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Dietitian's Problem Solving Knowledge to Promote and Support Breastfeeding

by

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A THESIS

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Dietitian's Problem Solving Knowledge to promote and Support Breastfeeding

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As a result of ongoing efforts in the U.S. to promote breastfeeding as the normal way to nourish an infant, breastfeeding initiation rates are higher than they have been in decades. As the experts on food and nutrition through the lifecycle, registered dietitians (RDs) should be knowledgeable to promote and support breastfeeding. It is not well known if RDs have this knowledge. The purpose of this study was to determine the current knowledge of RDs about breastfeeding, the types of professional opportunities RDs have to promote and support breastfeeding, and the level of education RDs have to deal with breastfeeding problems. Questionnaires were sent to 353 Nebraska Dietetic Association members with a response rate of 67%. The survey included 34 general breastfeeding knowledge questions, seven advanced breastfeeding knowledge questions, and questions regarding personal and professional breastfeeding experience and preparedness to promote and support breastfeeding. Mean general knowledge score was 20.7/34 (61% correct) and mean advanced knowledge score was 4.1/7 (59% correct). Significantly higher general knowledge scores were seen for RDs who worked in

community/public health programs, had attended breastfeeding conferences/seminars/workshops and those whose personal experience was their main source of practical breastfeeding information ($p < 0.0001$ for each). Few RDs had received adequate breastfeeding education in their undergraduate courses or dietetic internships ($n=16$ (7%) and $n=14$ (6%), respectively). Only 8% ($n=19$) of RDs felt very prepared to support breastfeeding mothers. Twenty-four percent of participants routinely counseled breastfeeding mothers and 79% of these RDs need more training on breastfeeding problem solving. Although the RDs surveyed had some breastfeeding knowledge, they are unprepared to support mothers with breastfeeding problems.

TABLE OF CONTENTS

	<u>Page number</u>
Table of contents	1
<u>Chapter 1</u>	
Literature review	5
U.S. breastfeeding goals	5
Barriers to breastfeeding	7
Maternal health benefits	11
Post-partum weight loss	12
Vitamin D	12
Breastfeeding contraindications	14
Maternal medications	16
Maternal lifestyle	17
Maternal diet	18
Skin to skin	19
Infant growth patterns	20
Exclusivity	21
Type 1 diabetes	22
Breastfeeding and dental health	24
Baby friendly hospital initiative	24
Purpose of the research	26

Objectives	28
<u>Chapter 2</u>	
Subjects and methods	28
Results	30
Demographics	30
Table 1	30
Personal experience	32
Table 2	33
Knowledge scores	34
Table 3	35
Table 4	39
Professional training	40
Table 5	40
Role in breastfeeding promotion and support	41
Table 6	41
Breastfeeding education background	42
Table 7	42
Dietitian preparedness to promote and support breastfeeding	43
Table 8	44
Practices in lactation counseling	45
Table 9	46

Table 10	47
Scores in relation to number of years in practice and age	48
Scores in relation to population	48
Scores in relation to college degree achieved	49
Scores in relation to employment	49
Scores in relation to professional training	51
Scores in relation to role in breastfeeding promotion and support	51
Scores in relation to breastfeeding education background	53
Scores in relation to preparedness to promote and support breastfeeding	54
Scores in relation to need for additional training	55
<u>Chapter 3</u>	
Discussion	55
Conclusion	62
Limitations	64
Recommendations for the profession and future research	65
<u>References</u>	67
<u>Appendices</u>	
IRB approval letter	73
Initial participant letter	76
Questionnaire	78
Reminder post-card	92

Second Participant letter	93
FDA Pregnancy risk categories	95
Dr. Hale's Lactation risk categories	97

CHAPTER 1

LITERATURE REVIEW

The health benefits of breastfeeding are widely known throughout the healthcare community. Among the benefits are increases in immune function and cognitive development and a decrease in acute illness and chronic disease (3) as well as psychologic, social and environmental advantages (4). Breastfeeding is also known to have great economic benefits. A study by United States Department of Agriculture's Economic Research Service found that by increasing the rate of breastfeeding to the level suggested by the U.S. Surgeon General, a minimum of \$3.6 billion could be saved on reduced incidences of childhood illnesses (5). This reflects savings in terms of medical expenditures, wages lost by parents attending to an ill child, and the prevention of premature deaths.

U.S. BREASTFEEDING GOALS

The U.S. came close to meeting the Healthy People 2010 breastfeeding goals set forth by the Centers for Disease Control and Prevention (CDC). In 2007, the U.S. met the Healthy People 2010 goal of breastfeeding initiation with three in four women having ever breastfed. For babies born in 2008 (the most current data available), only 44.3% of women were still breastfeeding at six months, and the number decreased to 23.8% at 12 months. Exclusivity rates were also below the target with 35% of women exclusively breastfeeding at 3 months and 14.8% at 6 months (6).

The Healthy People 2020 goals are to achieve a breastfeeding initiation rate of 81.9% (2010 goal was 75%) , with 60.6 % continuing at 6 months (2010 goal was 50%) and 34.1% breastfed at 1 year (2010 goal was 25%). In addition, the objective for exclusive breastfeeding at 3 months for 2020 is 46.2% (40% for 2010) and 25.5% at 6 months (6).

Three new sub-objectives have been added to the Healthy People 2020 breastfeeding goals. The first goal is to increase the proportion of employers that have worksite lactation support programs with a goal of 38% after 25% of employers reported having worksite programs in 2009. The second goal is to reduce the proportion of breastfed newborns who receive formula supplementation within the first 2 days of life to 14.2%. The latest statistic for this goal was 24.5% of infants born in 2008 were fed formula by the end of day two. The third new objective is to increase the proportion of live births that occur in facilities that provide recommended care for lactating mothers and their babies to 8.1%. In 2008, 4.53% of live births occurred in this type of facility (6).

Dietetics professionals have a responsibility to promote and support breastfeeding to reach this goal. The Academy of Nutrition and Dietetics (AND), formerly the American Dietetic Association (ADA), emphasizes the essential role of dietetics professionals in promoting and supporting breastfeeding for short- and long-term health benefits for both mother and infants. AND recommends the following strategies to promote and support breastfeeding: counsel and educate pregnant and postpartum

women; involve family and friends in breastfeeding counseling and education; enhance professional development; advocate for the removal of institutional barriers; collaborate with community organizations who promote and support breastfeeding; and advocate for policy change that promotes breastfeeding as the norm for infant feeding (2).

BARRIERS TO BREASTFEEDING

So, why do women stop breastfeeding? Many mothers stop breastfeeding shortly after initiation because their instruction on how to breastfeed and how to deal with problems is inadequate or nonexistent, and they do not know where to find help (1). In a study by Ahluwalia and associates (7), the main reasons cited for early cessation were perceptions of not producing enough milk, infant having difficulty breastfeeding or not being satisfied, and sore nipples. A sociological study on women's breastfeeding experiences at five weeks post-partum revealed that first time mothers were often surprised by the extent, intensity and duration of discomfort and pain (8). Women also reported that breastfeeding, in general, was physically challenging and the physical impact sometimes made them hesitant to continue. A cohort study from the American Academy of Pediatrics that examined predictors of breastfeeding duration found that duration of breastfeeding was negatively associated with breastfeeding difficulties in the first four weeks, maternal smoking, introduction of a pacifier and early return to work (9). These authors concluded that women should receive anticipatory guidance while still in the hospital on how to prevent or manage common breastfeeding difficulties. With

proper guidance and support from a trained, dietetic professional, these issues could be resolved.

Many women who choose to breastfeed also return to work which is another major reason for cessation of breastfeeding. Evidence suggests that return to employment does not affect breastfeeding initiation, except for those returning within the first 6 weeks post-partum; however, evidence suggests that duration of breastfeeding is significantly reduced when the mother returns to work in less than 12 weeks (2). Cardenas and associates proposed several work place interventions to reduce the conflict between breastfeeding and work (10). Among these are prenatal education on breastfeeding and lactation programs that provide appropriate facilities for pumping milk as well as lactation consultations for nursing mothers. RDs could be instrumental in developing lactation programs.

RDs working in the perinatal field can significantly impact breastfeeding initiation and duration (1). In a study that examined lactation consultant intervention, the researchers found that prenatal and postnatal interviews were effective at increasing breastfeeding duration and intensity (11). This has strong implications for RDs as they should be building their knowledge and skill level in lactation consulting to increase their problem solving knowledge and be in a better position to support breastfeeding.

RDs are uniquely positioned to support and encourage sustained breastfeeding, both among mothers and health care professionals. In a survey of physicians, when asked

what area they most needed breastfeeding education/information, problem-solving was the main response (12). Studies have reported that pediatricians lack knowledge and training on breastfeeding topics and Meyers reported that physicians must feel comfortable asking for assistance and they should establish relationships with knowledgeable dietetic professionals for consultations and appropriate referrals (13, 14). Because the physician's schedule may not allow for spending an extended period of time with a patient on lactation issues, dietetic professionals should be prepared to provide lactation information and problem-solving ideas.

One study examined the perspectives of both mothers and clinicians, which included obstetrician/gynecologists, nurse midwives, pediatricians, and nurse practitioners, regarding breastfeeding counseling (15). The authors found that of 164 mothers whose obstetric clinicians said they usually or always discuss breastfeeding duration during prenatal visits, only 16% of the mothers reported that the topic was discussed with them. Among mothers whose pediatric clinicians said they usually or always discussed breastfeeding duration during the 2-week pediatric visit, only 25% of mothers reported that it was discussed. However, the percent agreement between mothers and clinicians increased for the six week obstetric visit and two month pediatric visit. Having RDs available during prenatal visits and early well-baby visits would be advantageous for both patients and clinicians to ensure the topic of breastfeeding duration is well covered.

Nearly all obstetric (91%) and pediatric (97%) clinicians reported that they usually or always discuss whether a mother plans to continue breastfeeding after returning to work, however, approximately half (55%) of the mothers seen by the clinicians reported that it was discussed (15).

Advanced practice clinicians (nurse midwives and nurse practitioners) were more likely than physicians to identify the following items as very important barriers to their supporting breastfeeding: limited time, limited availability of lactation consultants, and limited availability of support services such as classes (15). Teaching breastfeeding classes is yet another way in which RDs could improve the breastfeeding support offered at physicians' offices.

Another area that dietetics professionals have an opportunity to greatly affect breastfeeding rates is through the Special Supplemental Nutrition Program for Women, Infants and Children (WIC). The portion of the population showing the greatest decline in breastfeeding rates is similar to the population served by WIC (16). Also, WIC participation is associated with a statistically significant increased probability of breastfeeding initiation (17). Although many WIC nutritionists are nurses, one earlier study showed that WIC RDs express stronger interest and exhibit greater knowledge of breastfeeding than WIC nurses (18). Because of their direct contact with women at a greater risk of not breastfeeding, it is very important that WIC nutritionists are able to fully support client's breastfeeding and that they are very knowledgeable so they are able to answer any questions about breastfeeding issues.

The decision to breastfeed is often made very early in the pregnancy and breastfeeding rates can be improved by repeated and extensive professional education (19). Unfortunately, it has been documented that only a minority of clinicians in both obstetric and pediatric practice consider their advice to mothers on breastfeeding duration to be very important (16). Therefore, it is important that everyone who is part of the healthcare team is educated and fully able to promote and support breastfeeding, including RDs. Dietetic professionals should stay abreast of current research, recommendations and practices in breastfeeding and lactation management.

