Abstract

Breastfeeding has been shown to be beneficial to both mother and baby for physical health, mental health, and even financial stability, and it is supported by the American Academy of Pediatrics (AAP) as "the optimal form of nutrition for infants" (2). In keeping with this mindset, Palmetto Health Richland is working to gain national designation as a Baby Friendly Hospital. One requirement to do so is to improve the rate of breastfeeding exclusivity among post-partum patients. This quality improvement project aimed to improve this rate by enhancing resident physician knowledge of the advantages of breastfeeding as well as proper breastfeeding techniques, and to provide an educational foundation on how to instruct mothers on this information. In order to achieve these goals, a breastfeeding curriculum put forth by the AAP was adapted to meet Palmetto Health Richland’s four-week newborn nursery rotation which is taken by Pediatric and Family Medicine residents during their intern year. The percentage of mothers of infants cared for by these residents in the newborn nursery who were exclusively breastfeeding their babies prior to and after implementation of the breastfeeding curriculum served as the primary outcome measure for the project. Secondary endpoint measures included resident satisfaction with the instruction provided and resident scoring on a pre- and post-test designed by the AAP to assess competency and comfort with breastfeeding advantages and patient instruction. After curriculum implementation, exclusive breastfeeding rates of resident team patients in the newborn nursery at Palmetto Health increased by a total of 15%, and resident physician comfort with breastfeeding patient education and management improved by as much as 20%. Overall, this resident-directed breastfeeding curriculum was successful from both a patient and clinician perspective, and its continued use as part of the training of resident physicians should greatly aid in Palmetto Health's strive to become a Baby Friendly Hospital.

Introduction

Multiple studies have shown that breast feeding is beneficial to both mom and baby for physical health, mental health, and even financial stability. In infants, this practice has been found to decrease the risk of gastrointestinal and respiratory infections, leukemia/lymphoma, obesity, SIDS, diabetes, allergies, and inflammatory bowel disease (2). Mothers who breastfeed benefit from decreased post-delivery blood loss secondary to improved uterine contraction, expedited return to pre-pregnancy weight, prolonged amenorrhea secondary to lactation,
decreased post-partum depression, and less financial strain when compared to mothers who purchase formula (2). For these reasons, the American Academy of Pediatrics (AAP) considers breast milk "the optimal form of nutrition for infants," and it endorses exclusive breastfeeding in healthy newborns until six months of age, as well as continued breastfeeding until at least one year of age (2). Furthermore, the AAP supports the Baby-Friendly Healthy Initiative (BFHI) put forth by WHO and UNICEF to provide both parents and providers with the necessary tools to encourage exclusive breastfeeding in healthy newborns, termed "The Ten Steps to Successful Breastfeeding" (5).

Palmetto Health Children’s Hospital, a pediatric academic hospital that cares for more than 80,000 children annually and that has more than 30 medical subspecialties devoted strictly to children, is working to obtain national accreditation as a Baby-Friendly Hospital. Part of this accreditation process involves a review of the rates of breastfeeding initiation and breastfeeding exclusivity in the post-partum period. This data would only include mothers and infants without a medical indication for supplementation (2). Prior to instituting this quality improvement project, exclusive breastfeeding rates for mothers of infants born at Palmetto Health were sub-optimal. From May 2014 to August 2014, the average exclusive breastfeeding rate within the resident managed team was 38%, meaning only 38% of these mothers were exclusively breastfeeding their babies, and the remainder were either exclusively formula feeding or some combination of breastfeeding supplemented with formula feeding. The aim of this project was to increase this rate to 50%, by implementing a resident-directed breastfeeding curriculum.

1 The Ten Steps: 1) Have a written breastfeeding policy that is routinely communicated to all health care staff. 2) Train all health care staff in the skills necessary to implement this policy. 3) Inform all pregnancy women about the benefits and management of breastfeeding. 4) Help mothers initiate breastfeeding within the first hour of birth. 5) Show mothers how to breastfeed and how to maintain lactation even if they are separated from their infants. 6) Given newborn infants no food or drink other than breast milk, unless medically indicated. 7) Practice rooming-in (allow mothers and infants to remain together) 24 hours a day. 8) Encourage breastfeeding on demand. 9) Give no artificial nipples or pacifiers to breastfeeding infants. 10) Foster the establishment of breastfeeding support groups and refer mothers to them on discharge from the hospital.

