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A quality initiative to improve exclusive breast milk feeding in preterm neonates

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ABSTRACT

Background and Objective: Preterm babies thrive well on exclusive breastfeeding with fewer complications. In a retrospective analysis, challenges were noticed in the form of delayed first milk expression and frequency of expression, which was limited to 2–3 times a day. A quality improvement initiative was designed to increase the exclusive breast milk feeding rates in admitted preterm babies. The purpose of the present study is to evaluate the proportion of preterm neonates receiving mother's own milk by day 7 of life after such an initiative.

Methods: The quality improvement initiative was conducted at a level 3 neonatal intensive care unit from May 10, 2018, to August 10, 2018. Inborn preterm neonates <34 weeks with a minimum hospital stay of 7 days were included. Neonates of critically sick mothers and neonates having major congenital malformations were excluded. Mothers were given structured antenatal counseling regarding expressing breast milk (EBM). Postnatal visits were conducted to provide information through a video and a leaflet and formation of breastfeeding support group.

Results: A total of 30 babies were recruited during a period of 3 months and compared to historical controls. The median age of the first EBM improved from 2.5 days to 1.16 days, and the amount of EBM on the first day improved from 0.24 ml to 2.6 ml ($p = .002$). The proportion of babies receiving EBM on the first day improved from 24% to 80% ($p = .0001$), and at the end of 7 days, it increased to 73% from 46% ($p = .02$). The factors time to reach full enteral feeds, time to regain birth weight, rate of necrotizing enterocolitis, rate of sepsis, and proportion of babies on exclusive mother's milk during discharge appear comparable in both the groups.

Conclusions: A simple quality improvement approach through the formation of breastfeeding support group, antenatal counseling, and postnatal support for breast milk expression has made a significant improvement in milk expression from mothers delivered prematurely. It reflects on a team approach using the available resources.

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1. Introduction

The importance of exclusive breast milk is unquestionable for any neonate. Exclusively breastfed preterm neonates have better short-term (reduced rates of necrotizing enterocolitis) and long-

term outcomes and obtain maximum immunological benefits [1–3]. The human milk feeding through neonatal intensive care unit (NICU) has been adopted into clinical best practices. Although the rates of “any” human milk use in NICU have improved during the last decade, efforts to help mothers in expressing and maintaining mother's own milk (MOM) through discharge remains a concern [4].

In our neonatal unit, we found many challenges faced by mothers in the initiation and maintenance of breastfeeding. From the retrospective analysis of our own data, we identified that there was a delay in first milk expression (sometimes no milk up to the

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first 24–48 h) and reduced frequency of expression, which was limited to 2–3 times a day, thus resulting in most neonates relying predominantly on formula feeds until the end of 1 week. With this background, we designed a quality improvement (QI) initiative to increase exclusive breastfeeding rates in admitted preterm neonates. The purpose of the present study is to evaluate the proportion of preterm neonates receiving MOM by day 7 of life after such an initiative.

2. Materials and methods

This work was carried out in accordance with tenets of the Declaration of Helsinki for experiments involving humans. The institutional ethics committee approved the study protocol, and an informed consent was obtained from the mother of the neonates. The QI initiative was conducted at a level 3 NICU from May 10, 2018, to August 10, 2018. Inborn preterm neonates <34 weeks with a minimum hospital stay of 7 days were included in the study (Fig. 1). Neonates of critically ill mothers who were admitted in maternal intensive care unit and neonates having major congenital malformations and requiring surgical intervention (hence nonestablishment of breastfeeding) were excluded from the study.

Baseline data of the first provision of expressed breast milk (EBM) to the babies, daily amount of EBM given from days 1–7, and the exact amount and type of milk (EBM or formula) were collected. After baseline data collection and detailed introspection, a “breastfeeding support group” was formed comprising a neonatologist in charge, an NICU Resident, a nurse in charge, three staff nurses (one in each work shift), and a lactation counselor. The team collaboratively evaluated the reasons for poor establishment of breast milk in preterm mothers by fish bone analysis. The team found the lack of maternal understanding on the importance of breast milk for preterm babies and the lack of maternal sensitization to initiate early breastfeeding and sustain exclusive breastfeeding as the major reasons, and they formulated various steps for improving the same.