MATERNAL HEALTH BENEFITS

A more recent focus of breastfeeding research is the potential benefits to the mother. Health benefits for mothers who breastfeed may not be well known by the general population. Immediate results of breastfeeding are faster shrinking of the uterus, reduced postpartum bleeding, delayed menstruation, which can help with natural pregnancy spacing, increased energy expenditure, which may lead to quicker postpartum weight loss, and decreased risk for postpartum depression (2).

Breastfeeding effects a mothers' long term health by decreasing the chance of developing chronic diseases such as breast cancer, ovarian cancer, and type 2 diabetes, and improving bone density leading to decreased risk for hip fracture (2).

A study published in the New England Journal of Medicine found a reduction in the risk of breast cancer among premenopausal women who had ever lactated (20).

Breastfeeding for 18 month or more has been shown to significantly reduce a woman's risk of epithelial ovarian cancer compared to women who never breastfed (21).

POST-PARTUM WEIGHT LOSS

Postpartum weight loss as a result of breastfeeding is a controversial topic. Researchers have shown that breastfeeding women experience greater weight and fat loss than non-breastfeeding women in the short term and that woman who breastfeed for longer than six months and do so exclusively are more likely to achieve greater weight loss. However, other studies report that lactation may be associated with increased weight gain, or that any observed weight difference may not be sustained past 18 months. In addition, many variables impact postpartum weight loss including pre-pregnancy weight, total pregnancy weight change, and parity. Therefore, the research is still somewhat inconclusive. However, because a woman uses additional calories to breastfeed a baby, the potential for increased weight loss is there. Given a healthy diet and moderate physical activity a breastfeeding mother will generally find breastfeeding helpful if she sets a goal of returning to pre-pregnancy weight (2).

VITAMIN D

RDs should be aware of recent research which has led to new vitamin and mineral supplementation recommendations for breastfed infants. The official position of the American Academy of Pediatrics (AAP) is to give 400 International Units (IU) of vitamin D daily to the exclusively breastfed infant as well as to any partially breastfed

infant receiving less than 32 ounces infant formula daily. Researchers have shown that these infants most often are ingesting less than the recommended minimum of 400 IU per day through breastmilk and without receiving other foods naturally containing or fortified with vitamin D these babies are at increased risk of developing rickets. In addition to rickets, infants, as well as children and adults, who consume inadequate vitamin D have an increased risk of chronic diseases such as cancer, diabetes and autoimmune diseases such as psoriasis, multiple sclerosis and rheumatoid arthritis (22).

Estimates of 5-50% of pregnant women in the U.S. are vitamin D deficient. African American women have a higher risk of vitamin D deficiency, compared with other women because of increased skin pigmentation and low dietary intake of vitamin D (23). One study reported the prevalence of vitamin D deficiency and insufficiency in 200 white and 200 black pregnant women and in their neonates. In pregnant black women, vitamin D deficiency occurred in 29.2% and vitamin D insufficiency occurred in 54.1%. In pregnant white women, 5% had vitamin D deficiency and 42.1% had vitamin D insufficiency. At delivery, 45.6% of black neonates had vitamin D deficiency and 46.8% had vitamin D insufficiency, compared with 9.7% of white neonates having vitamin D deficiency and 56.4% having vitamin D insufficiency (24).

The vitamin D status of an infant in the first six to eight weeks of life is largely dependent on the vitamin D acquired in utero. An infant's vitamin D stores are usually depleted by 8 weeks of age. Human milk generally contains a very low concentration of vitamin D (20 to 60 IU/L) which represents approximately 1.5 – 3 % of the maternal

level (23). If a woman is exclusively breastfeeding, these levels are not sufficient to maintain adequate levels of vitamin D in the infant. However, if a breastfeeding woman receives high-dose supplementation of vitamin D (2,000 UI/d or 4,000 IU/d) the levels of vitamin D in her milk will increase significantly, as will circulating levels of vitamin D in the infant (25). Currently, there is no recommendation for this high dose supplementation for lactating women. However, research is ongoing and in the future, recommendations for greater vitamin D supplementation for lactating and possibly for pregnant women may be forthcoming.

Although sunlight is a viable option for receiving an abundance of vitamin D, this poses a risk for infants because of the possibility of skin damage. Infants are at great risk of sunburn due to sensitive skin that has been previously unexposed. Also, it is not recommended to use sun block on infants under 6 months of age which is a critical time period for vitamin D supplementation. Additionally, the amount of vitamin D received from sunlight cannot be accurately determined because it varies greatly by time spent outdoors, skin pigmentation, body mass, degree of latitude, season, the amount of cloud cover, the extent of air pollution, the amount of skin exposed, and the extent of ultraviolet (UV) protection including clothing and sunscreen (22).

One formula company is taking advantage of this growing health concern by marketing a product with extra vitamin D for use with infants 0-3 months of age. Most infants in this age range typically drink less than 32 ounces daily of milk (the amount needed to receive the full 400 IU of vitamin D). The manufacturer has increased the

concentration of vitamin D in their “newborn” formula to provide 400 IU in 27 ounces of milk (26). Therefore, newborns will be more likely to consume a sufficient amount of vitamin D until they are able to consume 32 ounces of formula milk on a daily basis.

BREASTFEEDING CONTRAINDICATIONS

In the United States, HIV positive mothers are encouraged not to breastfeed their infants due to increased risk of transferring the virus to the infant. Other conditions in the mother that are contraindications to breastfeeding include active untreated tuberculosis, herpes simplex lesions on the breasts, use of street drugs, exposure to radioactive isotopes or receiving chemotherapy or a small number of other drugs that transfer to their milk. Infants with classic galactosemia cannot be breastfed as individuals with this metabolic disorder must receive a strict therapeutic diet. For these babies, ingesting foods containing galactose, including human milk or animal milk, can be life threatening (4). Another inborn error of metabolism called phenylketonuria (PKU) presents a special challenge to breastfeeding. Although a woman can partially breastfeed her PKU baby, the infant would need to receive supplements of low-phenylalanine formula and the challenge would be for the mother to achieve and maintain an adequate milk supply (2).

Several circumstances that are thought to be reasons a woman would be advised not to breastfeed her infant, are compatible with breastfeeding. Among these are maternal hepatitis C virus (as long as nipples are not cracked and bleeding), inactive treated tuberculosis, most communicable disease states (even if febrile), most cases of

infant jaundice and maternal smoking and occasional intake of small amounts of alcohol (4).

MATERNAL MEDICATIONS

Approximately 90-99% of women who breastfeed will receive medication during their first week post-partum (27). Unfortunately, very few pharmaceutical manufacturers have supported studies of their drugs in breastfeeding mothers and therefore, package inserts recommend against use of the drug in breastfeeding mothers. Because so few clinicians understand lactational pharmacology, they often review the package insert and advise the mother to stop breastfeeding. Consequently, the number of women who are advised to discontinue breastfeeding to take a medication is far too high (27).

Most drugs that have been studied average less than 1% of the maternal dose transferring to her milk, and once transferred to the infant, many drugs are not well absorbed or do not survive the infant gut. As a result, only rarely does the amount of drug transferred to the infant produce clinical doses. Therefore, the benefits of continuing to breastfeed often outweigh the risk of transferring the medication to the infant through breastmilk (27, 28).

For medications that are contraindicated for breastfeeding or not well studied, an alternative medication that is well studied and suitable is usually available. Ultimately, a thorough review of the literature should be done before advising a mother to cease breastfeeding. "Medication and Mother's Milk" by Thomas W. Hale is a useful resource

for clinicians to make appropriate recommendations for medication use in pregnant and lactating women. Dr. Hale has added trimester specific information to the Food and Drug Administration's pregnancy risk categories and has developed lactation risk categories for medication use during breastfeeding (Appendices F and G).

MATERNAL LIFESTYLE

Lactating women who want to exercise should know that they are able to do so while continuing to breastfeed. Researchers have shown that with moderate exercise lactic acid and other products of metabolism from exercise are not significantly increased in breastmilk (29, 30). No significant effect on breastmilk volume following moderate intensity exercise has been reported (31).

High intensity exercise may result in greater lactic acid production in the mother's body and result in greater lactic acid levels in breast milk (29, 30). Although an infant may refuse breastmilk that is high in lactic acid as a result of change in taste, the lactic acid presents no potential harm to an infant (32). An infant may refuse to nurse if there is sweat on the mother's skin from exercising. A solution for either of these situations would be for the mother to rinse the skin and wait approximately one and a half hours after exercise to breastfeed her baby (33).

The use of alcohol and tobacco products are not contraindications to breastfeeding, however, their use is not recommended and should be limited. Limiting smoke exposure to an infant is advised and mothers should make every effort to cease

smoking. Alcohol is concentrated in breast milk and its use can inhibit milk production. An occasional, single alcoholic drink is acceptable, but breastfeeding should be avoided for two hours after consumption. Use of any illegal or “street drugs” is considered a contraindication to breastfeeding (4).

MATERNAL DIET

Certain foods and beverages that have long been recommended to avoid by lactating women include cruciferous vegetables, spicy foods, coffee and tea. These foods are thought to cause an irritation to a baby that drinks breast milk from a woman who has consumed them. Often they can cause a baby to seem gassy, fussy and restless, but each child will be affected differently and some may not be affected at all. If a reaction is noticed, a simple solution would be for the mother to simply avoid the food of offense.

Occasionally, an infant may develop a condition known as milk/soy protein intolerance (MSPI) also referred to in the medical field as eosinophilic gastroenteritis. MSPI is a temporary inability to digest the proteins found in cow’s milk and soy products (34). MSPI is diagnosed through the history of an infant who displays irritable, colic-like behavior, poor growth, and abnormal stools, some of which visibly show blood (35). Infants can have varying degrees of MSPI and, depending on the severity, the mother may have to follow an elimination diet. Many physicians will recommend that the mother first eliminate dairy products. If symptoms persist, the next step would be to eliminate soy containing foods (35). If the infant has MSPI, symptoms will completely

resolve within two weeks. Infants usually outgrow MSPI by 12 months of age and are then usually able to tolerate milk and soy normally (34).

Supplementation of omega 3 fatty acid (n-3 FA) by women who are pregnant and breastfeeding is a recent area of research. Researchers have shown that pregnancy and breastfeeding women who supplement their diet with fish oil, cod liver oil, or docosahexaenoic acid (DHA)-rich oil can increase n-3 FA levels in both breast milk and in infants' plasma phospholipids (2). As evidence of the benefits of n-3 FA in the diet are supported by research, supplementation of n-3 FA may soon be recommended for all breastfeeding women and pregnant women planning to breastfeed.

SKIN TO SKIN

The American Academy of Pediatrics now recommends that healthy infants be placed and remain in direct skin-to-skin contact with their mother immediately after delivery until the first feeding is accomplished. The initial assessment can be completed while the baby remains on the mother and the anthropometric assessment and bathing should be delayed until the first feeding is completed (4). Researchers report that practicing skin-to-skin contact has a positive effect on successful latching and feeding by the newborn as well as regulating infant body temperature. Handlin and associates found that skin-to-skin contact before onset of sucking contributed to the decrease in cortisol levels observed during breastfeeding and that the longer the period of skin-to-skin contact before sucking of the breast, the lower the median cortisol levels recorded during the

breastfeeding session were. Skin-to-skin contact has previously been demonstrated to stimulate social interaction and bonding between mother and infant, to calm, to decrease the sensation of pain, to stimulate vagal nerve activity, and to induce anti-stress effects (36). These findings demonstrate that the skin to skin contact experienced by breastfed infants provides an additional level of benefit that reaches far beyond that of basic nutrition.

