

Improving the Outcome of Premature Infants with the Use of Mother's Own Milk

Abstract

The new lactation and pumping program at Carle Foundation Hospital's Neonatal Intensive Care Unit (NICU) has led to outstanding progress in increasing the number of mothers who pump and provide breast milk to their premature infants. Benefits include improved feeding tolerance and lessened necrotizing enterocolitis (NEC) infections and use of total parenteral nutrition.

Introduction

The purpose of this study was to determine and reduce the barriers that NICU mothers encounter when trying to establish and maintain adequate breast milk supply, as demonstrated in measured milk production and breastfeeding rates. Breast milk can be life-saving to the preterm infant. However, mothers who deliver prematurely are unprepared for the difficult task of parenting in the NICU and it is inherently difficult for them to maintain their milk supply as they must use breast pumps. Teaching mothers to pump breast milk is one way to immediately involve these mothers in their infants' care.

Methods

Subjects were recruited from our NICU and were mothers who gave birth to either Low Birth Weight (LBW) or Very Low Birth Weight (VLBW) infants and initiated pumping and breastfeeding. Data regarding specific interventions was collected by personal interview and chart review.

Rationale and Literature Support

Increasing the initiation of breastfeeding and its maintenance are important goals shared by the World Health Organization and Healthy People 2010.¹ Our hospital shares these goals and followed the program design provided by the Center for Disease Control and Prevention in their "Guide to Breastfeeding

Interventions."² Consequently, we provide a free Breastfeeding Clinic (BFC) staffed by nurses who are International Board Certified Lactation Consultants.

The medical and nutritional management of VLBW and LBW infants are closely related. NEC is the second most common cause of morbidity in the premature infant.³ NEC survivors are at risk for adverse outcomes including poor growth, cerebral palsy, vision and hearing problems and low scores on the Bayley Scales of Infant Development. A randomized, blinded trial found the use of mother's own milk (MOM) reduced infection rates and shortened hospital stays, when compared to infants who received preterm infant formula and donor breast milk. This study also indicated a dose-response relationship that suggests that the more MOM the baby was given the greater the benefits to that baby.⁴ Although MOM improves outcomes of the NICU population, breastfeeding rates in the typical NICU are lower than the national average for term infants.⁵ Strategies to assist mothers in developing an adequate milk supply and motivating them to pump throughout their infants' hospitalizations are needed.

Studies recommended structured breastfeeding education and behavioral counseling programs to promote breastfeeding.⁶ Mothers need education to make informed choices.⁷ They need to know the benefits their babies receive from MOM and they need to hear it from the doctors and nurses who help to care for their babies.

Project Site Data

Our NICU statistics from the past several years were reviewed and a gap between the rates of pumping initiation and number of mothers providing MOM at discharge was discovered. In 2003, 92% of VLBW infants received MOM during their NICU admissions, but only 39% were still receiving MOM at discharge. An even larger gap appeared when pumping initiation rates were compared to breastfeeding rates. Although

92% initiated pumping, only 16% of mothers put their babies to breast while in the NICU. Our attention turned to creating policies and procedures to support the use of MOM and breastfeeding in the NICU.

Study Framework

The first objective was to increase the percentage of breastfed premature infants from 16–40%. Implementation of the NICU feeding protocol allowed oral feedings to begin at approximately 32 weeks' gestation. Interventions were needed to assure that a mother pumped a full milk supply until her baby could take oral feedings. By early identification of mothers at risk of losing their milk supply and provision of corrective interventions, the milk supply can usually be recovered. The milk expression goal is 500–750 mL/day. This level should be reached between seven to ten days postpartum. When a mother's milk supply drops below 500 mL/day, her prolactin level decreases and milk supply is further diminished.

The second objective was to boost the percentage of infants who received MOM throughout their hospital stay. The high initial pumping rate indicated the mothers were at least initially interested in providing MOM to their babies and this should lead to improved satisfaction in caring for their babies. However, many mothers have difficulty maintaining an adequate milk supply and must pump at least seven to eight times per day. Stress, fatigue, lack of access to a reliable pump and pump accessories, inconsistent information, and time management are many of the barriers these new mothers face. Any one of them can lead to an insufficient milk supply.

These mothers live extremely taxing lives. They must wait months before their babies are ready to come home and they must sit by while NICU staff care for their babies. For many, the survival of the baby is uncertain. While pumping is important to them, it may sometimes be delayed as they try to figure out how to cope with all the other problems. The NICU staff must assist mothers to stay focused on pumping and help them understand the lactation process in addition to instructing them on proper pumping techniques.

Interventions

Interventions were planned with collaboration of medical and nursing staff, administrative staff and the lactation team. We previously observed that mothers who held their infants skin-to-skin while in the NICU (Kangaroo Care) were more likely to attempt breastfeeding and to continue to provide breast milk at discharge. This was also observed at another site.⁴

Nursing interventions were broken into four areas.⁷ These interventions were implemented or reinforced in early 2004.

