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Quality improvement initiative: improving proportion of preterm infants on mothers only milk at the time of discharge

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ABSTRACT

Background: Availability of mothers only milk (MOM) for preterm infants is a boon for their growth and development. Authors found that in our Special Newborn Care Unit (SNCU), the availability of MOM was very less with excessive use of formula feed. So, authors planned a quality improvement (QI) study to improve availability of MOM for preterms in level 3 SNCU catering to both in-born and out-born neonates.

Methods: Authors aimed to improve availability of MOM to preterm infants admitted in SNCU from the current 10% to 80% at day 7 of admission over a period of 8 weeks. Authors included preterm and mother dyads with <34 weeks of gestation or having birth weight <1800 gm. and likely to stay in SNCU for at least a week. For this initiative a QI team was formed. Baseline data was collected for a period of 3 weeks and analysis was performed of various constrains in providing MOM to preterms was later an interventional package was implemented which included counselling to mothers, Kangaroo mother care (KMC), demonstration of milk expression techniques. Intervention phase was implemented for the period of 8 weeks followed by sustenance phase for 2 months.

Results: Proportion of preterm infants on MOM increased from 10% to 81% during intervention phase at day 7 of admission and remained 66% during sustenance phase.

Conclusion: QI initiative has the potential to bring a tremendous change in making mothers milk available to both inborn and out-born preterms. With existing resources simple interventions can increase availability of MOM to preterm infants.

Keywords: Infants, Kangaroo mother care, Mothers only milk, Preterm, Quality Improvement

INTRODUCTION

Mothers own milk (MOM) for preterm infants is the best gift which a mother can give to these fragile sick infants. Exclusive breast feed preterm infants have better short-term outcomes like reduced feed intolerance, sepsis, necrotizing enterocolitis and early discharge along with long term outcomes in the form of better neurodevelopmental scores, cognition and intelligent quotient. Mother's milk provides the high quality of protein, carbohydrates and polyunsaturated fatty acids

along with anti-infective properties against several viruses, multi-drug resistant bacteria and protozoa. 4.5 It is observed that because of various reasons, mothers and health care professionals face multiple challenges in establishing and maintaining an adequate supply of milk in the intensive care unit, especially after preterm birth. It is a real challenge for health care team to overcome these constraints.

To dive deep into the facts, authors collected baseline information related to different constrains in our set up in

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a systematic way. Authors found that only around 10% of preterm infants were on MOM, rest 90% were on formula feeds which increases infection risk as well as the cost of care. Authors analyzed that major reasons behind less availability of mother milk were lack of counselling to mothers and knowledge deficiency in milk expression techniques, lack of kangaroo mother care (KMC), maternal sleep disturbances and non-availability of mothers in the hospital. Along-with this, there were structural issues also like less availability of beds to the mothers, no provision of milk expression pumps, unavailability of KMC chairs etc. So, to take up these systematically, authors planned improvement (QI) initiative to overcome these restrains using plan-do-study-act (PDSA) cycles and theory of change concepts. QI is an approach where healthcare team can be reorganized to provide quality care. Our primary focus was to make best use of scarce resources, adding few resources and to re-allocate the available resources. authors aimed to improve the availability of MOM to preterm infants admitted in SNCU from the current 10% to 80% at day 7 of admission over a period of 8 weeks.

METHODS

This study was conducted over a period of four months (September 2018 to January 2019), in Special Newborn Care Unit (SNCU) at Guru Gobind Singh Medical College and Hospital, Faridkot, Punjab, India. Ours is a tertiary care teaching hospital in North Indian state of Punjab. Study draft was approved by the institutional ethical committee and study was conducted in accordance with Declaration of Helsinki. Written informed consent was taken from all parents after sharing complete

information related to the study. Study population comprised of preterm and mother dyads with <34 weeks of gestation or having birth weight <1800 grams and likely to stay in SNCU for at least a week. Neonates with major congenital malformations were excluded from this study.

