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Impact of a dedicated NICU lactation specialist for VLBW infants

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Abstract

Early breastmilk expression increases milk production in mothers of preterm infants. Previous audit in our unit demonstrated that no very low birth weight (VLBW) infants received colostrum within 2 hours post-delivery. To address breastfeeding challenges, a dedicated international board-certified lactation consultant (IBCLC) was introduced to the Neonatal Intensive Care Unit (NICU).

Aims

To assess the impact of a dedicated IBCLC on colostrum availability and provision of maternal breastmilk for VLBW infants.

Methods

Following introduction of a dedicated IBCLC in October 2019, we conducted a retrospective review of VLBW infants born during two 6-month periods: January – June 2020 and January – June 2021. Time to lactation support, time to colostrum availability, feeding method and feeding substrate were compared to an historical cohort.

Results

Following IBCLC introduction, 20% (8/41) and 41% (18/44) of mothers received lactation support within 2 hours of delivery in 2020 and 2021, compared to none pre-intervention. Post-intervention, 17% (7/41) and 25% (11/44) of infants received colostrum within 2 hours. Over 80% (68/85) of infants received some breastmilk at discharge post-intervention compared to 67% (40/60) pre-intervention, but without significance.

Discussion

Specialised lactation support led to earlier availability of breastmilk and improved provision of maternal milk at discharge. Next steps include supporting feeding at the breast in this high risk group.

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Introduction

Early initiation of breastmilk expression following delivery increases breastmilk production in mothers of VLBW infants[1]. Thus, mothers of preterm infants should be taught effective milk expression techniques as a priority. Local NICU nutrition guidelines state that breastmilk is the preferred substrate for feeding and aims for oral exposure to colostrum within 2 hours of delivery[2]. To address the challenges of providing expressed breastmilk and establishing direct breastfeeding in preterm infants, a dedicated IBCLC for the NICU was introduced in our unit in October 2019. The aim of this study was to measure key indicators of breastmilk intake in VLBW infants following the initiation of specialist lactation support in NICU.

Audit of practice of from July-September 2019 (N=15) demonstrated that no mothers had received assistance with hand expression within the preferred time frame of 2 hours of birth and no infants received colostrum within 2 hours of birth[3]. 27% of mothers received assistance between 2-6 hours and 40% of mothers had not received help for more than 12 hours post-delivery[3]. Delay in first expression post-delivery impacts later maternal milk supply[4] and can lead to lack of maternal breastmilk for oral immunotherapy and feeding, difficulty transitioning to breastfeeding, increased risks associated with early formula use and increased need for donor milk. This highlighted the need for additional lactation services for preterm dyads.

Data from the Vermont Oxford Network 2009-2016 showed that across Europe, 67% of VLBW infants were discharged on some maternal milk with 26% feeding with maternal milk exclusively[5]. Our unit in 2019 was comparable with 68% of VLBW infants receiving some maternal milk at discharge[6].

Methods

In October 2019, a dedicated IBCLC was introduced with the aim of offering timely lactation support and enhancing education in the NICU. An expression assessment tool, top up guide and instructional videos were implemented within the first 6-months of service.

We performed a retrospective review of VLBW infants born in the Coombe Hospital from January-June in 2020 and January-June 2021. Those with contraindication to enteral feeding or whose mothers had an absolute contraindication to breastfeeding were excluded. Demographic data and outcomes of death or discharge from an alternative site were recorded. Outcomes were time to assistance with hand expression, time to first colostrum, time to full feeds and feeding substrate and method at discharge, term and 6 weeks CGA. Early feeding data included all eligible infants. Enteral feeding guidelines were consistent across the study periods. As per hospital guidelines for infants born at <1500g, feeds were commenced

at 30 ml/kg/day for the first 24 hours, then advanced by 10ml/kg every 8 hours until volumes of 150ml/kg/day were reached. Nutritional data at discharge and follow up were recorded for infants who were discharged from our hospital.

Results were compared to a pre-intervention cohort from January-June 2019. Time to receiving support with hand expression was not recorded in the original audit so was compared to a smaller cohort of VLBW infants born July-September 2019 just prior to the intervention[3].

Two group analyses were performed using t tests and Mann-Whitney U tests and three group analyses were performed using ANOVA and Kruskal-Wallace tests. Association was measured using Cramer's V. Chi Squared and Fisher's exact test were used to compare categorical data. Data analysis was performed using Stata/SE 17.0. Statistical significance was defined as $p<0.05$.