- **Creation of a favorable breastfeeding environment**

This included displaying posters of babies' breastfeeding, installing privacy curtains, making breast pumps readily available, and encouraging mothers to pump their own milk in the NICU. Pumping at the bedside enhanced the number of times per day that the mother pumped and increased ounces produced per day. Increased privacy created a cozy space for mothers to spend time with their infants, promoting Kangaroo Care and later breastfeeding. There are many benefits to this intimate mother child experience.⁸ Kangaroo Care can then progress to non-nutritive feedings. These "practice feedings" can begin between 27 and 29 weeks' gestation. Data collected in our NICU in 2003 found that all infants who did non nutritive feedings later attempted breastfeeding. These early attempts provide mothers with hope for future breastfeeding success. When the infant shows interest and remains stable during the non-nutritive sessions, actual breastfeeding and implementation of the feeding protocol can be considered.

- **Creation and continuation of collaborative relationships**

1. More than 50% of the mothers with premature infants in our NICU qualify for WIC (Special Supplemental Nutrition Program for Women, Infants and Children). Attending bimonthly meetings with our county WIC departments assisted us in quickly obtaining breast pumps for new mothers.
2. Continued involvement with the Vermont Oxford group assisted us in setting goals and establishing benchmarks.
3. Partnerships with the NICU nursing staff promoted pumping and maintenance of lactation.

- **Educational support**

1. Our educational materials were updated and our NICU nurses underwent mandatory training sessions reviewing the lactation process and the importance of MOM.
2. Daily lactation rounds were instituted.
3. A pumping diary was added to the educational packet and used for daily milk supply measurement. Mothers falling below 500 mL/day were referred to the BFC, where lactation specialists are constantly available, by phone or

in person. Mothers receive lactation support during their postpartum stays, and while their infants are in the NICU. They are all welcomed to return for help after the discharge of their infants. Our program is funded by gifts from our hospital employees.

- **Kangaroo care/non-nutritive feedings**

Subsequent Survey Information

Six months after the interventions had been instituted, mothers in the NICU were invited to participate in a survey to provide qualitative information. Since mothering in the NICU is so difficult, we sought their insight on how to better assist them and future mothers. Fourteen women participated in the survey, ranging from 17–38 years of age. Three had LBW and eleven had VLBW infants. Surveys were completed between weeks three and four postpartum and progress was followed while their babies were in NICU. This timeframe was chosen to allow adequate time to experience pumping and become familiar with the NICU environment. Eight (57%) were enrolled in the WIC program. These 14 women had 17 babies, including two sets of twins, two survivors from a set of triplets, and 11 singletons. Infant birth weights ranged from 1 lb 5 oz – 4 lb 7 oz and gestational ages at birth from 24–34 weeks' gestation.

Mothers were asked to identify barriers to pumping eight times per day. Their list included time struggles, fatigue, anxiety about milk supply and frustration with low milk supply, nipple soreness, working and pumping, difficulty finding a place to pump, travel time from home to hospital (some drove more than an hour each way), difficulty tracking the time, the fact that “it’s always time to pump,” and managing their other children. All mothers said that their motivation to continue to pump came from their babies. Although these mothers did well with pumping and management of lactation, all needed continual reinforcement and assistance. The many hours spent with these mothers may explain their high success rate with pumping: ten (71%) were still providing MOM at discharge and eleven (79%) attempted breastfeeding during their children’s NICU hospitalization.

Project Outcomes

The impact of these interventions was assessed by hospital chart review of 46 VLBW infants, looking at five specific events:

1. If the infant received MOM (97.8% were)
2. If the infant was held in Kangaroo Care (77.7% were)
3. If the infant was put to breast in non-nutritive feeding (46.6% were)

4. If the infant was put to breast in actual breastfeeding (57.7%, up from 16%)
5. If the infant was discharged still receiving MOM (57.7%, up from 39%)

These results surpassed the goals of 40% being put to breast and 50% being discharged on MOM.

Discussion

As the medical field is recognizing the benefits that extremely premature infants receive from breast milk the use of donor milk is increasing in the NICU. Donor milk (DM) is most often used as a substitute for MOM, when mothers cannot provide an adequate supply of their own milk. However, DM costs about \$3.50 per oz. One study estimated that an infant born at 1100 gm can use 330 oz of breast milk during an uncomplicated 60 day stay.⁹ If this baby were using DM, the cost would be \$1155. Our NICU also uses DM if necessary as our premature infants do not receive formula until after 32 weeks' gestation. Consequently, MOM is far less expensive. It should be noted that the entire budget for our Breast Feeding Clinic is about equal to the cost of one case of NEC requiring surgery.¹⁰

Conclusion

When lactation specialists and other healthcare providers work together in a conducive environment to assist mothers of premature infants in their pumping and breastfeeding efforts, improved rates of use of MOM and breastfeeding can be achieved.

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CME Questions 2a-e

Please give the correct answer to the following:

- 2a. A study revealed that MOM had no effect on the premature infant.
 - a. True
 - b. False
- 2b. Donor milk is equally as effective as mother's own milk.
 - a. True
 - b. False
- 2c. Mother's need only to pump two to three times per day.
 - a. True
 - b. False
- 2d. MOM plays no role in preventing necrotizing enterocolitis.
 - a. True
 - b. False
- 2e. Breastfeeding rates are higher for preterm NICU babies than for full term babies.
 - a. True
 - b. False