The Nurses Knowledge of Oropharyngeal Administration of Mother's Breast Milk in Extremely Low Birth Weight Infants to prevent NEC Study

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Abstract

Aim: To investigate the knowledge base of full time newborn critical care nurses related to oro-pharyngeal administration of mother's breast milk to reduce the risk and prevalence of NEC in ELBW infants.

Background: While the use of mother's breast milk is widely supported and accepted practice, the oropharyngeal administration of mother's breast milk is a new occurrence in neonatal care. A review of the literature suggest that, while it demonstrates benefits for the infants, some neonatal nurses do not exhibit an awareness of the current research on oropharyngeal administration of mother's breast milk to reduce the risk and prevalence of NEC in ELBW infant. As they have the most parent-infant contact and influence over whether oropharyngeal administration of mother's breast milk is carried out, assessment of their knowledge base is important.

Method: A quantitative, descriptive design with neonatal nurses (n= 37) was used.

Findings: Multiple areas were identified in which neonatal nurse education could be improved through a short in-service or handout. The three main topics of education are the indications of oropharyngeal administration, how colostrum affects the microbial colonization of the oral cavity of a very low birth weight infant, and that an epidemiologic risk factor for NEC is that there is a history of enteral feeding. Creating some educational material for the health care workers involved in the care of these neonates could be beneficial in promoting the implementation by breaking down the barrier of lack of knowledge by the providers and nurses.

Introduction

For the preterm infant, prolonged intensive neonatal nursing and medical care is critical for their survival. An interprofessional team approach results in better decisions on treatment options. Interprofessional teams are more likely to perform more interventions before introducing the feeding tube into therapy. This could be carried over into the neonatal intensive care unit for ELBW patients by collaborating with speech therapy, nursing, medicine, physical therapy, and respiratory therapy. (Ogita, Utsunomiya, Nin, Arai, 2013). Necrotizing enterocolitis (NEC) is a detrimental gastrointestinal disease that affects the intestines of infants. Extremely Low Birth Weight infants (ELBW) are those that weigh less than 1000 grams. ELBW infants are at an increased risk of developing NEC for various reasons, including that they are immunocompromised, are exposed to invasive procedures, and have increased time spent in a neonatal intensive care unit (NICU) (Rodriguez, Meier, Groer, & Zeller, 2008). In addition to these risks, ELBW infants also have an immature intestinal epithelial barrier, a suppressed anti-inflammatory response, decreased gastric acid, and decreased intestinal mucosa (Rodriguez & Caplan, 2015). Multiple studies have been performed with the end goal of reducing the risk and prevalence of NEC in ELBW infants. One feeding technique in particular that was studied was the oropharyngeal administration of mother's breast milk.

Infants have improved clinical outcomes with a standardized feeding protocol that includes oral administration of colostrum (Mccallie, et al., 2011). Administration of colostrum or breast milk into the oral cavity is safe, cost effective, and relatively easy (Seigel, et al., 2013). There are many theoretical possibilities for how oral administration of breast milk can lead to decreased rates of NEC (Rodriguez & Caplan, 2015). Oral administration of breast milk changes the oral microbiota in premature infants (Sohn, Kalanetra, Mills, & Underwood, 2015). While

early administration of oropharyngeal colostrum in ELBW infants did not create a statistically different rate of NEC, it did result in increased weight gain and shorter time to full enteral feeds (Seigel, et al., 2013).

In a review of the literatures the practice of placing mother's breast milk in the oral cavity of an ELBW infant was identified as having multiple theoretical perspectives on how and why this intervention may improve outcomes in these infants. The review also concluded that the practice of oropharyngeal administration is safe, cost effective, and relatively easy (Seigel, et al., 2013). With these conclusions there is a need to develop a standardized feeding protocol to include oral administration of colostrum or breast milk to these infants. This protocol would need to be nurse driven, and supported by the entire health care team including the family. This study is aimed at assessing the knowledge base of full time newborn critical care nurses related to this intervention. The goal of assessing the knowledge base is to identify some barriers to implementation and areas in which education could be improved to increase the use of this practice.

Review of the Literature

Necrotizing enterocolitis (NEC) is a gastrointestinal disease that affects the intestines of infants. In this disease, bacteria cause a local infection on the wall of the intestine. This infection can lead to an inflammatory process that can destroy the wall of the intestine, which could result in perforation, infection, and death. Once an infant develops signs of NEC, the treatment options are limited. Antibiotics are initiated and if that does not work, the infant will undergo surgery in which the damaged part of the intestine is resected. If too much intestine is resected, malabsorption and even death could occur ("Necrotizing Enterocolitis", 2016).