Results

Clinical characteristics

From January- June 2019, 61 VLBW infants were born in the Coombe compared with 44 and 46 in the first six months of 2020 and 2021, of whom 46, 26 and 30 were followed up locally (Table 1). There were 7 (11.6%), 8 (18.2%), and 3 (6.5%) deaths respectively (Table 1). One infant was excluded in each of 2019 and 2020 both with contraindications to enteral feeding. Two infants were excluded in 2021: one for maternal contraindication to breastfeeding and one with contraindication to enteral feeding. Although fewer infants were born in and discharged in the 2020 and 2021 cohorts, the difference was not significant ($p=0.76$) and demographics remained similar.

Time to Lactation Support

The time to receiving support with hand expression decreased over the study period. Pre-intervention, the median time to support was 6-12 hours, improving to 2-6 hours in 2020 and <2 hours in 2021, $p<0.01$ (Figure 1). Following dedicated IBCLC support, 20% (8/41) of mothers received assistance with hand expression within 2 hours of delivery in 2020, increasing to 41% (18/44) in 2021 compared to 0% pre-intervention. Furthermore, post-intervention 22% (19/85) of mothers were supported to hand express antenatally or within 1 hour of delivery.

Mothers who were supported to hand express at <2 hours, were more likely to have breastmilk for their infant before 24 hours ($p=0.01$) but with a weak association, Cramer's $V=0.2$. There was also a weak but statistically significant association between receiving support at < 2 hours and infants receiving breastmilk at discharge, Cramer's $V=0.2$ ($p=0.04$). This association was not present when time to support of less than 6 hours was used. There

was no significant relationship between mothers receiving support for hand expression before 1 hour and having adequate milk supply at 14 days, whether they were providing breastmilk at term or 6 weeks CGA or whether they directly fed at the breast at any time point.

Infants who were born out of hours (on nights or weekends) were less likely to receive early support for hand expression (p=0.04) but with a weak association, Cramer's V =0.25.

Time to Colostrum

Median time to receiving colostrum for oral care improved from 10 hours pre-intervention to 4 hours in 2020 and 5 hours in 2021, p<0.01 (Figure 1). Prior to dedicated lactation support, 73% (44/60) of infants had maternal EBM available to them within the first 24 hours compared to 83% (34/41) in 2020 and 93% (41/44) in 2021, p<0.01.

Early feeding outcomes

The time before formally commencing feeds, including supplementation with donor EBM, was variable over the three years. The median time of commencing feeds at 30 ml/kg/day was 24 hours [14.5-30.5] in 2019, 12 hours [8.5-23] in 2020 and 26 hours [24-30] in 2021, p=0.92. Interestingly, over the same period there was a decrease in time to full feeds from 7 days in 2019 to 6 days in 2020 and 2021, p<0.01 (Figure 2).

Adequacy of milk supply was stable throughout the study period with 73% of mothers having adequate milk supply at 14 days in 2019 compared to 71% (29/41) in 2020 and 73% (32/44) in 2021. Donor breastmilk use increased from 78% in 2019 to 83% (34/41) and 91% (40/44) post-intervention but did not reach significance, p=0.09. The proportion of infants receiving a breastfeed for their first oral feed increased over the study period with 26% (12/47), 41% (11/29) and 46% (18/39) in 2019, 2020 and 2021 respectively, p=0.02.

Breastmilk feeding at discharge and beyond

More infants received maternal breastmilk at discharge from hospital following intervention with 85% (22/26) in 2020 and 80% (24/30) in 2021 compared to 67% (31/46) in 2019, but without significance, p=0.08 (Figure 3).

At term corrected, a decreasing but non-significant proportion of infants were receiving some maternal breastmilk with 69% (32/46), 60% (16/26) and 57% (17/30) in 2019, 2020 and 2021 respectively, p=0.53 . By 6 weeks CGA, this decreased further with 48% (12/26) and 40% (12/30) receiving some proportion of maternal milk in 2020 and 2021 with no comparative data available from the pre-intervention cohort. Only 32% (8/26) in 2020 and 20% (6/30) in 2021 received breastmilk exclusively by 6 weeks CGA.

Latching to feed

At discharge, 63% (29/46), 52% (15/29) and 56% (22/30) of all infants had directly latched to feed in 2019, 2020 and 2021 respectively, but no infants were exclusively latch feeding. By term corrected, 34% (16/46), 46% (12/26) and 30% (9/30) of infants were latching to feed at least some of the time over the three year period. At 6 weeks CGA, 36% (9/26) and 17% (5/30) were latching in 2020 and 2021 with 12% (3/26) and 10% (3/30) exclusively feeding at the breast. No changes in latching to feed were significant.

