED**
CITI Conflict of Interest Course - Introduction	11/12/12
Financial Conflicts of Interest: Overview, Investigator Responsibilities, and COI Rules	11/12/12
Institutional Responsibilities as They Affect Investigators	11/12/12

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COLLABORATIVE INSTITUTIONAL TRAINING INITIATIVE (CITI)

HUMAN RESEARCH CURRICULUM COMPLETION REPORT

Printed on 12/10/2013

LEARNER	Frances Smith (ID: 3202321)
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INSTITUTION	Regis University
EXPIRATION DATE	12/09/2016

IRB REFERENCE RESOURCE

COURSE/STAGE:	Refresher Course/2
PASSED ON:	12/10/2013
REFERENCE ID:	11901093

REQUIRED MODULES	**DATE COMPLETED**
SBE Refresher 1 – Defining Research with Human Subjects	12/09/13
SBE Refresher 1 – Privacy and Confidentiality	12/09/13
SBE Refresher 1 – Assessing Risk	12/09/13
SBE Refresher 1 -- Research with Children	12/09/13
SBE Refresher 1 -- International Research	12/09/13
Biomed Refresher 1 - Instructions	12/09/13
ELECTIVE MODULES	**DATE COMPLETED**
SBE Refresher 1 -- History and Ethical Principles	12/09/13
SBE Refresher 1 – Federal Regulations for Protecting Research Subjects	12/09/13
SBE Refresher 1 – Informed Consent	12/09/13
SBE Refresher 1 – Research with Prisoners	12/09/13
SBE Refresher 1 – Research in Educational Settings	12/09/13
Biomed Refresher 1 -- History and Ethical Principles	12/09/13
Biomed Refresher 1 – Regulations and Process	12/09/13
Biomed Refresher 1 – Informed Consent	12/09/13
Biomed Refresher 1 – SBR Methodologies in Biomedical Research	12/09/13
Biomed Refresher 1 -- Records-Based Research	12/09/13
Biomed Refresher 1 – Genetics Research	12/09/13
Biomed Refresher 1 – Research Involving Vulnerable Subjects	12/09/13
Biomed Refresher 1 – Vulnerable Subjects - Prisoners	12/09/13
Biomed Refresher 1 -- Vulnerable Subjects - Children	12/09/13
Biomed Refresher 1 – Vulnerable Subjects - Pregnant Women, Human Fetuses, Neonates	12/09/13
Biomed Refresher 1 – FDA-Regulated Research	12/10/13
Biomed Refresher 2 -- History and Ethical Principles	12/10/13
Biomed Refresher 2 – Regulations and Process	12/10/13
Biomed Refresher 2 – Informed Consent	12/10/13
Biomed Refresher 2 – SBR Methodologies in Biomedical Research	12/10/13
Biomed Refresher 2 -- Genetics Research	12/10/13
Biomed Refresher 2 – Records-Based Research	12/10/13
Biomed Refresher 2 – Research Involving Vulnerable Subjects	12/10/13
Biomed Refresher 2 – Vulnerable Subjects – Prisoners	12/10/13
Biomed Refresher 2 – Vulnerable Subjects – Children	12/10/13
Biomed Refresher 2 – Vulnerable Subjects – Pregnant Women, Human Fetuses, Neonates	12/10/13
Biomed Refresher 2 – FDA-Regulated Research	12/10/13
Biomed Refresher 2 – HIPAA and Human Subjects Research	12/10/13
Biomed Refresher 2 – Conflicts of Interest in Research Involving Human Subjects	12/10/13
How to Complete the CITI Refresher Course and Receive a Completion Report	12/10/13

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Agency Letters of Support of Capstone Project

University of Louisville Hospital
KentuckyOne Health™

530 S. Jackson Street
Louisville, KY 40202
P 502-562-3000
KentuckyOneHealth.org

June 2, 2014

Frances E. Smith
4904 Forest Park Drive
Louisville, KY 40219

Dear Libby,

As Chief Nursing Officer of University of Louisville Hospital and the Center for Women and Infants at University of Louisville Hospital, I am pleased to write this letter in support of your project: "Measuring Changes in Knowledge and Attitudes of NICU Providers After Receiving an Educational Intervention about the Value of Human Milk in the NICU Preterm Infant."

University of Louisville Hospital, develops and maintains resources and educational programs that uphold the spectrum of research activities. The partnership between the University of Louisville, University of Louisville Hospital, and various other educational institutions sustains our mission and vision as an academic medical center as well as enhances our profile.

When your project is approved by the Regis University IRB, we will approve of and fully support your research being conducted in our facility. Your current work in the Center for Women and Infants has demonstrated your commitment for the best for our mothers and babies. I am sure that this project will further the success of the department.

I wish you success with your application and look forward to a fruitful collaboration.

Sincerely,

Mary Jane Adams

Mary Jane Adams, RN, MSN

FS/hg
6/2/14

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