Multiple studies have been performed with a goal of figuring out how to decrease the incidence and risk of NEC. Some of these studies have suggested that advances in feeding tech-

niques could be vital in the prevention of NEC, specifically in Extremely Low Birth Weight Infants (ELBW). One such feeding technique is the oropharyngeal administration of mother's breast milk. A literature review was performed to analyze the support for this feeding technique and suggestions related to practice. A total of 10 studies are presented in a chronological order so as to see the progression of this practice over the last ten years.

Table 1: Literature review paper characteristics

Study Number	Authors/Year	Article Title	Summary
1	Hunter, Catherine; Upperman, Jeffrey; Ford, Henri; Camerini, Victoria/ 9/13/2007	"Understanding the Susceptibility of the Premature Infant to Necrotizing Enterocolitis (NEC)"	This article identified many areas of possible susceptibility of the premature infant. One of the main ways that a premature infant is possibly susceptible is related to the insufficient defense mechanisms of the premature gut. It also identified a possible role for probiotics in this population. The authors also identified that the two consistent epidemiological risk factors for NEC include a history of enteral feeding (feeding directly into the stomach) and prematurity.
2	Rodriguez, Meier, Groer, Zeller/ 9/4/2008	"Oropharyngeal administration of colostrum to extremely low birth weight infants: theoretical perspectives"	This article identified two mechanisms for how oropharyngeal administration of own mother's colostrum to ELBW infants could be beneficial. These two mechanisms included immunomodulation of cells within the OFALT and GALT systems, and the mucosal absorption of sIgA and lactoferrin. They also

			discussed how the composition of the mother's colostrum changes depending on the degree of prematurity that the infant is experiencing.
3	McCallie, Lee, Mayer, Cohen, Hintz, and Rhine/ 2011	"Improved outcomes with a standardized feeding protocol for very low birth weight infants"	This retrospective analysis analyzed the data on infants receiving enteral feedings both before and after the implementation of a standardized feeding protocol. With the implementation of the protocol, various benefits were observed. Some of these benefits included decreased time to full feeds, decreased time on parenteral nutrition, decreased rates of necrotizing enterocolitis, and decreased late-onset sepsis.
4	Fallon et al./ 9/2012	"A.S.P.E.N. Clinical Guidelines: Nutritional Support of Neonatal Patients at Risk for Necrotizing Enterocolitis"	This article aimed to discover the appropriate feeding guidelines for neonatal patients at risk for NEC. The article concluded that the best practice for this at risk group includes initiating feedings within 2 days of life and using mother's milk. They concluded that additional research is needed for the use of probiotics, specific nutrients, and when to reintroduce feedings to those infants after experiencing NEC.
5	Ogita, Utsunomiya, Nin, Arai/ 4/13/2013	"Knowledge and Tube Feeding Practices for Older Adult Patients among Japanese Registered Nurses"	This study was related to knowledge studies of nurses about tube feedings in older patients. This article concluded that multidisciplinary

			teams are more likely to perform more interventions before introducing the feeding tube into therapy. This could be carried over into the practice suggestions for ELBW patients as speech therapy, nursing, medicine, physical therapy, and respiratory therapy could all have valuable input into the approach to care.
6	Seigel, Smith, Ashley, Cotton, Herbert, King, Maynor, Neill, Wynn, Bidegain/ 11/6/2013	"Early Administration of Oropharyngeal Colostrum to Extremely Low Birth Weight Infants"	This exploratory research study aimed to discover if there was a difference in clinical outcomes between ELBW infants who receive oropharyngeal colostrum and those infants who do not receive oropharyngeal colostrum. The study concluded that while there is still a need for further research, the initiation of oropharyngeal colostrum in ELBW infants in the first 2 days of life is feasible and safe and may have benefits in many facets of clinical outcomes. Two of these outcomes observed were that the group that received early administration of oropharyngeal colostrum began enteral feeds sooner and regained birth weight earlier than those that did not receive it.
7	Rodriguez, Caplan/ 12/2/2014	"Oropharyngeal Administration of Mother's Milk to Prevent Necrotizing Enterocol-	This article explored some theoretical mechanisms to protect against NEC. They concluded