2 Maternal contraindications include positive HIV status, human T-cell lymphotrophic virus (type I or II), untreated brucellosis, active/untreated tuberculosis, and active herpes simplex lesions on the breast. Infant contraindications include galactosemia, maple syrup urine disease, and possibly with very-low birth weight (VLBW), pre-term, hypoglycemia, hyperbilirubinemia, and PKU affected neonates.
Such a curriculum has been put forth by the AAP and has been implemented by residency programs such as New York University, Duke, University of California Los Angeles, Johns Hopkins, and Eastern Carolina (1,3,4). In this quality improvement project, the curriculum put forth by the AAP was adapted to fit the four-week Newborn Nursery rotation required by both the Pediatric and Family Medicine residency programs at Palmetto Health Richland during the intern year of residency. The curriculum included both a pre- and post-test from the AAP curriculum to assess resident competency and comfort with breastfeeding advantages and patient instruction (1). The change in score between pre- and post-curriculum tests and resident satisfaction with the curriculum in terms of effectiveness and time of completion served as secondary endpoints for this project.

**Methods**

Prior to establishing and implementing this project, a survey was distributed to Pediatric residents in Spring 2014 to assess the need for such a project and the preference for learning method, whether via lecture, reading selection, video, hands-on, or compilation. The consensus was to implement a curriculum which involved primarily resident-driven information which contained a combination of informational media to address various types of learners. To conduct this quality improvement study, the Breastfeeding Curriculum as put forth by the AAP was adapted to fit the four-week long Newborn Nursery resident rotation, as mentioned above. Pre-test, post-test, and case studies were taken directly from the AAP curriculum (1). Relevant research articles and academic publications, as well as video instruction and local breastfeeding resources were compiled into a binder to serve as a study reference for this adapted curriculum.
This resource was divided by topic for each of the four weeks which the residents were immersed in the newborn nursery environment.

Both Pediatric and Family Medicine residents at Palmetto Health Richland were included in this study. Residents repeating the rotation for an elective month were excluded. In addition to the paper and video components, residents were encouraged to spend at least one half-day under the guidance of a lactation consultant rounding on the post-partum floor.

Data was obtained through retrospective chart analysis to determine exclusive breastfeeding rate, excluding the need for medical supplementation. For the purposes of this project, breastfeeding exclusive rates were obtained monthly. Following each four week rotation, the change in resident test scores, as well as their overall comfort with breastfeeding family education and overall impression of the curriculum were assessed, and changes were made to the project design as deemed necessary. Breastfeeding exclusive rates were expressed as percentages, as were changes in resident test scores, while resident satisfaction with the curriculum was assessed on a qualitative scale. Due to the set length of each rotation (four weeks) and the set number of residents present for each rotation, the sample size of this project was rather small, with only two residents present in the Newborn Nursery per month and only seven months available for data collection post-implementation of the project.

Ethical issues considered in this project included maternal comfort and privacy, as well as resident comfort with discussion and instruction of breastfeeding technique. Residents were encouraged to integrate information regarding the advantages of breastfeeding during their daily rounds with patients, while respecting the family's right to choose to give formula instead. As previously mentioned, residents were also encouraged to participate in lactation rounds, but this was not a requirement of the Newborn Nursery rotation nor the quality improvement project.
Results