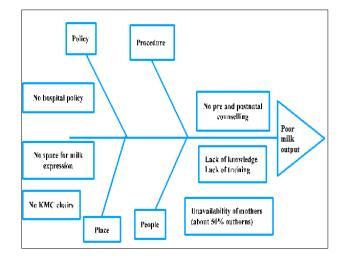


Figure 1: Fish bone diagram.

Baseline data were collected in a systematic way related to mother's demographic profile and MOM availability to preterm infants after admission. Daily observation was done related to expression of breast milk and its quantity from day 1 to day 7. Daily records were also maintained related to use of EBM vs formula feed in each dyad from day to day 7. To evaluate various reasons for less availability of MOM, Fish bone analysis was done (Figure 1).

Table 1: Intervention package.

Structural changes	Process	Outcome	
a) Display of posters related to KMC, benefits and milk expression.	a) Written breast-feeding policy was displayed in SNCU and communicated among health care personnel.	a) Baseline data related to study outcomes was collected during observation phase.	
b) Availability of place for milk expression and changing dress was provided	b) Postnatal counselling with teaching sessions related to KMC, importance of EBM, lactating mothers' diet were conducted with mother using A-V aids like videos, posters, role play.	b) Recording and reporting of outcome measures were routinely communicated among healthcare personnel.	
c) Gowns for KMC were provided to mothers on daily basis	c) Demonstration for KMC and milk expression techniques was given to mothers.	c) PDSA cycles were repeated according to weekly progress.	
d) KMC chairs were purchased and stationed in SNCU	d) Written orders for KMC and EBM were put in treatment register to ensure its compliance.	d) Intervention phase was followed by sustenance to ensure compliance.	
e) Breast milk expression pump was provided for milk expression.		d diameter	

PDSA: Plan-do-study-act, KMC: Kangaroo mother care, EBM: expressed breast milk, MOM: mothers only milk, SNCU: Special Newborn Care Unit, A-V: audio-visual

Table 2: Plan do study act(PDSA) cycle.

PDSA Cycle No.	Timeline for intervention (weeks)	Plan	Do	Study	Act	Remarks
PDSA 1	1 st and 2 nd	Introduction of comprehensive counselling package	Comprehensive counselling of mothers, video sessions and poster displays related to milk expression and KMC, written orders for KMC and EBM were put in treatment register	Proportion of mothers expressing milk on day 1 and day 3 of admission	Adopted	Significant increase in proportion of preterms on MOM
PDSA 2	3 rd and 4 th	Introducing KMC& facilitation of milk expression	Appreciating staff members for improving KMC and milk expression Availability of KMC chairs and screens for privacy Electric milk expression pump provided	Use of formula feeds and availability of EBM	Staff facilitation and plan adoption	MOM became pre- dominant feed for preterms
PDSA 3	5 th onward	More focus on out-born preterm-mother dyads	Team members were encouraged to have special emphasis on ensuring availability of EBM and KMC in this population	Availability of EBM to this population	Adopted	Achievement of target to improve availability of MOM for both inborn and out born infants

PDSA: Plan-do-study-act, KMC: Kangaroo mother care, EBM: expressed breast milk, MOM: mothers only milk

To overcome the obstacles in providing MOM to preterm infants, a multi-disciplinary team comprising of investigators of QI project, two resident doctors, one nursing in-charge, two senior staff nurses and nursing students posted in SNCU was constituted. Thorough analysis and work-up in discussing different approaches was done by the team members and a comprehensive package was developed by a common consensus. This Interventional package (Table 1) included counselling for early expression of breast milk, importance of breast milk, lactating women's diet, introduction of kangaroo mother care, counselling and demonstration of milk expression techniques.

Early milk expression policy was introduced in a step wise manner over a period of 2 months. Periodic meetings were held among team members to get inputs for effective implementation of comprehensive intervention package. Interventions were implemented in a phased manner to improve long term sustenance of study outcomes. Compliance to each of the intervention was evaluated in a typical PDSA (Plan-Do-Study-Act) cycle in Table 2.