		itis in Extremely Low-Birth-Weight Infants"	that there are very strong indications that oropha-ryngeal administration of mother's breast milk can reduce the NEC inci-dence; however there is significant variation in practice that needs to be addressed. One of their perspectives is that the breast milk exposes the GI tract to the same bio-factors that are present in the amniotic fluid that is steadily coating the intes-tinal tract during the third trimester. These biofac-tors offer antimicrobial, anti-inflammatory, and antioxidant protection, as well as encourage intesti-nal maturation and modu-late the infants' GI mi-croflora and immune re-sponse.
8	Dutta et. al/ 1/8/2015	"Guidelines for Feeding Very Low Birth Weight Infants"	This literature review tried to identify the ap-propriate feeding guide-lines for VLBW infants. They concluded that there should be a goal to reach full feeds in VLBW infants in 2 weeks of age for those weighing less than 1000 g. They also concluded that trophic feeds should be started within 24 hours of life, if possible and that mother's own fresh milk is the gold standard for feeds. The overarching theme for this article is that stand-ardizing feeding proto-cols for VLBW infants

			will improve outcomes.
9	Vongbhavit, Underwood/ 12/30/2015	"Prevention of Necrotizing Enterocolitis Through Manipulation of the Intestinal Microbiota of the Premature Infant"	This article focused on the association between microbial imbalance and NEC, and how the intestinal microbiota can be modified. They concluded that there is a vast difference in the composition of the intestinal microbiota of healthy term infants and premature infants. The literature review identified some possible prevention strategies such as probiotics, lactoferrin, and human milk. The area for further research that was identified was that we still don't know what the ideal gut microbiota composition is. With this in mind, a current approach to preventing NEC revolves around attempting to alter the gut microbiota with human milk.
10	Sohn, Kalanetra, Mills, Underwood/ 12/10/2016	"Buccal administration of human colostrum: impact on the oral microbiota of premature infants"	This exploratory research study wanted to know if the administration of mother's colostrum into the buccal pouch of the infants within the first days of life alters their oral microbiota. They conducted a randomized control trial and concluded that the buccal administration does alter the oral microbiota in infants and persists for 48 hours after the administration.

Research indicates how the composition of the mother's colostrum changes depending on the degree of prematurity that the infant is experiencing (Rodriguez, Meier, Groer, Zeller, 2008). Seigel, et al. (2013) explored if there was a difference in clinical outcomes between ELBW infants who receive oropharyngeal colostrum and those infants who do not receive oropharyngeal colostrum. The study concluded that while there is still a need for further research, the initiation of oropharyngeal colostrum in ELBW infants in the first 2 days of life is feasible and safe and may have benefits in many facets of clinical outcomes. Two of these outcomes observed were that the group that received early administration of oropharyngeal colostrum began enteral feeds sooner and regained birth weight earlier than those that did not receive it. Sohn, Kalanetra, Mills & Underwood (2016) examined the administration of mother's colostrum into the buccal pouch of the infants within the first days of life alter their oral microbiota. They conducted a randomized control trial and concluded that the buccal administration does alter the oral microbiota in infants and persists for 48 hours after the administration.

One of the main ways that a premature infant is possibly susceptible is related to the insufficient defense mechanisms of the premature gut. It also identified a possible role for probiotics in this population. The authors also identified that the two consistent epidemiological risk factors for NEC include a history of enteral feeding (feeding directly into the stomach) and prematurity (Hunter, Upperman, Ford, Camerini, 2007). Fallon et al. (2012) aimed to discover what the appropriate feeding guidelines for neonatal patients at risk for NEC were. The article concluded that the best practice for this at risk group includes initiating feedings within 2 days of life and using mother's milk. They concluded that additional research is needed for the use of probiotics, specific nutrients, and when to reintroduce feedings to those infants after experiencing NEC. Rodriguez & Caplan (2014) explored some theoretical mechanisms to protect against

NEC. They concluded that there are very strong indications that oropharyngeal administration of mother's breast milk can reduce the NEC incidence; however there is significant variation in practice that needs to be addressed. One of their perspectives is that the breast milk exposes the GI tract to the same biofactors that are present in the amniotic fluid that is steadily coating the intestinal tract during the third trimester. These biofactors offer antimicrobial, anti-inflammatory, and antioxidant protection, as well as encourage intestinal maturation and modulate the infants' GI microflora and immune response. Vongbhavit & Underwood (2015) focused on the association between microbial imbalance and NEC, and how the intestinal microbiota can be modified. They concluded that there is a vast difference in the composition of the intestinal microbiota of healthy term infants and premature infants. The literature review identified some possible prevention strategies such as probiotics, lactoferrin, and human milk. The area for further research that was identified was that we still don't know what the ideal gut microbiota composition is. With this in mind, a current approach to preventing NEC revolves around attempting to alter the gut microbiota with human milk