Kangaroo mother care (KMC) is a special type of skin to skin contact practiced by mothers who have given birth to premature infants. Premature babies benefit most from breastmilk and a mother who has given birth to a premature infant makes individualized milk to meet their increased protein and caloric needs. Being kept skin to skin helps regulate a premature baby's heart rate, breathing, and body temperature better than the alternative of being kept in an isolette. Remaining skin to skin allows an infant to smell the mother's milk, which in turn stimulates the release of enzymes in the baby's stomach to help digest the milk. A baby's touch on the mother's skin stimulates the release of oxytocin which in turn stimulates milk ejection. As early as 28 weeks gestation premature babies have the physical ability to suckle a breast nipple. In a situation where an infant is unable to suckle, breastmilk can be expressed and fed from a small cup rather than a bottle since sucking on a bottle nipple can be very stressful for a premature infant. It is recommended that KMC be practiced up to 8 weeks after birth along with continued breastmilk feeding (37, 38).

INFANT GROWTH PATTERNS

The growth patterns of formula-fed and breast-fed infants vary. One study that followed children from birth to 18 months who were either breastfed or formula-fed during the first 12 months found that the weight of infants who were breastfed was significantly lower than that of the formula-fed group between six and 18 months. In addition, the breast-fed infants were leaner between four and 18 months and gained less rapidly from three to 12 months. The authors recommended new growth charts be published based on infants who are breastfed (39).

In 2006, the World Health Organization (WHO) published growth standards for infants and children ages 0 to 2 years which are based on how children should grow given optimal standards. This means the charts reflect the growth patterns among children who were predominantly breastfed for at least four months and still breastfeeding at 12 months and use longitudinal weight and length data measured at frequent intervals. The CDC growth charts, often used by clinicians, may not represent ideal growth patterns. The CDC growth charts are references based on how a sample of children in the U.S. grew during a specific time period. Weight data were not available for the sample between birth and 3 months of age and the sample sizes were small for sex and age groups during the first 6 months of age. If a breastfed infant's weight and length are plotted on the CDC growth chart their growth may be inaccurately assessed. Therefore, the CDC recommends that health care providers use the WHO growth standards to monitor growth for infants and children age zero to two years of age (40).

EXCLUSIVITY

Supplements, such as sugar water, formula, or any other fluid should not be given to the breastfeeding newborn unless medically indicated. Breastfeeding should be well established before introduction of an artificial nipple (4). This recommendation includes offering a pacifier, which has a negative influence on breastfeeding duration when introduced before three months of age (2).

Furthermore, exclusive breastfeeding is sufficient to support optimal growth and development for approximately the first six months of life. Water and juice are unnecessary and discouraged for exclusively breastfed infants. The introduction of solid foods should occur around six months of age with breastfeeding continuing until the infant is at least 12 months old (4).

TYPE 1 DIABETES

Breastfeeding for a woman with type 1 diabetes is not only recommended but is highly encouraged. Colostrum can help to stabilize the infant's blood sugar after delivery. If the infant and mother are separated directly after delivery, the mother should begin pumping her milk as soon as possible to begin establishing her milk supply due to the fact that these women usually have lower prolactin levels which can delay the milk from "coming in" by approximately one day. Once the newborn is able to nurse, frequent feedings, in addition to pumping, may be advised to build the milk supply. Neonates of mothers with type 1 diabetes are often given supplemental formula feedings in the first 2-

3 days, however this may not always be necessary. Supplementation with human donor milk is another possible option if supplementation is needed (38).

Immediately after delivery a woman with type 1 diabetes' blood glucose levels often fluctuate dramatically due to hormonal changes. Hypoglycemia is usually expected and generally lasts 5-7 hours after delivery. Due to an increase in insulin reaction and sudden metabolic shifts of erratic blood glucose levels, these women will require close monitoring (38).

Adjusting an infant's feeding schedule and amount of milk taken at each feeding presents special challenges for these women to maintain good blood glucose control. However, once glucose levels are stabilized they generally remain lower during lactation as compared to before lactation (38).

Fasting plasma glucose levels in women with type 1 diabetes during exclusive breastfeeding were significantly lower than those not breastfeeding even though breastfeeding mothers had high caloric intake (38). Because lactating women with type 1 diabetes generally require less insulin, due to continuous conversion of glucose to lactose and galactose for synthesis of milk they may need to reduce their pre-pregnant insulin dose by as much as 27% (38).

When weaning baby from breastfeeding, adjustment to insulin will need to be made again. If done gradually, few problems should arise.

INFANT DENTAL HEALTH

Breastfeeding has a positive effect on the development of an infant's oral cavity by improving shaping of the hard palate resulting in proper alignment of the teeth and fewer problems with malocclusions (2).

Viggiano and associates found that although non-nutritive sucking, for example, thumb or finger sucking or sucking on a pacifier, nearly double the risk of altered occlusion in both breastfed and bottle fed babies. Posterior cross-bite, specifically, was significantly less frequent in children who had been breastfed even with a history of non-nutritive sucking. However, breastfeeding did not protect against open-bite in children with a history of non-nutritive sucking. The authors concluded that breastfeeding seems to have a protective effect on development of posterior cross-bite in preschool aged children (41).

BABY FRIENDLY HOSPITAL INITIATIVE

The Baby Friendly Hospital Initiative was started to encourage hospitals to follow practices that encourage new mothers to exclusively breastfeed while in the hospital and increase the chance of successful breastfeeding upon discharge. The *Ten Steps to Successful Breastfeeding* for Hospitals and Birth Centers are the basis for the Baby-Friendly Hospital Initiative implemented by the United Nations Children's Fund (UNICEF) and WHO. These steps are implemented in birthing centers and hospitals

across the globe, however, the majority of hospitals in the U.S. are not certified as baby-friendly. Currently, the state of Nebraska only has two baby-friendly hospitals (42).

The 10 steps for the United States are as follows:

1. Maintain a written breastfeeding policy that is routinely communicated to all health care staff.
2. Train all health care staff in skills necessary to implement this policy.
3. Inform all pregnant women about the benefits and management of breastfeeding.
4. Help mothers initiate breastfeeding within 1 hour of birth.
5. Show mothers how to breastfeed and how to maintain lactation, even if they are separated from their infants.
6. Give infants no food or drink other than breastmilk, unless medically indicated.
7. Practice “rooming in” – allow mothers and infants to remain together 24 hours a day.
8. Encourage unrestricted breastfeeding.
9. Give no pacifiers or artificial nipples to breastfeeding infants.
10. Foster the establishment of breastfeeding support groups, and refer mothers to them on discharge from the hospital or clinic.

Many hospitals and birthing centers in the U.S. opt not to be certified as baby-friendly due to the lengthy certification process and the fees that accompany it. This is yet another hurdle within the healthcare field that must be overcome in order for our breastfeeding initiation and duration goals to be met. Getting involved in this process would be another opportunity for nutrition and lactation professionals to support breastfeeding in the U.S. (43).

PURPOSE OF THE RESEARCH

In the past several years, improvements in promoting and supporting breastfeeding have led to a dramatic increase in the number of women who choose to breastfeed. Three out of four women who leave hospitals after delivery have initiated breastfeeding, but unfortunately, rates of continuation for the recommended length of time are very low. Even if a woman wants to breastfeed, often times problems arise that will hinder her ability or desire to continue. Among these are physical issues such as mastitis, plugged milk ducts, and engorgement. Other major problems women are faced with include social and personal issues, like societal disapproval and returning to work or school.

If women do not have support from healthcare providers, or other knowledgeable people, to address these problems and encourage continuation, it can be difficult, and many women will stop. Therefore, it is crucial that all healthcare providers who work with pregnant women and mothers of infants are knowledgeable about breastfeeding.

Because Registered Dietitians (RDs) are the primary promoter of optimal nutrition during the lifecycle, it is only reasonable to expect that they should promote successful breastfeeding and the provision of breast milk to the infant through the first year (1, 2).

Although RDs have the ability to successfully promote and support breastfeeding, it is not well known whether they have sufficient knowledge in the area of breastfeeding to accomplish this. As RDs continue to be some of the main advocates for breastfeeding, they need to sustain a high level of knowledge on all topics pertaining to breastfeeding, specifically problem solving strategies.

Limited research exists that demonstrates how much education and knowledge RDs have about breastfeeding. Studies have not thoroughly examined the impact or role of RDs on promotion and support of breastfeeding. RDs can serve in a variety of functions related to breastfeeding promotion and support where other healthcare providers may fall short. However, RDs may need more knowledge for solving breastfeeding problems and dealing with challenges that are associated with breastfeeding. Further exploration of this topic is needed to add to the literature a unique perspective of the dietetic profession. After reviewing the literature, there is a need to assess RDs breastfeeding knowledge, education on dealing with breastfeeding problems, and their professional opportunities to promote and support breastfeeding.

The hypothesis for this research was that RDs need more knowledge about solving problems and dealing with challenges related to breastfeeding and RDs who

counsel pregnant and breastfeeding mothers have greater knowledge of breastfeeding than RDs who do not counsel pregnant and breastfeeding women.

The objectives of this study were:

1. To determine the current knowledge of Nebraska RDs about breastfeeding.
2. To determine Nebraska RDs professional opportunities for continuing education and training on breastfeeding.
3. To determine the level of education RDs in Nebraska have to deal with breastfeeding difficulties and problems that arise when breastfeeding.

CHAPTER 2

SUBJECTS AND METHODS

The survey used for this study was modified from an original survey used by Marilyn Figueroa and Isobel Contento for doctoral research at Columbia University in 2000/2001 (44). Permission was obtained from Dr. Contento prior to starting our research in 2009. The modifications made were to tailor the survey to more closely meet our specific objectives. The survey was then reviewed by three nutrition professionals for suggestions and minor changes were made based on their feedback (appendix B).

Subjects for this survey were selected from the Nebraska Dietetic Association (NDA) 2009 roster. Mailing labels were purchased from NDA to obtain member's names and addresses. To achieve a mailing list of approximately 350, approximately one

third of the NDA members needed to be eliminated. Since the list was not in any type of alphabetical order, members were randomly eliminated by crossing off every third one until 353 were left. These remaining mailing labels were then assigned a number (001 through 353) so they could be identified by number rather than name. Coordinating numbers were written on the postage paid return envelopes which were mailed with the surveys so the corresponding subject number would be removed from the list for follow-up mailings once their survey was returned.

The initial mailing included a letter inviting participation, the survey, a postage paid return envelope and a one dollar bill as an incentive to complete and return the questionnaire. Approximately 10 days later, these same 353 people were sent a postcard reminder to complete and return the survey if they had not done so (Appendix D). Approximately three weeks after the postcard, a second mailing was sent out including a questionnaire, participation request letter, and return envelope to any participant from whom we had not received a response. The mailing procedures used were in accordance with those described in Don A. Dillman's book *Mail and Internet Surveys: The Tailored Design Method* (45).

Data were analyzed using the analysis of variance procedure and chi-square test. Means, standard deviations, frequencies and percentiles were also calculated. All analyses were performed using StatView 5.0.1 (SAS Institute, Cary, NC). Differences were considered significant at $P < 0.05$.

RESULTS

Seven of the envelopes from the initial mailing were returned either empty, with a blank survey or with a note indicating the subject did not wish to participate. These participant numbers were removed from the list for the second mailing. Ten survey packets were returned undeliverable.

The number of returned, filled out questionnaires totaled 238 out of 353 for a response rate of 67%. We were able to use 228 of the 238 (97%) of the completed surveys for our purposes. Eight of the questionnaires were excluded because the NDA member did not identify themselves as an RD.

DEMOGRAPHICS

Table 1 describes the participant demographics including, age, number of years in practice as an RD, population of town/city where they practiced, race/ethnicity, and gender.