As described above, a four-week resident driven curriculum notebook was created and placed in the Newborn Nursery at Palmetto Health Richland. At the start of each rotation, Pediatric and Family Medicine residents were each given an AAP-generated pre-test. A similar AAP-derived post-test was administered upon completion of the curriculum. Each month, or PDSA cycle, of the curriculum was evaluated by a survey component to the post-test, as well as a one-on-one interview between QI study staff and the resident physician that had just completed the newborn nursery rotation. Feedback, such as removing superfluous articles from the binder, was implemented for the subsequent month, or PDSA cycle. The initial quantity of journal articles was in fact decreased significantly over the course of this project. Residents found that too much time was spent on reading repetitive information, retracting from time which could have otherwise been spent on a wider variety of information and by viewing the associated videos. By the end of the project, a few core breastfeeding articles, as well as relevant recent case studies, were retained. In general, residents appeared to appreciate the multi-faceted learning style, implementing visual, auditory, and hands-on methods by means of articles, videos, case discussions, and lactation rounds.

The aim of this project was to increase exclusive breastfeeding rates among mothers of infants born at Palmetto Health and cared for by the resident team from 38% to 50%. This data was obtained by evaluating infants who did not require medical nutritional supplementation. The Exclusive Breastfeeding Rate was calculated as follows:

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\text{Number of exclusively breastfed babies} = \frac{\text{Number of exclusively breastfed babies}}{\text{Total number of babies eligible to breastfeed exclusively}}
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with the answer recorded as a percentage. Such calculations were performed on a monthly basis. Data for this project was included for an entire year, with data in the months of April 2014 through July 2014 serving as baseline, and data from the months of September 2014 through March 2015 serving as outcome data after implementation of this curriculum.

Over the course of this project, it was found that the average exclusive breastfeeding rate among babies in the newborn nursery resident team between the months of September 2014 and March 2015 increased by approximately 15%, to an average of 54% (see Figure 1).

The vertical line in figure 1 depicts implementation of the resident-driven breastfeeding curriculum. The exclusive breastfeeding rate in July 2014 was significantly lower than in the months preceding (12% exclusive breast-fed babies without need for medical supplementation). Whether this is a true reflection of the exclusive breastfeeding rate for that month or an outlier, the post-curriculum exclusive breast feeding rate is still greater than the pre-curriculum rate by approximately 9%, even if the results are calculated with the data from July 2014 removed from the analysis.
To determine effectiveness of the curriculum from an academic stand-point, resident performance in both pre- and post-curriculum tests was assessed. Data was also divided between Pediatric and Family Medicine residents. It was decided to examine these two groups of residents separately, because Pediatric residents complete a Neonatal Intensive Care Unit (NICU) month just prior to their month in the Newborn Nursery. Many Family Medicine residents have not had recent exposure to neonatal management prior to their month in the newborn nursery. In comparing the pre-test and post-test scores among residents, the results were quite impressive (see Figure 2):

All but one resident improved their score after completion of the breastfeeding curriculum. The average improvement by a Pediatric resident (Peds) was 16%, while the Family Medicine (FM) residents averaged a 17.2% increase. This trend is further explained by the fact that, on average,
the Family Medicine residents had lower scores on the pre-test than the Pediatrics residents, most likely due to their lack of previous newborn management experience.

The average Pediatric pre-test score was 74.7%, while the average Family Medicine pre-test score was 71.4%. One Family Medicine resident did have a decrease in score of 4%, but the pre-test score was rather impressive to begin with. Such data suggest that a curriculum focused on breastfeeding is greatly beneficial to residents new to managing a neonate, as well as helpful to residents who have been directly involved with their care for at least a month (see Figure 3).

To ensure that this breastfeeding curriculum was well-received by those it was intended to help, overall resident satisfaction with the curriculum and its effectiveness at preparing them to educate families on the benefits of breastfeeding was assessed. Both the pre- and post-tests had surveys where residents were asked how comfortable they felt with addressing questions and managing problems related to breastfeeding, with 1 representing "Very confident" and 5 "Not at
all confident." It appears that resident confidence improved over the course of this curriculum, as evident in Figure 4.

Residents were also asked "How much influence do you think breastfeeding education during your residency training will have on how you will care for mothers and babies in the future?" with 1 being "Very influential" and 5 "Not at all influential." The average score after completing the curriculum was a 1.6, suggesting that residents found such an intervention beneficial to them for both short- and long-term patient care.