McCallie, Lee, Mayer, Cohen, Hintz & Rhine (2011) analyzed the data on infants receiving enteral feedings both before and after the implementation of a standardized feeding protocol. With the implementation of the protocol various benefits were observed. Some of these benefits included decreased time to full feeds, decreased time on parenteral nutrition, decreased rates of necrotizing enterocolitis, and decreased late-onset sepsis. Dutta et. al. (2015) identified the appropriate feeding guidelines for VLBW infants. They concluded that there should be a goal to reach full feeds in VLBW infants in 2 weeks of age for those weighing less than 1000 g. They also concluded that trophic feeds should be started within 24 hours of life, if possible and that

mother's own fresh milk is the gold standard for feeds. The overarching theme for this article is that standardizing feeding protocols for VLBW infants will improve outcomes.

The growing acceptance of evidenced-based nursing practice indicates that nurses need to be more informed in their clinical area of expertise (Jennings and Loan, 2001). While the research evidence demonstrates the benefits of oropharyngeal administration of mother's breast milk to reduce the risk and prevalence of NEC in ELBW infants, its use in everyday neonatal care is not widespread. Therefore the purpose of this research was to examine the level of evidenced-based knowledge in a North Carolina neonatal critical care unit held regarding the use of oropharyngeal administration of mother's breast milk to reduce the risk and prevalence of NEC in ELBW infants. The knowledge assessment could identify the potential barriers to treatment and deficits in knowledge that could be improved upon to ensure maximum efficiency of the intervention.

Methodology

Study design and participants

This cross-sectional descriptive study evaluated the Newborn Critical Care Center (NCCC) nurses' knowledge base of Oropharyngeal Administration of Mother's Breast Milk (MBM) in Extremely Low Birth Weight (ELBW) Infants to prevent Necrotizing enterocolitis (NEC). A convenience sample of newborn critical care nurses that are employed full-time in a Newborn Critical Care Center were recruited from a university-affiliated hospital in North Carolina in February 2017. The Newborn Critical Care Center (NCCC) is a 59-bed facility where more than 750 infants are treated a year. On the unit, only two visitors can be at the bedside at a time for space constraints and infection control. The healthcare team involved in the care of these

patients includes neonatologists, nurse practitioners, social workers, pediatric pharmacists, respiratory care practitioners, dietitians, physical therapists, occupational therapists, and nurses.

Ethical approval was obtained from The University of North Carolina at Chapel Hill Institutional Review Board (IRB # 16-3059). Inclusion criteria for this study consisted of nurses in the NCCC at UNC Hospital that are employed full-time. Exclusion criteria included nurses in the NCCC at UNC Hospital that are per diem or part-time. All study participants must be able to read and write in English. Participants are able to withdraw from the study at any time without explanation or consequence.

Data Collection

Upon obtaining permission to collect data from the nursing research council, the researcher contacted the unit manager to explain the purpose of the study and to distribute the online Qualtrics ™ survey. The online Qualtrics ™ survey was accessed through a link in an e-mail blast sent to the nurses in the NCCC from the unit nurse manager. 130 neonatal nurses were invited to participate. The researcher also attended staff meetings during the month of February 2017 in order to make a short presentation informing the nurses of the background of the study and the need for their participation.

The survey was an electronic questionnaire specifically developed for use in this study. The researcher modeled the questionnaire off of a study done by individuals at the Kyoto University Graduate School of Medicine, Kyoto, Japan (Ogita, Utsunomiya, Nin, Arai, 2013), and another study published in the Journal of Pediatric Nursing (Distelhorst, Bieda, DiMarco, Tullai-McGuinness, 2016). The survey analyzed demographic information and topic areas related to oropharyngeal administration of mother's breast milk. The survey was 23 questions and took between 10-15 minutes to complete. The survey was open for three weeks and 37 responses

(37/130=28%) were obtained. The surveys were then analyzed individually using descriptive statistics.