Table 1. Participant demographics

	<u>mean±standard deviation</u>	<u>range</u>
Age (years)	42.8±13.8	23-79
Years in practice	15.9±12.3	<1-50+
Population of town/city where practice	<u>%</u>	<u>(n)</u>

□10,000	19	(45)
10,000-100,000	20	(47)
□100,000	56	(130)
No response	3	(6)
Race/ethnicity		
White	95	(218)
Non-white	1	(3)
Did not identify	4	(9)
Gender		
Female	96	(221)
Male	4	(9)

Approximately seven percent of respondents belonged to one of the two ADA Dietetic Practice Groups (DPG) that include breastfeeding or lactation as an area of focus: Pediatric Nutrition DPG and Women’s Health DPG. Fifty-three percent of respondents held a Bachelor’s degree as the highest degree achieved, whereas 43% percent held a Master’s degree and three percent had a PhD.

Two of the RDs held an International Board Certified Lactation Consultant (IBCLC) certificate. The majority of RDs (78.5%) were Licensed Medical Nutrition

Therapists (LMNT) within the state. Eight also stated that they were licensed in a different state.

Approximately one-third (31%) of respondents were employed at an in-patient or acute care hospital and 11% were employed at a clinic or ambulatory care center. Thirteen percent worked at an extended care facility, 1.7% with an HMO, physician or other health care provider and 3.9% worked in home health care. Almost one-third (30%) worked in community/public health programs. Two respondents worked in K-12 school food service and one in college or university food service. Less than five percent (4.8%) were college or university faculty, 5.2% were employed as a food manufacturer/distributor/retailer, and 6.6% were in private practice. Nearly twelve percent (11.7%) were consultants primarily to health care facilities and another 4.4% were consultants primarily to other organizations/industries/media. Some respondents selected more than one employment setting which may have skewed the score summaries when calculated for specific employment settings.

PERSONAL EXPERIENCE

Table 2 describes the RDs number of children, their experience with breastfeeding their own children, and the number of RDs who themselves were breastfed as an infant.

Table 2. Participants number of children and attitude toward their personal experience with breastfeeding

Number of Children	%	(n)
0	33	(75)
1	14	(32)
2	30	(68)
3	16	(36)
≥4	8	(19)
At Least One Child Was Breastfed		
Yes	64	(147)
No	3	(8)
N/A	33	(75)
Breastfeeding Experience		
Negative	13	(19)
Positive	78	(115)
Both	5	(7)
N/A or Neither	39	(89)
Breastfed as an Infant		
Yes	41	(95)
No	53	(123)
Unsure/no response	5	(12)

No significant correlation was found between being breastfed as an infant and their own children being breastfed.

Several of the RDs in this study who breastfed their own children felt it was a negative experience. A few of the comments were “Live in rural community with no lactation specialist; it took me 3 weeks to figure out problem with no help from pediatrician” and “it was very hard work for about the first month (soreness, etc.) then it was easier...It was hard to have to pump at work though, not a lot of privacy” and “disappointing – needed help, but didn’t get it” and “it was hard making enough milk for twins” and one dietitian made the comment that it “Involves more effort and time than I think new mothers realize. It requires a lot of support and dedication to get over some of the difficulties in the beginning”.

KNOWLEDGE SCORES

The general knowledge section of the survey contained 34 true/false questions. Any question left unanswered or a response of “unsure” was coded as an incorrect response when collecting data. The advanced knowledge section of the survey contained seven scenarios and questions with multiple choice answers. Any “not sure” response or unanswered question was coded as incorrect.

The mean score for the general knowledge questions was 20.7/34 (61% correct). The mean score for the more advanced questions or “scenario” portion of the survey was 4.1/7 (59% correct).

Table 3 presents the RDs responses to the general knowledge questions.

Table 3. RDs responses to general knowledge questions. (True or False)		
<u>Question</u>	<u>Correct responses</u>	
	%	(n)
1. Human milk and infant formula are nutritionally equivalent.(F)	85	(193)
2. Formula fed and breastfed babies have the same rate of respiratory and gastrointestinal infections.(F)	94	(214)
3. Both breast and formula fed babies need to be fed on a fixed schedule, for example, every four hours.(F)	82	(187)
4. A breastfeeding woman needs to eat nutritionally balanced meals in order to have high quality milk for her baby.(F)	25	(58)
5. There are foods a woman should avoid while she is breastfeeding.(F)	39	(89)
6. Breastfed babies need to nurse more frequently than formula fed babies.(T)	58	(132)
7. It is recommended that breastfed babies be introduced to solid foods at six months of age.(T)	79	(181)
8. An exclusively breastfed infant needs to get water regularly (at least once/day) in addition to breastmilk.(F)	80	(184)

- | | | |
|---|----|-------|
| 9. Breastfeeding helps postpartum women lose weight.(T) | 92 | (210) |
| 10. Human milk and infant formula both provide immunological protection for the infant.(F) | 86 | (196) |
| 11. Glucose water should be offered to newborns whose mothers plan to breastfeed, until the mother's milk comes in.(F) | 78 | (178) |
| 12. Breastfeeding women have to avoid all caffeine in their diet.(F) | 85 | (193) |
| 13. Breastfeeding women cannot take medication while they are breastfeeding.(F) | 86 | (197) |
| 14. A woman with truly inverted nipples can breastfeed.(T) | 61 | (140) |
| 15. A breastfed baby grows faster than a formula fed baby.(F) | 68 | (155) |
| 16. A woman with a breast infection (e.g. mastitis) has to stop breastfeeding, at least from the infected breast.(F) | 48 | (109) |
| 17. Formula fed babies have a greater risk of developing allergies than breastfed babies.(T) | 79 | (179) |
| 18. When an exclusively breastfeeding woman starts to give her baby some formula, the amount of milk her breasts produce stays the same.(F) | 84 | (192) |
| 19. Mothers planning to breastfeed should expect sore nipples as a normal part of breastfeeding, especially at the beginning.(F) | 35 | (79) |
| 20. An infant sucks from a bottle the same way it sucks | | |

from the breast.(F)	83	(190)
21. The most common cause of sore nipples related to breastfeeding is allowing the infant to nurse too much from the breast.(F)	80	(182)
22. The main reason most breastfeeding mothers switch to formula is because they are returning to work.(T)	57	(129)
23. Growth patterns of breastfed infants differ from those of formula fed infants.(T)	54	(122)
24. It is not advisable to introduce a bottle to a newborn for the first month of life, until lactation is well established.(T)	68	(155)
25. Nipple confusion refers to the way some newborns have difficulty feeding from bottles with different shaped nipples.(F)	62	(142)
26. If a breastfed infant has not regained his/her birth weight by two weeks of age, generally the mother should be encouraged to begin supplementing with formula.(F)	50	(115)
27. A breastfed newborn should nurse at least 10 times in a 24 hour period.(F)	24	(55)
28. Large breasts produce, on average, 10% more milk than average or small sized breasts.(F)	80	(183)
29. Women who are breastfeeding and run marathons need to pump and discard their breastmilk after a run rather than		

feeding it to their infant.(F)	43	(99)
30. A woman typically decides on a feeding method during the third trimester.(F)	29	(66)
31. Breastfeeding can promote normal jaw development and straighter alignment of teeth.(T)	63	(144)
32. Women with PKU cannot breastfeed their infants.(F)	47	(108)
33. Breastfeeding women who are hepatitis B or C positive are at risk of transmitting the virus through their breastmilk to their infants. (F)	14	(32)
34. Exclusively breastfed infants should begin receiving vitamin D supplements daily by at least two months of age.(T)	48	(109)

In addition to responding with true or false to question number 5, participants were given the opportunity to list any foods they believed breastfeeding women should avoid. Foods frequently listed were fish, cabbage, cauliflower, broccoli, chocolate, garlic, spicy foods, caffeine and alcohol.

Table 4 presents RDs responses to the advanced knowledge/scenario portion of the survey.

 Table 4. RDs responses to the advanced knowledge/scenario questions.

<u>Scenario/Question</u>	<u>Correct response</u>	
	%	(n)
1. A woman with Insulin Dependent Diabetes Mellitus gives birth to a nine pound newborn. She wants to breastfeed. Your recommendations to this mother would be:	28	(63)
2. A 25 year old new mother presents with the following concerns: She has a two week old baby who was nursing well until a day ago when he started frequent bouts of crying and wanting to be fed “all the time”. Your treatment option would be to tell the mother:	62	(142)
3. A new mother calls you exasperated. She has just given birth to healthy twins. She is solely breastfeeding both babies. They both want to be fed at the same time. The mother reports that after feeding, the babies keep crying as if they are still hungry. Your response to this mother would be:	61	(138)
4. An exclusively breastfeeding mother presents with sore nipples. Her infant is six days old. Upon visual examination of the mother’s breast, you observe cracked, bleeding nipples. Your treatment option would be:	75	(170)

5. Care for engorgement should include which of the following?	75	(171)
6. Care for plugged milk ducts should include which of the following?	74	(169)
7. Care for mastitis should include which of the following?	53	(120)

PROFESSIONAL TRAINING

Table 5 presents the RDs professional training in breastfeeding and lactation including any conferences/seminars/workshops, lactation educator courses, and lactation consultant courses.

Table 5. Dietitian's sources of professional training in breastfeeding and lactation

Conferences/seminars/workshops attended	(n)	%
None	(106)	46
1-3	(86)	37
4-6	(14)	6
6+	(22)	9
Lactation Educator courses		
None	(198)	87
1-3	(29)	13
4+	(0)	0

Lactation Consultant courses

None	(208)	92
1-3	(18)	8
4+	(0)	0

ROLE IN BREASTFEEDING PROMOTION AND SUPPORT

Table 6 presents the RDs responses to what they view to be their role in breastfeeding promotion. They were asked to select all that apply and many participants marked more than one. Thirty-three respondents did not select any of the choices, indicating they feel they have no role in breastfeeding promotion. Some responders that marked “other” elaborated by writing in comments such as “none”, “not practicing in this area”, or “refer to lactation consultant” on the line provided.

Table 6. Dietitian’s view of their role in breastfeeding promotion

	(n)	%
Recommend it	(194)	85
Discuss pros and cons of breastfeeding with clients	(84)	37
Educate the public	(72)	32

Help women manage breastfeeding problems	(51)	22
Provide hands-on support	(27)	12
Other	(28)	12

BREASTFEEDING EDUCATION BACKGROUND

We were interested in finding out about RDs education on breastfeeding and lactation during their undergraduate and graduate coursework, as well as in their dietetic internships. The participants were given a list of possibilities and asked to mark all that apply. Table 7 describes their responses.

Table 7. Dietitian's extent of breastfeeding education from undergraduate coursework, dietetic internship, graduate coursework, and workshops.

Undergraduate coursework	(n)	%
No education	(57)	25
Some education	(133)	58
Adequate education	(16)	7
Dietetic internship		
No education	(60)	26
Some education	(88)	39
Adequate education	(14)	6

Did not complete an internship	(15)	7
Graduate coursework		
Some education	(24)	11
Adequate education	(3)	1
Have attended workshops/meetings	(95)	42

We also wanted to find out from which sources RDs have received most of their practical information on managing lactation. Those surveyed could check all applicable sources from the ones listed. The first choice was “school” to which only about 17% of respondents checked this source. Twenty-seven percent checked “work”, 52% marked “personal experience”, 13% said “friends”, 11% said “family”, 26% said “continuing education training”, and 14% checked “other”. Some responses for the “other” category were: reading books, certified lactation counselor (CLC) training, ADA position paper, WIC, birthing and breastfeeding classes, breastfeeding mom’s group, La Leche League, hospital staff and lactation specialist, nurses, and consultants. One person listed “pediatricians” as a response.