### Discussion

In summary, it appears that this AAP-adapted resident-driven breastfeeding curriculum was successful for both the patient and newborn nursery resident. Not only did it help to
improve exclusive breastfeeding rates by 15% to an average of 54% between September 2014 and March 2015, but it also increased resident knowledge and comfort with the subject of breastfeeding. Furthermore, the curriculum did so by addressing multiple learning styles, including visual, auditory, and hands-on learning. By including multiple components to present similar information, residents were more likely to retain what they learned. Residents were encouraged to discuss their findings during case reports, and they were able to implement what they had learned during the lactation shadowing experience.

As mentioned above, quite a few studies have evaluated residency breastfeeding curriculums with similar results. In 2010, Feldman-Winter, et. al published data from a prospective cohort study involving 417 residents and their response to the AAP breastfeeding curriculum. They found that Pediatric, Family Medicine, and OB-GYN residents who completed this curriculum showed improvements in knowledge, practice patterns, and confidence in breastfeeding management, thus increasing the exclusive breastfeeding rate among their patients (3). A similar intervention was performed by Hillenbrand, et. al. at the Brody School of Medicine in 2002. In this study, 49 Pediatric residents underwent an interactive multimedia curricular intervention, not unlike the one in this quality improvement project. Following the curriculum, it was found that breastfeeding knowledge and confidence, as well as clinical behaviors of Pediatric residents were enhanced through such an educational opportunity (4). Further supporting the effectiveness of a resident-centered breastfeeding curriculum, similar changes have been made at New York University, Duke, University of California Los Angeles, Johns Hopkins, and Eastern Carolina (1,3,4).

Limitations of this study lie largely with the structure of the resident rotation schedule, which is beyond the scope of this project. For instance, residents do not take call in the newborn
nursery, so overnight breastfeeding difficulties are managed by staff outside of the curriculum. A discouraged mother may request her infant receive formula overnight, and she may not feel supported or encouraged to do otherwise. Also, many infants were not able to breastfeed exclusively because formula was given for reasons not medically-indicated, such as maternal preference. A mother may feel as if her colostrum is not a sufficient volume to supply the needed nutrients to her neonate. Proper education pre-partum and immediately post-partum are crucial to supporting mom and baby during this stressful time. Ideally, it would be beneficial for such a curriculum to be implemented among the OB-GYN residents as well, both on the Labor and Delivery floor and the OB-GYN outpatient prenatal clinic. Overall, both Pediatric and Family Medicine residents gave positive feedback and were generally amenable to the curriculum and its long-term benefits for both themselves and the patients. One could conclude that a similar curriculum for OB-GYN residents might be equally well-received and beneficial. It would also be helpful to determine the long-term effects of this curriculum by following newborns at their 2 week, 2 month, 4 month well child clinic visits and beyond to survey for continued exclusive breastfeeding.

Overall, this quality improvement project has demonstrated that implementation of a resident-driven breastfeeding curriculum does benefit both resident comfort with breastfeeding education and management and exclusive breastfeeding rates among patients medically able to do so. Such a correlation is reassuring, as breastfeeding can be both a time of growth and stress for mom and baby. As mentioned above, there is still room for growth to achieve improved breastfeeding initiation and exclusive rates among patients in the newborn nursery. It is by addressing the issue of breastfeeding from every involved specialty encounter (pre-partum, immediately post-partum, and subsequent days) that initiation and exclusive breastfeeding can be
best achieved. As is evident by the Baby Friendly Initiative, a staff-wide and multiple residency program education on exclusive breastfeeding and its benefits is crucial. As the Initiative and this curriculum become more prevalent in the Palmetto Health newborn nursery, it is possible that our initiation and exclusive breastfeeding rates will trend upwards, secondary to overall staff and resident comfort and familiarity with breastfeeding practices. Such a trend will undoubtedly improve the health and well-being of our mothers and their babies both immediately post-partum and for many years to come.
Appendix A: Resources Incorporated into the Residency Breastfeeding Curriculum


Resources