Discussion

Dedicated NICU lactation support improved early breastmilk availability and first feed at the breast, however this did not translate to improved rates of breastmilk feeding or feeding at the breast beyond discharge. Infants received colostrum for oral immunotherapy sooner and a higher, but not significant proportion of infants received maternal breastmilk at discharge from hospital. Across all three cohorts, no infants were exclusively latching to feed upon discharge from hospital. Most infants were discharged prior to establishing this skill, highlighting the need for ongoing support post-discharge. Previous qualitative studies have highlighted the need for post-discharge support[7,8] and our data supports this recommendation to enable transition to feeding at the breast. The Academy of Breastfeeding Medicine (ABM) protocol for "transitioning the breastfeeding infant form the NICU to home" recommends rooming in, individualised breastfeeding assessment pre-discharge and early post-discharge assessment (after 72 hours) of feeding and growth including observation of a breastfeed. If allocated appropriate resources, NICU IBCLCs are ideally placed to provide this individualised approach to increasing time and/or frequency of breastfeeds when growth has been appropriate.

The relationship between very early expression and full milk supply demonstrated by Parker et al.[1] was not demonstrated when mothers whose timing of expressions was less than 2 hours were compared to those who expressed after longer intervals. In our cohort, mothers who expressed early were more likely to be feeding with maternal breastmilk at discharge from hospital.

Timing of colostrum availability improved significantly from 10 hours to 4-5 hours. Although maternal breastmilk was available earlier, the time to commencing feeds at 30 ml/kg/day was prolonged from 2020 to 2021. By convention, any available volume of maternal breastmilk was given to infants for oral care over the first 24 hours. In practice, this was usually less than the starting feed volume of 30ml/kg/day. This may be due to reluctance to supplement with donor milk unless maternal milk supply was inadequate. Reassuringly, the time to full feeds decreased over the study period despite formally commencing feeds later and no change in feeding protocols with feeds advancing by 30ml/kg/day over the study period. It can be

inferred that this may have been due to fewer feed interruptions however this was not directly captured from our data.

One role of the NICU IBCLC was to facilitate further education for healthcare professionals enabling them to discuss the importance of maternal breastmilk and teach hand expression. Approximately 50% of VLBW infants were born outside normal working hours (nights or weekends) when a dedicated IBCLC was not in house. Infants born out of hours also benefited with 25% and 35% receiving support within 2 hours of delivery in 2020 and 2021, demonstrating that the new role did not de-skill staff who would otherwise have provided this support, but empowered colleagues to continue this role.

The proportion of infants fed at the breast for their first oral feed increased over the study period and as Pineda et al. have shown, this is associated with longer duration of breastmilk feeding [9]. Despite this, the rates of breastmilk feeding in our small cohort were lower by term and 6 weeks CGA. The timing of this study coincided with the SARS CoV-2 pandemic and during the same time period, we saw the first decline in Irish breastfeeding rates for decades[10]. This may have been due to social isolation, lack of face-to-face community support and limitation of hospital visits, but likely also reflects the difficulty in continuing to express milk to feed by bottle particularly after discharge.

The number of infants feeding directly at the breast at all stages up to 6 weeks corrected remained low. Expressing to feed breastmilk by bottle is a risk factor for early discontinuation of breastfeeding[11] and this remains an area for improvement. Qualitative studies have explored maternally reported barriers to preterm infants feeding at the breast which include lack of confidence, strict schedules and regulation around feeding[7] and that some infants are not able to take full feed requirements at the breast by discharge[8]. Internationally, the majority of VLBW infants have not established this skill by discharge[12-14] and the mean age of achieving exclusive feeding at the breast was over 37.5 weeks CGA[15]. Our mean age at discharge was just over 36 weeks, highlighting the importance of IBCLC support post-discharge. To address this need, the NICU lactation consultants have expanded their role to include follow up consultations for breastfeeding dyads to support their feeding goals.

After successful introduction of a NICU IBCLC locally, more infants have received expressed breastmilk early and have been fed with breastmilk at discharge. However, rates of feeding at the breast remain low at and post-discharge. The high attrition rate of breastmilk feeding and challenges establishing feeding at the breast despite lactation support highlights the need for further interventions that may support the transition to feeding at the breast.

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Declarations of Conflicts of Interest:
None declared.