Findings

Characteristics of participants

The demographic data of our study sample is summarized in table 2 below. Approximately 95% (35) of the participants were female, while 5% (2) were male. About 89% (33) of the population were Caucasian, 5% (2) were African American, 3% (1) were American Indian or Alaska Native, and 3% (1) were Asian. In relation to highest degree of education, 11% (4) of participants had obtained their Associates degree, 72% (26) had obtained their Bachelor's degree, 11% (4) had obtained their Master's degree, and 6% (2) had obtained their Doctorate. When asked about their current age, 11% (4) of participants answered that they were in the 18-24 range, 30% (11) in the 25 to 34 range, 30% (11) in the 35 to 44 range, 16% (6) in the 45 to 54 range, and 14% (5) in the 55 to 64 range. Finally, the participants were asked about their experience. When asked how many years of experience the nurse had as a Registered Nurse (RN), 11% (4) answered less than 1 year, 14% (5) answered 1 to 3 years, 24% (9) answered 4 to 9 years, 24% (9) answered 10-19 years, 8% (3) answered 20-29 years, 16% (6) answered 30-39 years, and 3% (1) answered more than 40 years. When asked how many years of experience in their current position they had, 19% (7) answered less than one year, 24% (9) answered 1 to 4 years, 16% (6) answered 5 to 9 years, 24% (9) answered 10-19 years, 8% (3) answered 20-29 years, and 8% (3) answered 30-39 years.

Table 2. Participant Characteristics (N = 37)

Characteristic	***n* (%)**
Gender	
Male	2 (5)
Female	35 (95)

Racial/Ethnic Background	
Caucasian	33 (89)
African American	2 (5)
Asian	1 (3)
Hispanic	2(5)
Not Hispanic	35 (95)
Highest Nursing Education level	
Associate	4 (11)
Bachelor	26 (72)
Master	4 (11)
Doctorate	2 (6)
Age	
18-24	4 (11)
25-34	11 (30)
35-44	11(30)
45-54	6 (16)
55-64	5 (14)
65 and over	0 (0)
Years of Experience in Nursing	
Less than 1 year	4 (11)
1-3 years	5 (14)
4-9 years	9 (24)
10-19 years	9 (24)
20-29 years	3 (8)
30-39 years	6 (16)
More than 40 years	1(3)
Years of Experience in Current Position	
Less than 1 year	7(19)
1-3 years	9 (24)
4-9 years	6 (16)
10-19 years	9 (24)
20-29 years	3 (8)
30-39 years	3 (8)
More than 40 years	0(0)

Knowledge related to oropharyngeal administration of mother's breast milk

When asked "What do you think are the indications for enteral (or trophic) (placing milk directly into the gut of the infant) feeds in ELBW infants (select all that apply)?" 61.11% (22) answered being premature (any gestational age less than 37 weeks). 44.44% (16) answered that being "unable to meet nutritional needs without the trophic feeds" for an indication for enteral

feeds. 91.67% (33) answered "receiving parenteral nutrition, but needing to "prime the gut."' Finally, 88.89% (32) of those surveyed answered that an indication for enteral feeds in ELBW infants was "being able to tolerate the feeding, but not having a coordinated suck, swallow, gag reflex."