DIETITIAN PREPAREDNESS TO PROMOTE AND SUPPORT BREASTFEEDING

The next segment of questions was to understand dietitian’s views on their preparedness and other health care professional’s roles in breastfeeding promotion and support. Table 8 presents their responses.

Table 8. RDs preparedness to promote and support breastfeeding and their beliefs of other healthcare professional's role in breastfeeding promotion and support.

Preparedness to <u>promote</u> breastfeeding	(n)	%
Very prepared	(52)	23
Somewhat prepared	(136)	60
Not prepared	(40)	18
Who believed to have primary role in <u>promoting</u> breastfeeding		
Physician or PA	(147)	64
Nurse or APRN	(14)	6
IBCLC	(8)	4
RD	(14)	6
Other/combination	(45)	18
How prepared to <u>support</u> breastfeeding		
Very prepared	(19)	8
Somewhat prepared	(142)	62
Not prepared	(65)	29
Who believed to have primary role in <u>supporting</u> breastfeeding		
Physician or PA	(25)	11
Nurse or APRN	(13)	6
IBCLC	(10)	4
RD	(115)	50
Other/combination	(65)	29

With regard to promoting breastfeeding, a large number of respondents responded with some combination of the listed choices and/or marked “other” and wrote in “all of the above”. For supporting breastfeeding, many respondents wrote in either “all have a role” or even family, friends, spouse, partner, parents and/or grandparents.

PRACTICES IN LACTATION COUNSELING

The last segment of the survey was only for those individuals who routinely counsel breastfeeding mothers. Nearly 24% (n= 56) of our total respondents completed this portion of the survey indicating that they do counsel breastfeeding mothers. Of these individuals, less than 22% (n=12) said that a physician or other health professional routinely refers patients to them to promote breastfeeding and 25% (n=14) said a physician or other health professional routinely refers patients to them for breastfeeding support. Nearly 43% of those who counsel breastfeeding mothers said they have talked with a physician or other health professional to make them aware of their availability to provide breastfeeding support/promotion.

When asked what areas they felt they needed additional training, only seven of the 56 (13%) responded that breastfeeding promotion was one of them. Eighteen (32%) said they needed additional training in breastfeeding techniques and 44 (79%) indicated they needed more training on breastfeeding problem solving. Only six (11%) of those

completing this portion of the survey stated that there were no areas in which they needed additional training.

These individuals were also asked what would be the best way for them to acquire training and newer information. Table 9 presents their preferred source of acquiring training in lactation and breastfeeding.

Table 9. Dietitian's preferred source for acquiring training in lactation and breastfeeding.

<u>Source</u>	%	(n)
Courses that provide CEUs	27	(15)
Informational brochures and pamphlets	0	(0)
Webinars	4	(2)
Workshops	9	(5)
Internet courses	0	(0)
*Other	59	(33)

*If more than one of the given options was marked, the response was categorized as "other".

RDs that routinely counsel breastfeeding mothers were asked when the method of infant feeding and the subject of breastfeeding was typically discussed, as well as what form of breastfeeding education is initially used. They were also asked if they promote breastfeeding to mothers who have decided to bottle feed and if they or a co-worker ever

distribute infant formula samples or promotional material. Table 10 describes their responses.

Table 10. RDs practices in discussing infant feeding, providing breastfeeding education, promoting breastfeeding and distribution of infant formula.

<u>What point is infant feeding method</u>		
<u>discussed with patient/client</u>	%	(n)
Prior to pregnancy	13	(7)
First trimester	50	(28)
Second trimester	15	(8)
Third trimester	13	(7)
<u>Who initiates subject of breastfeeding</u>		
RD	78	(43)
Patient/client	7	(4)
Physician/PA	11	(6)
<u>What form is breastfeeding information</u>		
<u>initially provided</u>		
Pamphlets and brochures	73	(40)
Counseling session	64	(35)
Other	7	(4)

Promote breastfeeding if patient/client has
decided to bottle feed

Yes	79	(44)
No	21	(12)

You distribute infant formula samples or
promotional material

Yes	4	(2)
No	96	(54)

Anyone where you work distribute infant formula
samples or promotional material

Yes	20	(11)
No	80	(44)

SCORES IN RELATION TO NUMBER OF YEARS IN PRACTICE AND AGE

There was not a significant relationship ($p > 0.05$) between number of years in practice or age of respondents and general knowledge scores or advanced knowledge/scenario scores.

SCORES IN RELATION TO POPULATION

Although not significant, there is a trend for an inverse relationship for the general knowledge scores ($p = 0.0664$), advanced knowledge scores ($p = 0.3192$), and both scores

combined ($p=0.0650$) with respect to the population categories. RDs practicing in a town/city with population $<10,000$ scored highest (22.9/34, 4.6/7, and 27.5/41). RDs practicing in a town/city with a population 10,000 – 100,000 scored lower (21.9/34, 4.5/7, and 26.3/41) than those who practiced in a town/city $<10,000$ and higher than RDs practicing in a town/city with population $> 100,000$. Those who responded that they practiced in a town/city with a population greater than 100,000 scored the lowest (21/34, 4.1/7, and 25.1/41).

SCORES IN RELATION TO COLLEGE DEGREE ACHIEVED

There was not a significant relationship ($p>0.05$) between highest college degree achieved and knowledge scores.

SCORES IN RELATION TO EMPLOYMENT

RDs working in a hospital, compared to those in other employment settings, had significantly ($p=.0149$) lower scores on the general knowledge portion of the survey and significantly ($p=.0379$) lower scores when the general knowledge and advanced/scenario scores were combined. However, their advanced/scenario scores alone were not significantly different ($p>0.05$) from those in other employment settings.

RDs employed in a clinic or ambulatory care center did not score significantly different ($p>0.05$) on either section of the questionnaire when compared to RDs working in other settings.

RDs employed in an extended care facility had significantly lower scores for the general knowledge portion of the survey as well as combined general knowledge and advanced knowledge ($p=0.0004$ and $p=0.0015$, respectively). However, their advanced knowledge scores alone were not significantly different ($p>0.05$) from other RDs.

RDs working for an HMO, physician or other health care provider did not have significantly different scores on either of the knowledge portions of the questionnaire when compared to others.

RDs employed in home health care did not have significantly different scores on either knowledge portion of the survey when compared to other RDs.

RDs working in community/public health programs scored significantly ($p<0.0001$) higher on the general knowledge portion of the questionnaire than RDs practicing in other settings, but did not score significantly different on the advanced/scenario questions. Their scores were significantly ($p=0.0002$) higher when both knowledge sections were combined. However, they did not score higher on the more advanced knowledge section.

RDs employed in both K-12 school food service and college or university food service did not score significantly different from other RDs on either knowledge portion of the survey.

RDs working as college or university faculty, as well as RDs working in food manufacturing, distributing, and/or retailing did not show any significant difference in knowledge scores for either portion of the survey compared to other RDs.

RDs in private practice and RDs working as consultants did not have significantly different scores on either knowledge portion of the questionnaire when compared to RDs practicing in other settings.

SCORES IN RELATION TO PROFESSIONAL TRAINING

RDs who reported attending any breastfeeding conferences/seminars/workshops scored significantly higher than those who had attended none on both the general knowledge section, advanced knowledge section, and both combined ($p < 0.0001$ for each). Those who had attended Lactation Educator courses scored significantly higher on the general knowledge section of the survey ($p < 0.0001$) and the advanced knowledge section ($p = 0.0046$) and the two combined ($p < 0.0001$). RDs who had taken lactation consultant courses also scored significantly higher on both knowledge portions of the survey as well as both combined, ($p = 0.0229$ for general knowledge, $p = 0.0498$ for advanced knowledge, and $p = 0.0146$ when combined.)

SCORES IN RELATION TO ROLE IN BREASTFEEDING

For RDs who viewed recommending breastfeeding as their role in breastfeeding promotion, their scores on the general knowledge portion of the questionnaire were

significantly ($p=0.0018$) higher than those who did not. Although not significant, their advanced knowledge/scenario scores showed a trend toward significance at $p=0.0873$. The scores for the two sections combined was also significantly higher at $p=0.0027$.

The general knowledge scores, as well as advanced knowledge/scenario scores were significantly higher ($p<0.0001$ and $p=0.0069$, respectively) for RDs who believe their role in breastfeeding promotion to be to discuss the pros and cons. Combined scores were also significantly higher with $p<0.0001$.

RDs who view educating the public as one of their roles in breastfeeding promotion scored significantly higher on both knowledge sections of the questionnaire ($p<0.0001$ and $p=0.0048$, respectively) and also significantly higher when combined at $p<0.0001$.

Knowledge scores were significantly higher for RDs who felt one of their roles in breastfeeding promotion was to help women manage breastfeeding problems. The general knowledge, advanced knowledge/scenario as well as the combined score all had p values of <0.0001 .

RDs who view providing hands-on support as part of their role in breastfeeding promotion scored significantly ($p<0.0001$) higher on the general knowledge portion of the questionnaire and significantly ($p=0.0036$) higher on the advanced knowledge/scenario portion of the questionnaire. When scores from both sections were combined they were also significantly higher at $p<0.0001$.

SCORES IN RELATION TO BREASTFEEDING EDUCATION BACKGROUND

When comparing sources of education in lactation and breastfeeding, no significant difference ($p>0.05$) in knowledge scores was found between those who reported receiving no education, some education or adequate education as part of undergraduate coursework. Similarly, no significant difference ($p>0.05$) in knowledge scores was found for individuals who received no, some or adequate education as part of a dietetic internship. No significant difference ($p>0.05$) in scores was found between those who completed a dietetic internship and those who did not. No significant difference ($p>0.05$) in scores existed between those who received either some or adequate education as part of graduate coursework. However, RDs who reported acquiring lactation and breastfeeding education through workshops and/or meetings scored significantly higher ($p<0.001$) in both knowledge sections of the survey.

RDs who stated they received most of their practical information on how to manage lactation from school scored significantly lower on the general knowledge portion of the survey ($p=0.0302$). For the advanced knowledge/scenario portion of the survey, the mean score for this population, although not significant, trended towards being significantly lower at $p=0.0676$. Combined scores were significantly lower with $p=0.0231$.

Respondents who selected work for where they received most of their practical information scored significantly ($p=0.0007$) higher on the general knowledge portion of

the survey. There was a trend in scores being significantly higher on the more advanced questions ($p=0.0646$), and when all were combined knowledge scores were significantly ($p=0.0011$) higher.

For those who selected personal experience as their main source of practical information, scores for general knowledge, advanced, and both combined were significantly higher with $p<0.0001$, $p=0.0002$, and $p<0.0001$, respectively.

As friends and family are often a source of information and support with respect to breastfeeding and lactation, these responses were a popular choice as the main source of practical information. The mean general knowledge score for those who selected friends was not significantly different ($p>0.05$) from others; however the mean score for the scenario portion of the survey was significantly lower ($p=0.00360$). When both scores were combined, no significant difference ($p>0.05$) existed. Knowledge scores for those who selected family were not significantly different ($p>0.05$) for either section.

Knowledge scores for the RDs who selected continuing education training as a major source of practical information were significantly higher for both sections individually and combined ($p<0.0001$, $p=0.0563$, and $p=0.0002$, respectively).