A leaflet depicting the importance of breastfeeding in preterm neonates and a video explaining the methods of milk expression both manually and with the help of breast pumps were designed. Mothers were given structured antenatal and postnatal counseling regarding expressing breast milk and its importance. The team also counseled other family members and the husband to help them provide better support to the mother once she initiates

breastfeeding. Postnatal visits within half an hour of delivery, then every 3–4 h for the first three days, and subsequently daily visits were conducted to provide information and encourage mothers for milk expression. The breastfeeding support group conducted meetings with on-duty nursing staff and resident doctors involved in clinical care on a daily basis to ensure all mothers and preterm neonates were involved in the quality intervention. A continuous feedback loop was maintained.

The changes were analyzed as part of a Plan-Do-Study-Act cycle (Fig. 2). During the retrospective analysis (observation phase), we observed 180 inborn babies admitted <34 weeks in our NICU per year, and we reviewed 30 case sheets from the medical records of inborn preterm neonates <34 weeks during the last three months (February to April 2018) just before the intervention phase. During the intervention phase, a total of 30 babies were recruited for a period of 3 months. Proportions of mothers expressing breast milk within 6 h of birth, within 24 h of birth, and subsequently on day 3 and 7 were assessed. The amount of EBM on days 1, 3, and 7 and the proportion of neonates fed on MOM on day 7 of life were evaluated. Data of time to reach full enteral feeds, time to regain birth weight, rate of necrotizing enterocolitis (NEC), rate of sepsis, duration of hospital stay, and proportion of babies on exclusive MOM during discharge were also collected.

Statistical analysis was performed using STATA version 11.1 (Stata Corp., College Station, Texas, US). Continuous data were checked for the normality of the distribution by the Shapiro–Wilk test. Because all the data were not distributed normally, they were described by median and interquartile range (IQR). Categorical data were described in proportions. Comparisons between the study and control groups were performed using the chi-square test or Fisher-exact test for categorical data and the Mann–Whitney test for continuous data. A *p*-value of <.05 was considered statistically significant.

3. Results

Table 1 summarizes the demographics and the amount of EBM expressed in both the study groups. Age and gender were

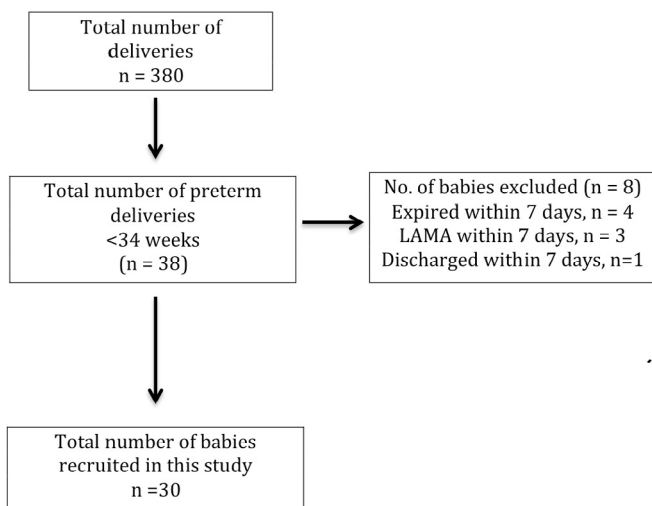


Fig. 1. A flowchart depicting the number of neonates evaluated, included, and excluded in the present study.