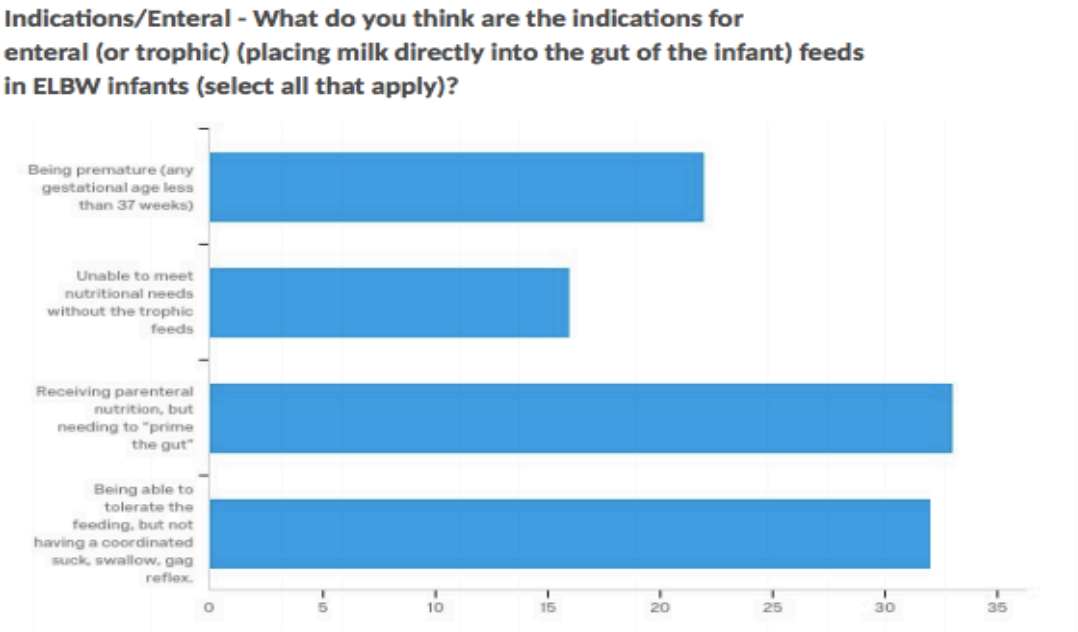

Figure 1. Indications for trophic feeding

Next, the survey participants were asked if they had "heard of oropharyngeal administration of mother's breast milk in premature infants (placing milk in the oral cavity of the infant)?" 86.49% (32) said that they had heard of this practice, while 13.51% (5) said that they had not heard of the practice.

The participants were then asked "what do you think are the indications for oropharyngeal administration, described as placing drops of mother's breast milk directly onto the oral mucosa of the infant, is in extremely low birth weight infants (ELBW) (Select all that apply)?" 5.56% (2) answered "None, the oropharyngeal administration is not necessary in treatment." The answer choice of "being on parenteral nutrition and not taking milk via the intestinal pathway" was

a popular one, with 88.89% (32) of the participants selecting it. 31 participants (86.11%) also answered that an indication for oropharyngeal administration is “being on feedings via the naso-gastric or orogastric tube.” 6 participants (16.67%) selected “Taking bottle feed.” Finally, “feeding at the breast” was the answer choice of 8 participants (22.22%).

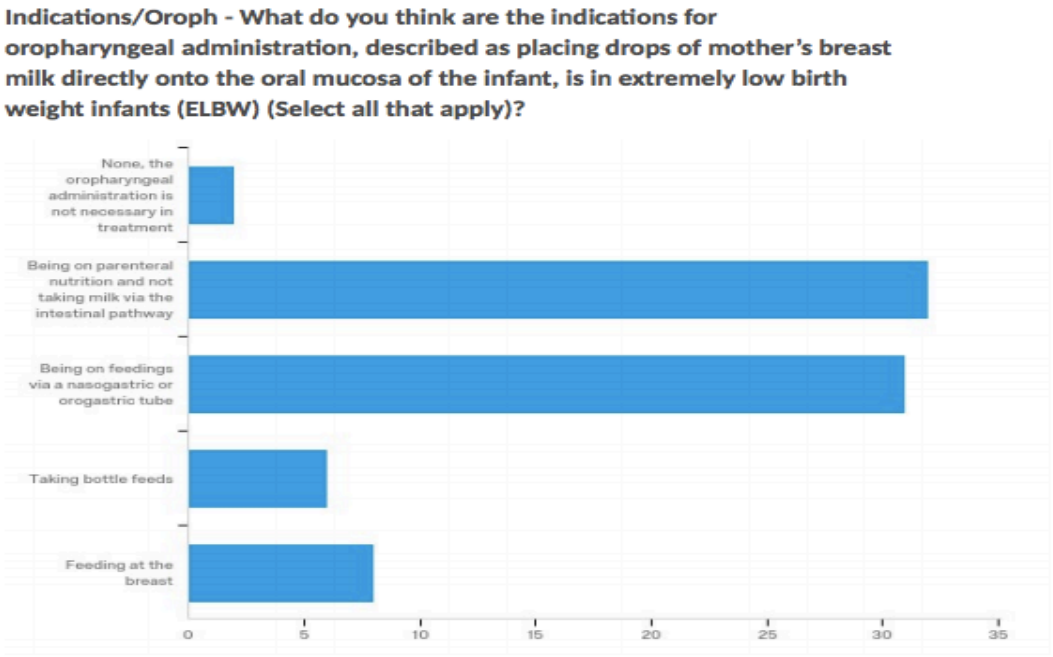

Figure 2. Indications for oropharyngeal administration

When asked if colostrum affected “the microbial colonization of the oral cavity of a very low birth weight infant,” 86.48% or 32 participants answered, “yes,” while 13.51% or 5 participants answered “no.”