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Table 1. Demographic data of VLBW infants and early feeding outcomes by year

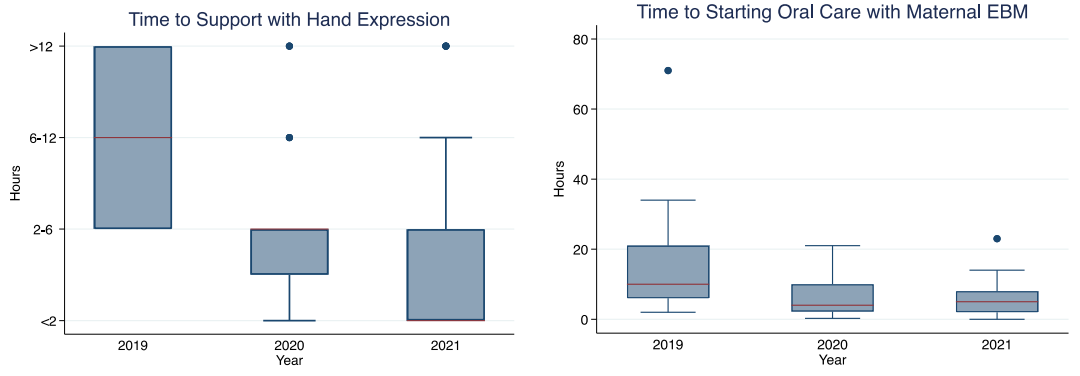
Values are presented as means (±SD), medians [IQR] and absolute counts (%).BW: birth weight, EBM: expressed breastmilk.

Population Characteristics	Jan-June 2019	Jan-June 2020	Jan-June 2021	p value
Total infants	61	42	46	0.76
Excluded	1	1	2	
Died	6	7	3	
Transferred to another hospital	8	8	11	
Infants discharged from CWIUH	46	26	30	0.76
Gestation at birth (weeks)	28+2 (±2+5), range 23+1–35+1	28 (±2+3), range 23-32	28+6 (±2+6), range 23-33+5	0.28
BW (g)	1040 [790-1260], range 400-1490	1120 [800-1240], range 440-1490	1185 [790-1340], range 515-1495	0.43
BW centile	41.5 [15.7-59.5]	50 [28-67]	46.5 [11-65]	0.17
Birth weight z score	-0.46 (±0.87)	-0.12 (±0.81)	-0.25 (±0.92)	0.14
Sex	37% female	50% female	43% female	0.40
Duration of admission (days)	51 [42-74]	48.3 [43-71.8]	44.5 [34.8-69.6]	0.37
Gestation at discharge (weeks)	36+4 [35+6-38]	36+4 [35+6-37+6]	36+4 [36-37+4]	0.74
Weight at discharge (g)	2280 [2140-2550]	2300 [2100-2620]	2315 [2030-2500]	0.83

P values based on comparison between pre and post-intervention periods.

	Jan-June 2019	Jan-June 2020	Jan-June 2021	p value

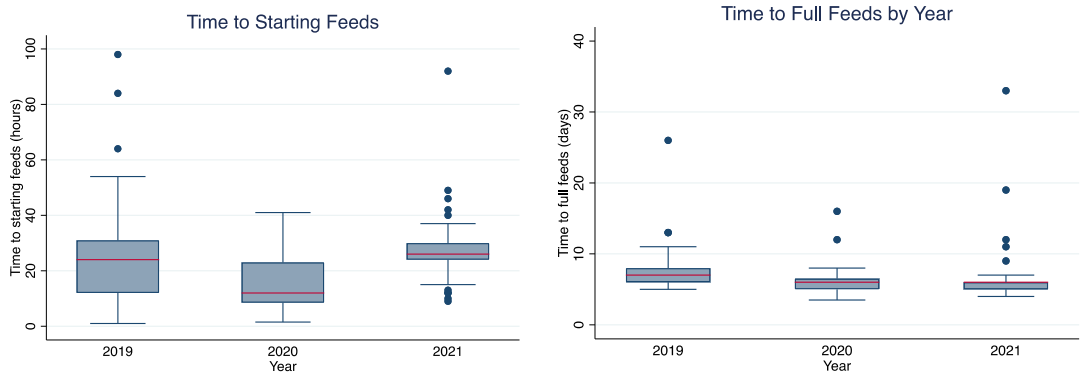
Time to support with hand expression (hours)	Not available	3 [1.25-6]	2 [1-5]	
Time to colostrum availability (hours)	10 [6-21]	4 [2.2-10]	5 [2-8]	<0.01
Time to starting feeds at 30 ml/kg/day (hours)	24 [14.5-30.5]	12 [8.5-23]	26 [24-30]	0.92
Time to full feeds (days)	7 [6-8]	6 [5-7]	6 [5-7]	<0.01
Maternal EBM within first 24 hours	44/60 (73%)	34/41 (83%)	41/44 (93%)	<0.01
Adequate milk supply at 14 days	73%	71%	73%	0.84
Donor breastmilk ever used	47/60 (78%)	34/41 (83%)	40/44 (91%)	0.09
First oral feed was breastfeed	12/46 (26%)	11/29 (41%)	18/39 (46%)	0.02
Fed at the breast during in patient stay	29/46 (63%)	15/29 (52%)	22/39 (56%)	0.85