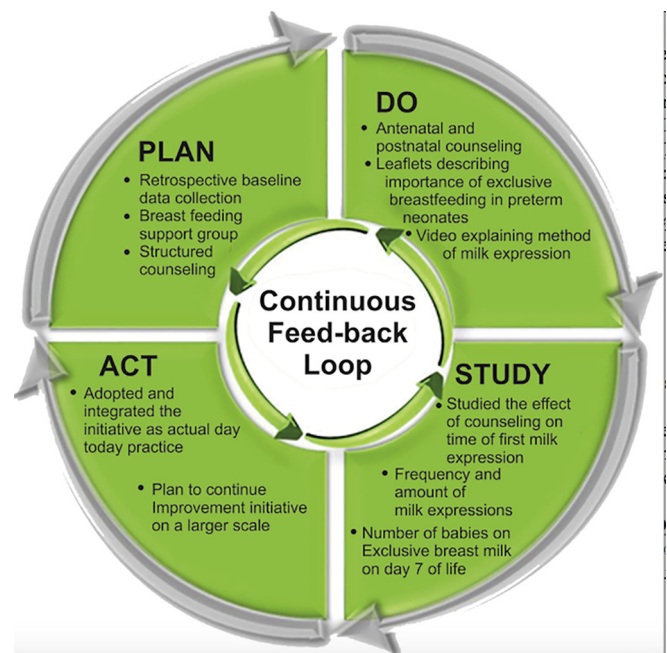


Fig. 2. A flowchart depicting the Plan-Do-Study-Act cycle followed in the present study.

Table 1
Demographics and amount of EBM in study and control group.

Characteristic	Study group with quality improvement initiative (n = 30)	Control group with no initiative (n = 30)	p-value
Age (weeks), median (IQR)	30 (27–32)	31 (28–32)	.47
Male:female	15:15	12:18	.60
Neonates receiving EBM on Day 1	24 (80%)	6/25* (24%)	<.0001
Amount of EBM in ml (Day 1), median (IQR)	1 (1–4)	0 (0–0)	<.0001
Amount of EBM in ml (Day 3), median (IQR)	15 (10–40)	6 (0–18)	.005
Amount of EBM in ml (Day 7), median (IQR)	115 (60–170)	60 (40–120)	.01
Exclusive MOM on Day 7	22 (73.3%)	14 (46.7%)	.07

(*Five neonates were kept nil by mouth on day 1, hence excluded from analysis).

EBM-Expressed breast milk, MOM-Mother's own milk.

Table 2
Comparison of maternal characteristics in both the groups on basis of antenatal counseling.

Characteristic	Antenatal counseling in the study group (n = 18)	No antenatal counseling in the study group (n = 12)	p-value
Age (weeks), median (IQR)	29.5 (27–31)	31 (30–32)	.06
Male:female	6:12	9:3	.06
First milk expression (≤ 6 h)	15 (83.3%)	10 (83.3%)	1.00
Amount of EBM in ml (Day 1), median (IQR)	1 (0–2.5)	1.5 (1–4)	.33
Amount of EBM in ml (Day 3), median (IQR)	15 (12–20)	17.5 (8–66)	.50
Amount of EBM in ml (Day 7), median (IQR)	115 (40–130)	132.5 (60–205)	.62
Exclusive MOM on Day 7	14 (77.8%)	8 (66.7%)	.68

comparable between the two groups. The proportion of neonates receiving EBM on day 1 in the study group was significantly higher than that in the control group. Although the proportion of neonates on exclusive MOM on day 7 did not show significant difference between the two groups, the amount of EBM on days 1, 3, and 7 in the study group was significantly higher than that in the control group.

In the study group, the first milk expression (≤ 6 h) was observed in 25 subjects (83.3%), and all mothers expressed milk within 24 h. Although all mothers received postnatal counseling, only 18 of them (60%) received antenatal counseling in the study group. Table 2 compares the characteristics between the mothers who received antenatal counseling and those who did not. There appeared to be no effect of antenatal counseling on the expression or quantity of EBM in the study group. Median age of the first EBM in the control group was 2.5 days, whereas, it was lower in the study group (1.16 days).

Table 3 compares the secondary outcome measures between the study and control groups. All the measures such as time to reach full enteral feeds, time to regain birth weight, rate of NEC, rate of sepsis, duration of stay, and proportion of babies on exclusive MOM during discharge did not show significant difference between the two groups.