The entire group of study participants answered, “Yes” when asked, “do infants have improved clinical outcomes with a standardized feeding protocol that includes oral administration of colostrum?”

In relation to risk factors for NEC, the participants were presented with the statement, “an epidemiological risk factor for NEC (Necrotizing Enterocolitis) is that there is a history of enter-

al feeding (feeding directly into the stomach).” They were then asked if this was “True” or “False”. A total of 22 (59.46%) participants selected, “True,” while 15 (40.54%) participants selected, “False.” In another true/false question related specifically to NEC, the participants were asked if “a large focus of NEC (Necrotizing Enterocolitis) prevention research today is the type and amount of bacteria colonizing the gut of the newborn, and how we may alter the composition of the bacteria.” Almost all of the participants (94.44% or 34) answered, “True,” while only 2 participants (5.56%) answered “False.”

When asked if the participants felt that the “administration of colostrum or breast milk into the oral cavity is safe,” most of the participants (94.5% or 35) said yes, while 5.41% (2) said no.

In regards to appropriate gestational ages for trophic and oropharyngeal feedings, the participants were asked two questions. When asked, “Around what gestational age can you start a newborn on trophic feeds,” 88.19% (33) said “at birth, regardless of gestational age,” 5.41% (2) said “22 weeks gestation,” and 5.41 % (2) said “28 weeks gestation.” When asked, “Around what gestational age can you start a newborn on oropharyngeal feeds,” 75.68% (28) answered “at birth, regardless of gestational age,” while 2.70% (1) answered “28 weeks gestation,” and 21.62% (8) answered “32-34 weeks gestation.”

The next part of the survey was related to frequency of feedings. The participants were asked, “How often should enteral feeds be given in ELBW infants in their first week of life?” The responses included “every 6 hours (8.33% or 3),” “every 4 hours (2.78% or 1),” “every 3 hours (77.78% or 28),” “every 2 hours (5.56% or 2),” and “every hour (5.56% or 2).” The participants were then asked “How often should oropharyngeal administration of mother’s breast milk be performed in ELBW infants (placing milk in the oral cavity of the infant)?” 8.11% (3) of par-

ticipants selected “every 12 hours,” 10.81% (4) of participants answered “every 6 hours,” 10.81% (4) of participants selected “every 4 hours,” 62.16% (23) of participants selected “every 3 hours,” 5.41% (2) of participants chose “every 2 hours,” and finally, 2.70% (1) of participants selected “every hour.”

The next three questions of the survey were related to personal experiences with oropharyngeal feedings. The first question was, “Have any parents of ELBW infants advocated for oropharyngeal feeds/mouth swabs of mother’s breast milk? If so, how many?” 32.43% (12) of participants answered, “yes, 1-5 parents,” 16.22% (6) of the participants selected, “yes, 5-10 parents,” 18.92% (7) of the participants answered “yes, >10 parents,” and 32.43% (12) of the participants selected “no.” The next question asked, “Have you ever performed an oropharyngeal feed/swab on an ELBW infant?” 94.59% (35) of the participants answered, “yes,” with 5.41% (2) of participants answering, “no.” The 35 participants that answered “yes” to the previous question were posed the question of “If yes to above question, what method did you use?” The majority of participants (85.71% or 30) selected “swabbing the oral cavity with a sponge that was dipped in milk (or something similar). 5.71% (2) of the participants selected, “placing drops of milk directly into the oral cavity (or something similar),” and 8.57% (3) of participants selected “dipping a pacifier in milk and allowing the infant to suck (or something similar).”

The final question of the survey asked the participants, “What do you think are the barriers, if any, to performing oropharyngeal swabs in the NCCC for ELBW infants?” 17.65% (6) of the participants answered, “preparing the milk for administration,” 14.71% (5) of the participants answered, “documenting that the administration was performed,” 29.41% (10) of the participants selected, “time constraints.” The remainder of the participants (38.24% or 13) selected “other” and typed some comments. Most of the comments fit under one of the following reasons; “avail-

ability of colostrum," "lack of knowledge by providers and nurses," "infection control and identification issues with having to reuse the same bottle of colostrum," and "clinical status of the infant."