SCORES IN RELATION TO PREPAREDNESS TO PROMOTE AND SUPPORT

There was significant ($p<0.0001$) positive relationship between preparedness to promote breastfeeding and general knowledge scores, advanced knowledge scores and

both combined. There was also a significant ($p < 0.0001$) between preparedness to support breastfeeding and general knowledge scores, advanced knowledge scores and both combined.

SCORES IN RELATION TO AREAS OF NEED FOR ADDITIONAL TRAINING

No significant difference in knowledge scores existed for RDs who selected “breastfeeding promotion,” “breastfeeding problem solving,” or none as an area in which they felt they needed additional training. However, for those who selected “breastfeeding techniques” as an area they felt they needed additional training, there was a trend toward general knowledge, advanced knowledge/scenario and combined scores being significantly lower ($p = 0.0861$, $p = 0.0571$, and 0.0551 respectively.)

CHAPTER 3

DISCUSSION

This study demonstrates that some RDs lack the knowledge to successfully promote and support breastfeeding and there are certain sub-groups that are more knowledgeable than others to solve breastfeeding problems.

It is interesting that RDs practicing in larger cities scored slightly lower than those in less populated areas considering that more populated cities would have more opportunity for continuing education. Perhaps RDs in rural parts of the state are utilized in several different roles, including lactation management and breastfeeding support, and

therefore, are more likely to be knowledgeable on these topics even if it is not their main area of practice.

The result of the present study finding no relationship between advanced college degree and knowledge scores was in agreement with the results of the Figueroa survey (44).

Our study showed that RDs working in hospital and extended care settings had significantly lower general knowledge scores compared to others and RDs working in community/public health programs had significantly higher general knowledge scores than others. The WIC program often employs RDs as WIC nutritionists and RDs working for WIC would fall into the category of community/public health programs. The survey results from Figueroa similarly showed that WIC professionals scored significantly higher than non WIC professionals on the basic knowledge questions and advanced knowledge questions (44).

A main goal of WIC programs is to endorse breastfeeding as the optimal way to feed an infant and serves as a resource for breastfeeding promotion and support. Researchers have shown that WIC eligible mothers participating in the WIC program have a higher probability of breastfeeding initiation (17). Although WIC participants may have access to a lactation consultant from a hospital or other healthcare organization, these lactation consultants are most likely a Registered Nurse (RN). RNs have different educational backgrounds and different professional experience. Researchers have

demonstrated that RDs have a stronger interest in lactation and exhibit greater breastfeeding knowledge than nurses (18). This provides an opportunity for RDs to share their skill set for a WIC job and is an opportunity for AND to promote RDs for jobs in WIC.

Participants in this study who had attended any breastfeeding conferences/seminars/workshops, lactation educator courses, or lactation consultant courses scored significantly higher on both knowledge sections of the survey. Higher knowledge scores were expected for RDs with professional education in lactation and are similar to the finding by Figueroa which showed higher basic and advanced knowledge scores for respondents who were IBCLC (44). Recently researchers have shown that continuing breastfeeding education improves the knowledge, clinical skills and practices, and counseling skills of nurses and midwives (46). Other recent research has shown that healthcare providers have increased levels of knowledge and comfort dealing with breastfeeding issues after implementation of a formal breastfeeding education program (47).

In the present study, only 8% of participants had attended 1-3 lactation consultant courses and none had attended 4 or more. In the Figueroa study, 23% of participants had attended 1-3 lactation consultant courses, 0.9% had attended 4-6 and 0.5% had attended 6 or more lactation consultant courses. The percentage of respondents in the present study who had attended lactation educator courses was also lower than that of the Figueroa study (14% vs. 30.6%), as was the percentage of respondents who had attended any

breastfeeding seminars/workshops/conferences (53% vs. 65.5%). The Figueroa study included non-RD WIC nutritionists, so it would have been interesting to know if the number of participants who had attended these courses would have been much lower if non-RDs (such as nurses) were excluded.

The results of this study show that RDs who feel they have any role in breastfeeding promotion scored higher on general knowledge and advanced knowledge questions. RDs who feel they do not have a role in breastfeeding promotion may not work with a population that needs lactation services, however, it is the responsibility of all nutrition professionals to promote and support breastfeeding for its short- and long-term health benefits for both mother and infants (2).

Based on the results of the current study, breastfeeding and lactation are not adequately covered in nutrition courses at the college level, nor are they adequately covered in dietetic internship programs. Similar results were seen in the Figueroa study which showed that only 23.9% of participants felt their academic training in lactation management was adequate (44). In addition, RDs in the present study who stated they received most of their practical information on how to manage lactation from school scored significantly lower on the general knowledge portion of the survey.

Although AND emphasizes the essential role of nutrition professionals in the promotion and support of breastfeeding, AND should also emphasize the importance of thoroughly covering lactation in didactic programs and dietetic internships in order for

new RDs to have the education necessary to promote and support breastfeeding. Based on the results of our questionnaire, topics that should be covered in the curriculum include nutritional concerns of breastfeeding women, normal infant feeding and growth patterns, and problem solving knowledge for both simple and complicated breastfeeding issues.

Respondents in the present study who selected work for where they received most of their practical information on breastfeeding scored significantly higher on the general knowledge portion of the survey as did RDs who selected continuing education training as a major source of practical information. It would be expected that an RD who has received ongoing training on lactation, either through work or continuing education, be more knowledgeable on the topic. This highlights the need for continuing education opportunities to be provided for RDs who may not receive breastfeeding education and training as part of their job.

RDs who selected personal experience as their main source of practical information scored significantly higher on the general knowledge and advanced knowledge portion of the survey. These results are similar to Figueroa's results which showed that respondents who had breastfed at least one child and had a positive experience scored higher on both knowledge sections of the survey compared to no personal breastfeeding experience or personal breastfeeding experience that was negative.

Other researchers have looked at personal breastfeeding experience and its influence on practices and recommendations. Freed and associates found that obstetrics-gynecology residents and with personal breastfeeding experience were significantly more likely to have counseled expectant mothers regarding infant feeding methods and common lactation problems and significantly more likely to have taught mothers breastfeeding techniques and how to use a breast pump (48). Guise and Freed found that resident physicians who had breastfed or whose spouse had breastfed tended to recommend breastfeeding for longer (12 months vs. 10 months) than residents without personal breastfeeding experience (49). These results indicate health professionals, including RDs, may be more ready to promote and support breastfeeding if they have experienced it in their personal lives. As breastfeeding advocates and role models, RDs should be encouraged to choose to breastfeed if/when they have children of their own.

Many of the RDs participating in the present study that had breastfed, responded that their personal experience with breastfeeding their children was a negative one. Based on this qualitative data, even knowledgeable nutrition professionals may find breastfeeding challenging and experience similar problems as the general public associated with breastfeeding. This could be an advantage when counseling breastfeeding women, as they would more easily relate to breastfeeding difficulties. Although personal experience is valuable, it cannot replace education based on facts, research based knowledge, or training by experienced professionals.

Another topic that was touched on in the present study inquired about the RDs having been breastfed themselves. Because several of the participants in the current study considered family members as a source of support and information, it can be assumed that the choice to breastfeed one's baby would, for most of them, be at least partly affected by whether or not their parents had breastfed. For example, if a maternal or paternal grandmother breastfed her own child(ren), she may encourage her daughter or daughter-in-law to breastfeed, and if the grandmother did not breastfeed, she may not encourage the new mother to breastfeed. However, the present study showed no relationship between having been breastfed themselves and their own children having been breastfed. This may be due to the sample being educated nutrition professionals who value the nutritional benefits of feeding breastmilk more than the lay public.

An interesting finding of this study is that RDs practicing in less populated cities scored higher than RDs practicing in more populated cities. RDs working in rural parts of the state may be utilized in several different roles, including breastfeeding promotion and support, even if it is not their main area of practice. RDs practicing in larger cities can specialize in one area of dietetics and may choose to not participate in breastfeeding promotion and support.

Interestingly, RDs in the present study who chose family and friends as a main source of practical breastfeeding information scored significantly lower on the advanced knowledge questions. AND identifies involving family and friends as a strategy to promote and support breastfeeding. Having family and friends present during

breastfeeding education and counseling could ensure improvement in breastfeeding duration by conveying accurate information to both the mother and those supporting her throughout the breastfeeding experience.

Twenty-three percent of participants in the present study felt very prepared to promote breastfeeding compared to only 8% feeling very prepared to support breastfeeding mothers if questions or problems arise. In addition, 32% of the RDs who counseled breastfeeding mothers said they needed additional training in breastfeeding techniques and 79% indicated they needed more training on breastfeeding problem solving. Unfortunately, breastfeeding problem solving skills are also lacking in physicians that work with breastfeeding mothers (12, 48). If RDs increased their knowledge in this area of lactation management, physicians would be confident to refer patients to RDs when complicated breastfeeding issues arise.

CONCLUSION

Only 22% of RDs in this study stated that physicians or other health professionals routinely refer patients to them to promote breastfeeding and 25% stated that physicians or other health professionals routinely refer patients to them to provide breastfeeding support. Yet 43% of these RDs had ever made physician or other health professionals aware of the availability to provide breastfeeding promotion or support. RDs working in lactation counseling must promote themselves as the ideal member of the healthcare team to provide these services.

The results of this survey suggest that most RDs did not receive adequate education about lactation and breastfeeding through their undergraduate coursework or during their dietetic internship programs. Educators of undergraduate dietetic students should cover the topic of breastfeeding and lactation thoroughly in lifecycle nutrition courses. Dietetic internship directors and RDs serving as dietetic preceptors should ensure the topic is well covered during dietetic internships.

The results of this study also suggest that RDs who have received education through professional sources are more knowledgeable about breastfeeding and lactation than RDs who have not. Since most of the RDs surveyed stated that they would prefer to receive breastfeeding education through courses that provide CEUs, breastfeeding should be a topic covered more often at state and local dietetic association meetings and conferences.

Based on the results of our study, many RDs have the knowledge and confidence to promote breastfeeding to pregnant women, however, they may be lacking knowledge and confidence to properly support a currently breastfeeding mother. Education and training on the challenges of supporting breastfeeding mothers may be the key to reaching the continuation rates set forth by the CDC. AND recommends enhancing professional development by participating in continuing education activities and considering obtaining the credential IBCLC (2). RDs who counsel breastfeeding women should keep up to date with the art and science of lactation and sharpen skills in counseling and motivational interviewing (2). By following these recommendations and

positioning themselves in professional roles to use their breastfeeding knowledge and problem solving skills, RDs can help improve breastfeeding duration and exclusivity.

LIMITATIONS TO THE STUDY

One of the limitations of this study is the lack of ethnic, racial and gender diversity. Ninety-five percent of participants were white and 96% were female. Because our responders were not diverse, it would be beneficial to reach a more diverse group of RDs from all U.S. regions and compare results. Additional research is needed on a national level to compare RDs with a variety of ethnic and racial backgrounds.

Another limitation to the survey is potential participants' willingness to participate. RDs have a wide range of practice areas and an RD with no professional or personal interest in breastfeeding may be unlikely to complete a survey on the topic. RDs not working with the breastfeeding population contributed important data on adequacy of lactation education in college courses and dietetic internship programs.

A possible limitation to the study is participant's internet access and the ability to look up answers to the knowledge questions. Unlike conducting an interview, the researcher cannot be sure that the participants are answering questions unassisted. It is unknown how likely a participant would be to do this, but if a significant number of responders did it, survey results would be skewed.

Most of the questions on this survey were based on the questionnaire initially used by Figueroa who conducted validity and reliability testing. Content validity was established using a focus group of currently practicing nutritionists and lactation experts. Using Pearson correlation, test-retest reliability scores were calculated. Scores for basic knowledge, advanced knowledge and attitude questions were 0.87, 0.88, and 0.87 respectively. However, in the present study some questions were added and some questions were removed to target the author's specific objectives. The questions added to the survey for the present study did not undergo the same process to ensure validity and reliability.