Post intervention, data were collected over a period of 2 months. Recording and reporting of outcomes was done in a systematic way. Compliance and sensitization of

healthcare team was evaluated during the sustenance phase.

Statistical analysis

Data was entered, coded and analyzed statistically using STATA version 11.1 (Stata Corp, College station, Texas, US). The continuous data with normal distribution was analyzed by 't' test. Categorical data was analyzed using Chi-square test or Fisher's exact test. Results were presented in the form of mean, frequencies, and percentages. A 'p' value of <0.05 is taken as statistically significant.

RESULTS

Baseline data was collected for a period of 3 weeks and it was found that out of the total 10 eligible preterm infants, only one (10%) was on MOM on day 1 and day 3 of enrollment. Observation was continued till day 7 of enrollment and it was observed that only 2 (20%) out of 10 preterm infants were on exclusive MOM. Also similar rate of 10% was found during observation of proportion of preterms on KMC. Baseline characteristics of preterm infant and mother dyads are shown in Table 3.

Intervention phase was done for a period of 2 months, total 22 preterm infant and mother dyads were enrolled during this period. On day 1 total 68% of preterms were on MOM. Thereafter at day 3 and day 7 total 77% and 81% preterms were on MOM. There was increase in rate of KMC from 10% to 52% during the total period of intervention. There was a significant increase in proportion of babies who were exclusively on MOM and also total amount of milk expressed in ml also increased. (Table 4).

Table 3: Baseline characteristics of participants in study.

Parameter	Mean±SD
Gestation age, weeks	33.07±2.17
Maternal age, years	23.9±2.68
Birth weight, Kgs	1.51±0.3
Weight at enrollment, Kgs	1.49±0.29
SNCU stay in days	11.76±5.32
Weight at discharge, Kgs	1.56±0.19

SD: standard deviation, SNCU: Special Newborn Care Unit

Table 4: Proportion of preterm infants on mothers only milk (MOM) during observation and intervention phase.

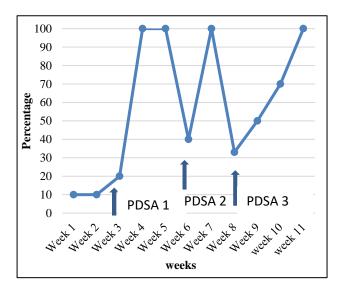
Outcomes	Observation phase N=10	Intervention phase N= 22	P
Proportion of preterm infants on MOM on D1 of enrolment	1(10%)	15(68%)	0.002
Proportion of preterm infants on MOM on Day 3 of enrolment	1(10%)	17(77%)	0.000
Proportion of preterm infants on MOM on D7 of enrolment	2(20%)	18(81%)	0.000

MOM- mothers only milk

Table 5: Proportion of preterm infants on mothers only milk (MOM) during intervention and sustenance phase.

Outcomes	Intervention phase N= 22	Sustenance phase N= 51	P
Proportion of preterms on MOM on D1 of enrollment	15(68%)	27(52%)	0.227
Proportion of preterms on MOM on D3 of enrollment	17(77%)	28(53%)	0.071
Proportion of preterms on MOM on D7 of enrollment	18(81%)	30 (58%)	0.057
EBM on D1 in ml	14	11	NS
EBM on D3 in ml	21	12	NS
EBM on D7 in ml	22	10	NS

MOM- mothers only milk, NS: not significant statistically, EBM: expressed breast milk and the significant statistically and the significant statistically are significant statistically. The significant statistically is also significant statistically and the significant statistically are significant statistically. The significant statistically are significant statistically are significant statistically are significant statistically. The significant statistically are significant



MOM: mothers only milk, PDSA: Plan-do-study-act cycle

Figure 2: Proportion of pre-terms on MOM during observation and day 7 of intervention.

Early during the intervention phase, authors found that there was a need for repeated PDSA cycles to enhance the proportion of neonates on MOM.

Hence, authors adopted this strategy of repeating PDSA cycles and three such cycles were repeated at interval of 2 weeks each. After every PDSA cycle, significant improvement was noted which helped to achieve our set target. These results are shown in Figure 2.