Discussion and Implications for Clinical Practice

Discussion

The review of the literature concluded that the practice of performing the oropharyngeal administration of mother's breast milk in ELBW infants is safe, cost effective, and relatively easy (Seigel, et al., 2013). The literature review also identified that the infants that are exposed to a standardized feeding protocol that includes the oral administration of colostrum have improved clinical outcomes (Mccallie, et al., 2011). Finally, the literature review identified many theoretical possibilities for how oral administration of breast milk can lead to decreased rates of NEC (Rodriguez & Caplan, 2015). The survey that was administered to the full time nurses in the Newborn Critical Care Center at UNC Hospitals examined the knowledge base of the participants in relation to the practice of oropharyngeal administration of mother's breast milk. The aim of the survey was to identify any knowledge deficits, or areas in which knowledge could be improved, among this group of participants in order to examine any possible road blocks in implementing this practice.

The demographic portion of the survey highlighted that the population was diverse in age, experience, and education. While the population was largely dominated by White, non Hispanic or Latino, females; there was representation of multiple ethnic groups, races, and males in the survey responses.

The knowledge survey identified multiple areas in which there is some confusion around the practice of oropharyngeal administration of mother's breast milk in premature infants. Of the

37 participants, five of them stated that they had not heard of oropharyngeal administration of mother's breast milk in premature infants. There was also some confusion around what the indications for this practice were. Six participants stated that taking bottle feeds were an indication, and eight participants stated that feeding at the breast was an indication for oropharyngeal administration. Most nurses correctly answered that colostrum affects the microbial colonization of the oral cavity of a very low birth weigh infant, with only 13.51% stating that it does not. There was a slight discrepancy in what the participants thought the gestational age was that you could start a newborn on trophic feeds. Two participants stated that the newborn must be 22 weeks gestation, and two other participants stated that the newborn must be 28 weeks gestation. A majority stated, correctly, that you can start a newborn on trophic feeds at birth, regardless of gestational age. In regards to what gestational age the newborn can be started on oropharyngeal feeds, there was a little more confusion. Eight participants stated that the newborn must be 32-34 weeks gestation before you could begin this practice. A majority, correctly, answered that you could begin this practice at birth, regardless of gestational age.

When asked if any parents of ELBW infants had advocated for oropharyngeal feeds/mouth swabs of mother's breast milk, over 50% said that they had been asked. This proves that though this is a very new idea, people are already beginning to take it seriously. Finally, most participants stated that if they had performed an administration before, it was by swabbing the oral cavity with a sponge that was dipped in milk (of something similar).

When asked what the nurses thought were some barriers to performing the intervention, the most common answers were lack of knowledge, safety concerns, and availability of colostrum.

Implications

The study statistics showed that there were a few areas in which education could be improved surrounding this topic area. The three main topics of education are the indications of oropharyngeal administration, how colostrum affects the microbial colonization of the oral cavity of a very low birth weight infant, and that an epidemiologic risk factor for NEC is that there is a history of enteral feeding. In the survey results, there were a good number of participants that displayed a deficit in knowledge in these areas. This is to be expected because this is a very new idea and area of research, with all of the articles from the literature review coming from the last 10 years. A common barrier that the nurses perceived to this practice included lack of knowledge by both the providers and the nurses. These two results could be combined to make a short in-service and handout to the nurses. The findings of the literature review could be compiled and disseminated amongst the nurses so that the confusion around some of the implications for practice and standards for practice could be cleared up.

In addition, a lot of the concerns from the nurses were related around protocol and how certain things would work in the clinical setting. A pilot study of this practice needs to be conducted and practice standards established.

Moving forward, there is a need for continued research to contribute to understanding of the benefit and practice of oropharyngeal administration of mother's breast milk to reduce the risk and prevalence of NEC in ELBW infant. In order to begin to effectively implement this intervention, nurses need to be knowledgeable and involved in the development of practice standards. Nurses need to also find a way to integrate current research findings into practice. The following are recommendations for clinical practice:

- Comprehensive education based on up to date research evidenced detailing the benefits and challenges of oropharyngeal administration of mother's breast milk to reduce the risk

and prevalence of NEC in ELBW infant could be incorporated into new staff orientation and continuing education for neonatal nursing staff.

- Interactive workshops may increase nurses' knowledge, skills and confidence in initiation of safe and effective oropharyngeal administration of mother's breast milk with preterm infants. These should support the nurse to educate and communicate the benefits of oro-pharyngeal administration of mother's breast milk to all parents and other healthcare professionals within the neonatal environment.
- Organizational support is also needed to encourage collaboration among health care professionals and neonatal support staff (i.e. nutrition services and registered dietitians) to develop practice guidelines and protocols, to ensure the standardization of information to parents and staff.

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