RECOMMENDATIONS FOR THE PROFESSION AND FUTURE RESEARCH

It would be interesting to conduct one-on-one interviews with RDs of a wide range of professional experience and years in the profession. As dietetics has evolved over the years, gathering more information on breastfeeding knowledge, practices and sources of breastfeeding information may vary greatly. In addition, surveying recently graduated dietetic students and recent dietetic internship graduates would give insight to what is currently being taught in undergraduate and internship curriculum.

RDs can serve in both the traditional role of clinical dietitian and can also serve as a resource for breastfeeding support, especially if credentialed with IBCLC. For smaller hospitals and clinics that may not be able to justify the cost of hiring an additional nurse for lactation consulting and an RD for nutrition consulting, having one person to serve in

both roles would be ideal. Hospital RDs should become more involved in providing initial breastfeeding support to mothers after delivery of their baby and studying the impact of RDs with this type of dual role is of interest.

Since time constraints are almost definitely a barrier to physicians and nurses providing support to patients with breastfeeding issues, RDs could be utilized. Working in pediatricians offices would be ideal to reach breastfeeding mothers attending well-baby appointments.

Another focus of future research should be on RDs fulfillment of AND recommendations for nutrition professionals to promote and supporting breastfeeding.

When RDs are adequately educated on breastfeeding and lactation they can promote themselves as breastfeeding and lactation experts as they do the food and nutrition experts for all other stages of the lifecycle.

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APPENDICES

Appendix A – IRB approval letter

August 12, 2009

Cassandra Dytrych

Department of Nutrition and Health Sciences

6155 NW 12th St Lincoln, NE 68521

Kaye Stanek Krogstrand

Department of Nutrition and Health Sciences

202J LEV UNL 68583-0806

IRB Number: 20090810099 EX

Project ID: 10099

Project Title: Breastfeeding Promotion and Support of Nutrition Professionals

Dear Cassandra:

This letter is to officially notify you of the approval of your project by the Institutional Review Board (IRB) for the Protection of Human Subjects. It is the Board's opinion that you have provided adequate safeguards for the rights and welfare of the participants in this study based on the information provided. Your proposal is in compliance with this institution's Federal Wide Assurance 00002258 and the DHHS Regulations for the Protection of Human Subjects (45 CFR

46) and has been classified as exempt.

You are authorized to implement this study as of the Date of Final Approval: 08/12/2009. This approval is Valid Until: 08/11/2010.

1. The approved informed consent form has been uploaded to NUgrant (Dytrych ICF - Approved.doc at the end of the file name). Please use this form to distribute to participants. If you need to make changes to the informed consent form, please submit the revised form to the IRB for review and approval prior to using it.

We wish to remind you that the principal investigator is responsible for reporting to this Board any of the following events within 48 hours of the event:

- Any serious event (including on-site and off-site adverse events, injuries, side effects, deaths, or other problems) which in the opinion of the local investigator was unanticipated, involved risk to subjects or others, and was possibly related to the research procedures;
- Any serious accidental or unintentional change to the IRB-approved protocol that involves risk or has the potential to recur;
- Any publication in the literature, safety monitoring report, interim result or other finding that indicates an unexpected change to the risk/benefit ratio of the research;
- Any breach in confidentiality or compromise in data privacy related to the subject or others; or
- Any complaint of a subject that indicates an unanticipated risk or that cannot be resolved by the research staff.

This project should be conducted in full accordance with all applicable sections of the IRB Guidelines and you should notify the IRB immediately of any proposed changes that may affect the exempt status of your research project. You should report any unanticipated problems involving risks to the participants or others to the Board. For projects which continue beyond one year from the starting date, the IRB will request continuing review and update of the research project. Your study will be due for continuing review as indicated above. The

investigator must also advise the Board when this study is finished or discontinued by completing the enclosed Protocol Final Report form and returning it to the Institutional Review Board.

If you have any questions, please contact the IRB office at 472-6965.

Sincerely,

Mario Scalora, Ph.D.

Chair for the IRB

Appendix B – Initial letter/participant invitation letter

COLLEGE OF EDUCATION AND HUMAN SCIENCES

Department of Nutrition & Health Sciences

September 29, 2009

Dear Nebraska Dietetic Association Member:

We are asking nutrition professionals for your help with research in a study about breastfeeding.

As a member of the Nebraska Dietetic Association your responses will be very valuable in examining the knowledge and experience of those who make recommendations and provide support in feeding others. Your input will help in determining the educational needs of those in the profession as well as the need for the development of material that will be most useful in promoting and supporting breastfeeding.

Your answers are confidential and will only be released in aggregate form in which no individual's answers can be identified. When you return your completed questionnaire, your name will be deleted from the mailing list and your responses will remain anonymous. This study is voluntary. However, you can help by sharing your experience and knowledge. After completing the questionnaire, return it in the enclosed postage-paid envelope. If for some reason you prefer not to respond, please let us know by returning the blank questionnaire in the postage-paid enclosed envelope.

It will take approximately 30 minutes to complete the questionnaire and we have enclosed a small token of appreciation as a way of saying thank you for your help.

If you have any questions or comments about this study, we will be happy to talk with you at (402) 472-5285. You may also contact us at cdytrych@gmail.com. or at the address at the top of this letter. If you have any questions about being a research participant you can call the University of Nebraska Institutional Review Board at (402) 472-6965.



Thank you very much for helping with this study. Your responses are very important to this research.

Sincerely,

Cassandra Dytrych, RD

Primary Investigator

Dr. Kaye Stanek Krogstrand, RD, LMNT

Secondary Investigator

(402) 472-5285

Kstanek1@unl.edu

Appendix C – Participant survey

PART I: True/False Questions.

Please check the box with the answer you feel is correct.

QUESTION	TRUE	FALSE	UNSURE
1. Human milk and infant formula are nutritionally equivalent.			
2. Formula fed and breastfed babies have the same rate of respiratory and gastrointestinal infections.			
3. Both breast and formula fed babies need to be fed on a fixed schedule, for example, every four hours.			
4. A breastfeeding woman needs to eat nutritionally balanced meals in order to have high quality milk for her baby.			
5. There are foods a woman should avoid while she is breastfeeding.			
(If true, please list foods that should be avoided.)			

6. Breastfed babies need to nurse more frequently than formula fed babies.			
7. It is recommended that breastfed babies be introduced to solid foods at six months of age.			
8. An exclusively breastfed infant needs to get water regularly (at least once/day) in addition to breastmilk.			
9. Breastfeeding helps postpartum women lose weight.			
10. Human milk and infant formula both provide immunological protection for the infant.			
11. Glucose water should be offered to newborns whose mothers plan to breastfeed, until the mother's milk comes in.			
12. Breastfeeding women have to avoid all caffeine in their diet.			
13. Breastfeeding women cannot take medication while they are breastfeeding.			
14. A woman with truly inverted nipples can breastfeed.			
15. A breastfed baby grows faster than a formula fed baby.			
16. A woman with a breast infection (e.g. mastitis) has to stop breastfeeding, at least from the infected breast.			

17. Formula fed babies have a greater risk of developing allergies than breastfed babies.			
18. When an exclusively breastfeeding woman starts to give her baby some formula, the amount of milk her breasts produce stays the same.			

QUESTION	TRUE	FALSE	UNSURE
19. Mothers planning to breastfeed should expect sore nipples as a normal part of breastfeeding, especially at the beginning.			
20. An infant sucks from a bottle the same way it sucks from the breast.			
21. The most common cause of sore nipples related to breastfeeding is allowing the infant to nurse too much from the breast.			
22. The main reason most breastfeeding mothers switch to formula is because they are returning to work.			
23. Growth patterns of breastfed infants differ from those of formula fed infants.			
24. It is not advisable to introduce a bottle to a newborn for the first month of life, until lactation is well established.			
25. Nipple confusion refers to the way some newborns have difficulty feeding from bottles with different shaped nipples.			
26. If a breastfed infant has not regained his/her birth weight by two weeks of age, generally the mother should be encouraged to begin supplementing with formula.			
27. A breastfed newborn should nurse at least 10 times in a 24 hour period.			
28. Large breasts produce, on average, 10% more milk than average or small sized breasts.			
29. Women who are breastfeeding and run marathons need to pump and discard their breastmilk after a run rather than feeding it to their infant.			
30. A woman typically decides on a feeding method during the third trimester.			
31. Breastfeeding can promote normal jaw development and straighter alignment of teeth.			
32. Women with PKU cannot breastfeed their infants.			
33. Breastfeeding women who are hepatitis B or C positive are at risk of transmitting the virus through their breastmilk to their infants.			
34. Exclusively breastfed infants should begin receiving vitamin D supplements daily by at least two months of age.			

PART II: SCENARIOS

Please check the box with the answer you feel is correct.

1. A woman with Insulin Dependent Diabetes Mellitus gives birth to a nine pound newborn.

She wants to breastfeed. Your recommendations to this mother would be:

- a. Yes, you can breastfeed but you may need to decrease your insulin dosage.
- b. Yes, you can breastfeed but you may need to increase your insulin dosage.
- c. Yes, you can breastfeed and you may keep your insulin dosage the same.
- d. Not sure.

2. A 25 year old new mother presents with the following concerns: She has a two week old Baby who was nursing well until a day ago when he started frequent bouts of crying and Wanting to be fed “all the time”. Your treatment option would be to tell the mother:

- a. Don't worry, the baby is going through a growth spurt, just give him a few ounces of formula after nursing him to fill his stomach.
- b. Don't worry, the baby is going through a growth spurt, nurse him more often and you'll soon make enough milk to fill his stomach.
- c. I'm not sure why your baby is crying so much, take him to his pediatrician for an

examination.

d. Not sure.

3. A new mother calls you exasperated. She has just given birth to healthy twins. She is solely breastfeeding both babies. They both want to be fed at the same time. The mother reports that after feeding, the babies keep crying as if they are still hungry. Your response to this mother would be:

a. Put the babies back on the breast after they nurse and let them feed for as long as they want to. You will make enough breastmilk for two babies.

b. You need to supplement with a few ounces of formula because you may not be making enough breastmilk for two babies.

c. You need to supplement with a few ounces of formula until your body makes enough breastmilk to feed two babies.

d. Not sure.

4. An exclusively breastfeeding mother presents with sore nipples. Her infant is six days old.

Upon visual examination of the mother's breast, you observe cracked, bleeding nipples.

Your treatment option would be:

- a. Tell the mother to stop nursing temporarily, until her nipples have healed.
- b. Observe positioning and latch-on during breastfeeding in order to evaluate the cause for the sore nipples.
- c. Refer her to a breast specialist or to her physician to further evaluate the condition.
- d. Not sure.

5. Care for engorgement should include which of the following?

- a) Decrease the frequency and duration of breastfeeding/pumping.
- b) Use only a breast pump (stop nursing from the breast).
- c) Express some milk before nursing the infant.
- d) Not sure.

6. Care for plugged milk ducts should include which of the following?

- a) Nursing only on the unaffected side.
- b) Begin each feeding on the unaffected side.
- c) Gentle massage of the plugged area while feeding.
- d) Not sure.

7. Care for mastitis should include which of the following?

- a) Application of damp heat to the affected area before feeding and application of a cold pack to the affected area after feeding.
- b) Application of cold compresses only.
- c) Cease breastfeeding.
- d) Not sure.