Comparing pre and post-intervention, p<0.01 Comparing pre and post-intervention, p< 0.01

Figure 1. Median time to lactation support and to colostrum for oral care by year

Time to mothers receiving lactation support for breastmilk expression and time from delivery to first oral care with maternal EBM. Comparing pre and post-intervention periods.



Comparing pre and post-intervention, p=0.92 Comparing pre and post-intervention, p<0.01

Figure 2. Time to starting enteral feeds at 30 ml/kg/day by year and to reaching full enteral feeds

Starting feeds was defined as formally commencing 30ml/kg/day and full enteral feeds were defined as time to stopping parenteral nutrition (PN) and removing central line or to 150 ml/kg/day.

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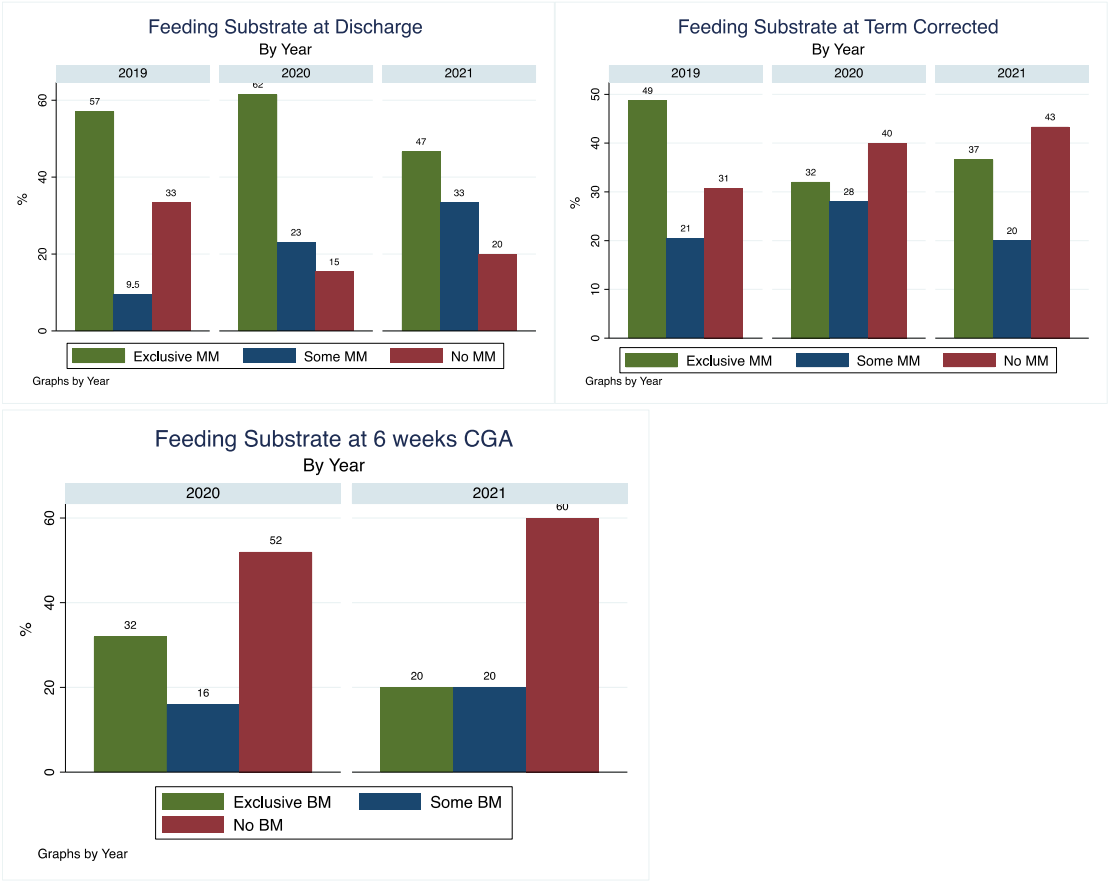

Figure 3. Feeding substrate at discharge, term and 6 weeks CGA for VLBW infants by year
Proportion of infants receiving exclusive, some or no maternal milk during their hospital stay. There was no difference between pre versus post-intervention or between years at 6 weeks CGA.