4. Discussion

With our simple QI initiative for a short period of three months, we could demonstrate that the formation of a dedicated breastfeeding support group, structured counseling, and presentation of informative leaflets and videos helped in increasing the early and frequent milk expression in mothers and hence increasing the

exclusive breastfeeding rates in preterm babies in a busy unit. This QI initiative was based on previously published QI projects on early milk expression in preterm mothers, how special care bundles and structured approach affects MOM use, and benefits of exclusive MOM in preterm and very-low-birth-weight babies [5–11].

We studied the problems in our unit and planned interventions accordingly. We realized during the observation phase that parents of sick preterm neonates are completely unfamiliar with the NICU environment and hence rely on the healthcare professionals for every kind of support and guidance either before or after the delivery. Evidence suggests that both health care professionals and peer support for mothers contribute to the success of breastfeeding in babies [12,13]. Literature also proposes a positive effect of education and lactation support on maternal decision to provide exclusive MOM for very-low-birth-weight infants and switch over from formula to MOM [14–17].

Although the babies in the intervention group achieved full enteral feeds slightly earlier than those in the control group, the results were not statistically significant and comparable to the study results of Healy et al. [9]. Similar to the results in previous studies [9,18], birth weight was regained earlier in the intervention group, babies also had lesser duration of hospital stay, and there appeared to be a decreased trend in neonatal morbidities such as NEC and sepsis in comparison to the control cohort, although the results were not statistically significant.

In our study, antenatal counseling did not make an impact on the expression or quantity of milk on day 1, 3, and 7. The reason could be the smaller sample size, which is a limitation in the study. Every neonate's mother in the intervention group received postnatal counseling with the help of informative leaflets, videos, and regular visits of the breastfeeding support group providing

Table 3
Secondary outcomes.

Characteristic	Study group with quality improvement initiative (n = 30)	Control group with no initiative (n = 30)	p-value
Time to reach full enteral feeds (days), median (IQR)	8 (6–11)	9 (6–11)	.55
Time to regain birth weight (days), median (IQR)	11 (7–15)	15 (8–17)	.34
Necrotizing enterocolitis	1 (3.3%)	3 (10%)	.61
Sepsis	4 (13.3%)	5 (16.7%)	1.00
Duration of hospital stay (days), median (IQR)	26 (17–56)	35 (17–60)	.42
Exclusive MOM on discharge	18 (64.3%)	14 (48.3%)	.34*

(*Two babies in the study group and one in the control group died during the hospital stay and were excluded from analysis).

reassurance and encouragement to all the mothers, which significantly improved the amount of MOM. Our study protocol did not affect the duration of the hospital stay of the mother. Mothers were discharged and followed up with obstetricians as per their postpartum protocol. We provided support to the mothers during the neonatal counseling sessions of their hospital visits and through telephonic conversations as performed in other studies [19].

In the future, we plan to continue the quality initiative on a larger scale. Although this study is a very effective initiative for our NICU, the sample size is small. Although support group made every effort that interventions are appropriately placed, it must be acknowledged that these are motivational and behavioral interventions that are user dependent and may not reflect the best practices. Another limitation is that many previous studies enrolled only one of the babies in multiple births, whereas we included all the babies for better clinical correlation, as multiple births formed a considerable proportion of very preterm births. Moreover, we have compared our outcome variables of the intervention group with those of the retrospective cohort, as we cannot have prospective controls of not supporting breastfeeding (randomized controlled trial).

5. Conclusions

The team's approach and proper channeling of available resources through a simple quality initiative has resulted in significant improvement in milk expression from mothers who delivered prematurely.

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This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Ethical statement

This work was carried out in accordance with tenets of the Declaration of Helsinki for experiments involving humans. The Institutional Ethics Committee approved the study protocol, and an informed consent was obtained from the mother of the neonates.

Declarations of interest

None.

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