PART III: PERSONAL EXPERIENCE

Please respond as completely as possible by checking the box with the correct answer.

<p>1. Were you breastfed as an infant?</p> <p>a. <input type="checkbox"/> Yes b. <input type="checkbox"/> No c. <input type="checkbox"/> Don't know</p>
<p>2. If you were breastfed, how long were you breastfed?</p> <p>a. <input type="checkbox"/> Weeks _____ b. <input type="checkbox"/> Months _____ c. <input type="checkbox"/> Years _____ d. <input type="checkbox"/> Don't know</p>
<p>3. Do you have children?</p> <p>a. <input type="checkbox"/> Yes b. <input type="checkbox"/> No</p>
<p>4. How many children do you have? _____</p>
<p>5. How many of your children were breastfed? _____</p>
<p>6. If you or your spouse/partner breastfed, how would you describe the breastfeeding experience overall?</p> <p>a. <input type="checkbox"/> Negative b. <input type="checkbox"/> Positive</p>

comments:

Part IV: General Information

Please answer the following questions that best describe you and your practice.

1. Your age _____
2. Size of town/city where you practice:
 - a. Population <10,000
 - b. Population 10,00-100,000
 - c. Population >100,000
3. Your gender:
 - a. Female
 - b. Male
4. Your race/ethnicity:
 - a. Hispanic or Latino
 - b. American Indian or Alaskan Native
 - c. Asian
 - d. Black or African American
 - e. Native Hawaiian or Pacific Islander
 - f. White
 - g. Two or more races
 - h. Prefer not to identify
5. How many years have you been in practice as a Registered Dietitian?

6. To which ADA Practice Group(s) do you belong? (Please list)

7. Your degree:
 - a. Bachelor (Year Graduated) _____
 - b. Master (Year Graduated) _____
 - c. Doctorate (Year Graduated) _____
 - d. Other (Specify) _____
8. Certificates/Licenses (Check all that apply)
 - a. RD
 - b. IBCLC
 - c. LMNT
 - d. Other (Please list) _____
9. Current employment setting:
 - a. Hospital (in-patient/acute care)
 - b. Clinic or Ambulatory Care Center
 - c. Extended Care Facility
 - c. HMO, physician or other health care provider

- d. Home Health Care
- e. Community/Public Health Program
- f. School Food Service (K-12)
- g. College or University Food Service
- h. College or University Faculty
- i. Food Manufacturer/Distributor/Retailer
- j. Private Practice, primarily individual client counseling
- k. Consultation, primarily to health care facilities
- l. Consultation, primarily to other organizations/industries/media

General Information (continued)

10. How many breastfeeding conferences/seminar/workshops have you attended?

- a. none
- b. 1-3
- c. 4-6
- d. 6+

11. How many Lactation Educator courses have you attended?

- a. none
- b. 1-3
- c. 4-6
- d. 6+

12. How many Lactation Consultant courses have you attended?

- a. none
- b. 1-3
- c. 4-6
- d. 6+

13. What do you view your role to be in breastfeeding promotion? (Check all that apply)

- a. Recommend it
- b. Discuss pros and cons of breastfeeding with clients
- c. Educate the public
- d. Help women manage breastfeeding problems
- e. Provide hands-on support
- e. Other (Specify) _____

14. What is the extent of your education in lactation and breastfeeding? (May choose more than one):

- a. Received no education as part of my undergraduate coursework.
- b. Received some education as part of my undergraduate coursework.

- c. Received adequate education as part of my undergraduate coursework.
- d. Received no education as part of my Dietetic Internship.
- e. Received some education as part of my Dietetic Internship.
- f. Received adequate education as part of my Dietetic Internship.
- g. Did not complete a Dietetic Internship.
- h. Received some education as part of graduate coursework.
- i. Received adequate education as part of graduate coursework.
- j. Have attended workshops and/or meetings.

General Information (continued)

15. Where would you say you received most of your practical information on how to manage lactation? (Check all that apply)

- a. School
- b. Work
- c. Personal experience
- d. Friends
- e. Family
- f. Continuing education training
- g. Other (Specify) _____

16. How prepared are you professionally to promote breastfeeding?

- h. Very Prepared. (I am confident in my knowledge and abilities.)
- i. Somewhat Prepared. (I question my knowledge and ability, but feel I could offer some level of promotion.)
- j. Not Prepared. (I do not know enough about breastfeeding to feel comfortable promoting breastfeeding.)

17. Who do you believe has the primary role in initially promoting breastfeeding?

- k. Physician or Physician's Assistant
- l. Nurse or Nurse Practitioner
- m. Registered Dietitian

- n. Lactation Consultant
- o. Other (Specify) _____

18. How prepared are you professionally to support breastfeeding mothers if questions or problems arise?

- a. Very Prepared. (I feel I can help a mother through any problem.)
- b. Somewhat Prepared. (I feel I could help a mother through a common problem, but would need additional help with more difficult cases.)
- c. Not Prepared. (I do not feel I could help a breastfeeding mother who had questions or problems.)

19. Who do you believe has the primary role in supporting a breastfeeding mother?

- a. Physician or Physician's Assistant
- b. Nurse or Nurse Practitioner
- c. Registered Dietitian
- d. Lactation Consultant
- e. Other (Specify) _____

If you DO NOT counsel breastfeeding mothers, you may stop the survey now. If you ever counsel breastfeeding mothers, please continue the survey.

1. Does a physician or other health professional routinely refer patients to you to promote breastfeeding?
 - a) yes
 - b) no
2. Does a physician or other health professional routinely refer patients to you for breastfeeding support?
 - a) yes
 - b) no
3. Have you ever talked with a physician or other health professional and made them aware of your availability to provide breastfeeding promotion/support?
 - a) yes
 - b) no
4. In what areas do you feel you need additional training?
 - a. Breastfeeding promotion
 - b. Breastfeeding techniques
 - c. Breastfeeding problem solving

- d. None
- e. Other (please explain) _____

5. What would be the best way for you to acquire training and newer information?
- a. Breastfeeding courses that provide CEUs
 - b. Informational brochures and pamphlets
 - c. Webinars
 - d. Workshops
 - e. Internet courses
 - f. Other (please explain) _____

6. At what point of a patient's pregnancy do you or another health care provider typically

discuss the method of infant feeding?

- a) Before pregnancy or in preconception counseling
- b) First Trimester
- c) Second Trimester
- d) Third Trimester

7. In your practice, who usually initiates the subject of breastfeeding?

- a) You
- b) The client
- c) Physician/PA

8. In what form do you initially provide breastfeeding information? (Select all that apply)

- a) Pamphlets and brochures
- b) Counseling Session
- c) Other (please specify) _____

9. Do you promote breastfeeding to patients who have already decided to bottle feed?

- a) Yes
- b) No

10. Do you distribute infant formula samples/promotional materials to your clients who are

pregnant?

a) Yes

b) No

11. Does anyone where you work distribute infant formula samples/promotional materials to

your clients who are pregnant?

a) Yes

b) No

12. Is there any additional information about breastfeeding management training or your experience that you might want to add?

Thank you for completing our survey!

Department of Nutrition & Health Sciences

November 30, 2009

Dear Nebraska Dietetic Association Member:

About 10 days ago I mailed you a questionnaire seeking your input on breastfeeding knowledge and experience. You were selected because you are a Nebraska Dietetic Association member and your input is so important in this area even if it is not an area in which you currently work. If you have already completed and returned the questionnaire, please accept our sincere thanks. If not, please do so today. If you have questions or concerns, please call me at 402-416-2230 or email me at cdytrych@gmail.com.

Sincerely,

Cassandra Dytrych, RD

Principal Investigator

Appendix E – Second letter/survey

COLLEGE OF EDUCATION AND HUMAN SCIENCES

Department of Nutrition & Health Sciences

December 28th, 2009

Dear Nebraska Dietetic Association Member:

About three weeks ago we sent you a questionnaire that asked for your input on breastfeeding knowledge and experience. The questionnaires that have been received have provided some valuable information on the education and needs of nutrition professionals in this area.

We are writing again because of the importance of your voice in providing expert opinion in an area that involves promoting and supporting the best feeding practices of others. We maintain confidentiality of all responses. An identification number is printed on the back cover of the questionnaire so that we can check your name off of the mailing list when it is returned. The list of names is then destroyed so that individual names can never be connected to the results in any way. All responses will be reported in aggregate thereby protecting the confidentiality of people's answers which is very important to us, as well as the University.

We hope that you will fill out the questionnaire and return it soon in the enclosed postage-paid envelope so that we can remove your name from the list. If you have any questions please contact me at 402-416-2230 or by email at cdytrych@gmail.com.

Sincerely,

Cassandra Dytrych, RD

Principal Investigator

Kaye Stanek Krogstrand, PhD, RD, LMNT

Secondary Investigator

Appendix F – FDA PREGNANCY RISK CATEGORIES

CATEGORY	DEFINITION
A	Controlled studies in women fail to demonstrate a risk to the fetus in the first

	trimester (and there is no evidence of a risk in later trimesters) and the possibility of fetal harm appears remote.
B	Either animal-reproduction studies have not demonstrated a fetal risk, but there are no controlled studies in pregnant women, or animal-reproduction studies have shown an adverse effect (other than a decrease in fertility) that was not confirmed in controlled studies in women in the first trimester (and there is no evidence of a risk in later trimesters).
C	Either studies in animal have revealed adverse effects on the fetus (teratogenic or embryocidal, or other) and there are no controlled studies in women, or studies in women and animals are not available. Drugs should be given only if the potential benefit justifies the potential risk to the fetus.
D	There is positive evidence of human fetal risk, but the benefits from use in pregnant women may be acceptable despite the risk (e.g., if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective.)
X	Studies in animals or human beings have demonstrated fetal abnormalities, or there is evidence of fetal risk based on human experience, or both, and the risk

	of the use of the drug in pregnant women clearly outweighs any possible benefit. The drug is contraindicated in women who are or may become pregnant.
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Appendix G – DR. HALE’S LACTATION RISK CATEGORIES

CATEGORY	DEFINITION
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L1 SAFEST:	<p>Drug which has been taken by a large number of breastfeeding mothers without any observed increase in adverse effects in the infant. Controlled studies in breastfeeding women fail to demonstrate a risk to the infant and the possibility of harm to the breastfeeding infant is remote; or the product is not orally bioavailable in an infant.</p>
L2 SAFER:	<p>Drug which has been studied in a limited number of breastfeeding women without an increase in adverse effects in the infant. And/or, the evidence of a demonstrated risk which is likely to follow use of this medication in a breastfeeding woman is remote.</p>
L3 MODERATELY SAFE:	<p>There are no controlled studies in breastfeeding women, however, the risk of untoward effects to a breastfed infant is possible; or, controlled studies show only minimal non-threatening adverse effects. Drugs should be given only if the potential benefit justifies the potential risk the infant. <i>(New medications that have absolutely no published data are automatically categorized in this category, regardless of how safe they may be.)</i></p>
L4 POSSIBLY HAZARDOUS:	<p>There is positive evidence of risk to a breastfed infant or to breastmilk production, but the benefits from use in breastfeeding mothers may be acceptable despite the risk to the infant (e.g., if the drug is needed in a life-threatening situation or for a serious disease for which safer drugs cannot be used or are ineffective.)</p>

L5 CONTRAINDICATED:	<p>Studies in breastfeeding mothers have demonstrated that there is significant and documented risk to the infant based on human experience, or it is a medication that has a high risk of causing significant damage to an infant. The risk of using the drug in breastfeeding women clearly outweighs any possible benefit from breastfeeding. The drug is contraindicated in women who are breastfeeding an infant.</p>