Sustenance phase: it was carried on for a period of 2 months. Total 51 mothers were enrolled. Results revealed that on day of enrollment 52% of preterm infants were on MOM.

Further observation was carried on for day 3 and 7. It was found that on day 3 proportion of preterm infants on MOM was 53% and on day 7 of enrollment it was 58% (Table 5).

During the sustenance phase, authors found acceptable rate of availability of MOM to preterm infants although

authors were not able to sustain results yielded during intervention phase. Weekly variation in availability of MOM to pre-terms in sustenance phase is presented in Figure 3.

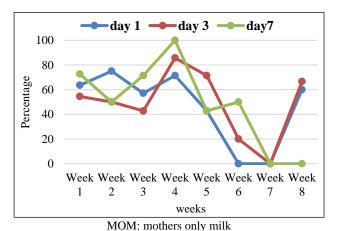


Figure 3: Proportion of pre-terms on MOM during sustenance.

DISCUSSION

In our study proportion of neonates getting MOM increased from 10% to 68% during intervention phase and 52% during sustenance phase on day one. Also there was statistically significant increase in total amount of EBM in intervention phase. During observation phase on day 3 only 10% preterm infants were on MOM that increased to 77% during intervention phase. Similarly, on day 7 of observation only 20% preterm infants were on MOM while during intervention 81% were on MOM. Similar findings were found in Q.I study by Sethi et al, conducted in All India Institute of Medical Sciences, NICU which caters to inborn neonates only.6 A Q.I. project by Belal Alshaikh et al, to improve to Use Exclusive MOM rate of Necrotizing on Enterocolitis(NEC) in Preterm Infants, showed significant improvement from 34.6 to 74.4% in exclusive use of MOM.7 On regression analysis, there was significant decrease in risk of NEC in the sustain period (odds ratio = 0.32; 95% confidence interval, 0.11-0.93). A study by Merewood et al, has shown improvement in initiation of mother's milk availability to neonates in Intensive Care Unit but they have included term neonates also.8 Another aspect is that they included all those neonates in outcome who have received even one mother's milk feed in first week of life. In contrast authors included only preterm <34 weeks and <1800gm weight and included only those preterms in outcome who had received exclusive mothers milk feed at day 1, 3 and 7 of enrollment. Lowenstein et al, have documented significant increase in human milk use at Day 14 of life from 64.95% to 73.66%. Similarly authors found increase in mother's milk availability at day 7 from 20% to 81%.9 Improved availability of mother's milk to preterm especially in set up where there is no availability of donor milk can definitely result in better outcomes. A study by

Sullivan S et al, have concluded that for extremely premature infants, an exclusively human milk-based diet is associated with significantly lower rates of NEC and surgical NEC when compared with a mother's milk-based diet that also includes bovine milk-based products.¹⁰

Present study has shown that quality improvement initiative in a low resource setting can improve availability of mother's milk to preterm infant. Strength of the study is that authors have laid much emphasis on enrollment of all preterm as per inclusion criteria despite of the fact that authors have around 50% out born neonates. Authors attained our target to improve preterms on MOM during intervention phase and enrolled both inborn and out born neonates equally. Limitations of our study are that during sustenance phase authors found downfall in proportion of pre-terms on MOM possibly because of non-involvement of obstetrics nurses and consultants, lack of counselling to family members for availability of out born mothers in unit, few breast pumps, less KMC chairs, inadequate space for mothers, overcrowding in NICU. Findings of our study have been discussed at our Institutional review meetings and these have been instrumental in bringing about administrative decision to shift the present SNICU to a separate Mother and Child Healthcare (MCH) block with ample space for newborns and mothers.

CONCLUSION

Quality improvement initiative can yield fruitful results in ensuring mother's milk availability to preterm infants by simply re-allocating the available resources. Improvement in availability of mother's milk in NICU can be reduce dependence on formula feed and on donor human milk. With the same objective our study results have shown statistically significant results in increasing proportion of mother's milk availability as well as increase in total amount of EBM.

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Institutional Ethics Committee

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