

Nutritional trends and perinatal factors associated with feeding mother's-own-(breast)milk among preterm babies admitted to NICU

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INTRODUCTION

Premature newborns are at increased risk of several postnatal complications. (1) Benefits of maternal breast milk in reducing morbidity of prematurity and improving outcomes are well known (2-4), however there are many barriers to breast milk feeding. (5-7) Studies about the granular details of breast milk feeding rates and volumes, and their relationships to duration of breastfeeding in the NICU are lacking. In Manitoba, the overall trends in feeding patterns amongst preterm infants admitted to the NICU and predictors of breastfeeding have never before been studied.

AIMS

1. To quantify the patterns of mothers-own-(breast) milk (MOM) feeding amongst preterm newborns delivered <32 weeks' gestation.
2. To evaluate the perinatal factors contributing to breastmilk feeding duration amongst these most vulnerable newborns.

METHODS

- Retrospective cohort study using stored nutrition sheets and delivery record books (January 2010 to March 2020).
- Neonates born <32 weeks and admitted to the NICU at HSC with stored nutrition profiles were eligible for inclusion.
- Neonates transferred to another site or with demise prior to day 7 of admission were excluded. Newborns were also excluded if they were missing nutrition profiles.
- We used a standardized data collection form to abstract information about maternal demographics, pregnancy factors, and newborn characteristics as well as detailed feeding information from the nutrition profiles. Delivery record books were also used to acquire additional maternal information and newborn characteristics.
- Descriptive and inferential statistics (Chi-square, student t-, Wilcoxon rank sum tests) were used to analyze results and compare groups.

RESULTS

Over the 10-year study period, the percentage of mothers providing any MOM decreased from 93% to 85% (p=0.002) (Figure 1). There was a significant decrease in both MOM initiation (r=-0.163; p= 0.002) and MOM continuation (r =-0.275; p= <0.001). Use of donor milk increased significantly with increased availability in Manitoba since 2015 (r =0.629; p<0.001) (Figure 1). Comparing continued MOM to hospital discharge (C-MOM) and discontinued MOM prior to hospital discharge (DC-MOM) mothers, factors positively associated with continuation included: **older maternal age** (31.3 years (SD 5.6) vs. 28.5 (SD6.5); p=0.0002), **primiparity** (49% vs. 35%; p=0.021), and **early initiation** (admission day 4 [IQR 2 to 6] vs. day 5 [IQR 3 to 8]; p=0.004). Factors **negatively associated** with

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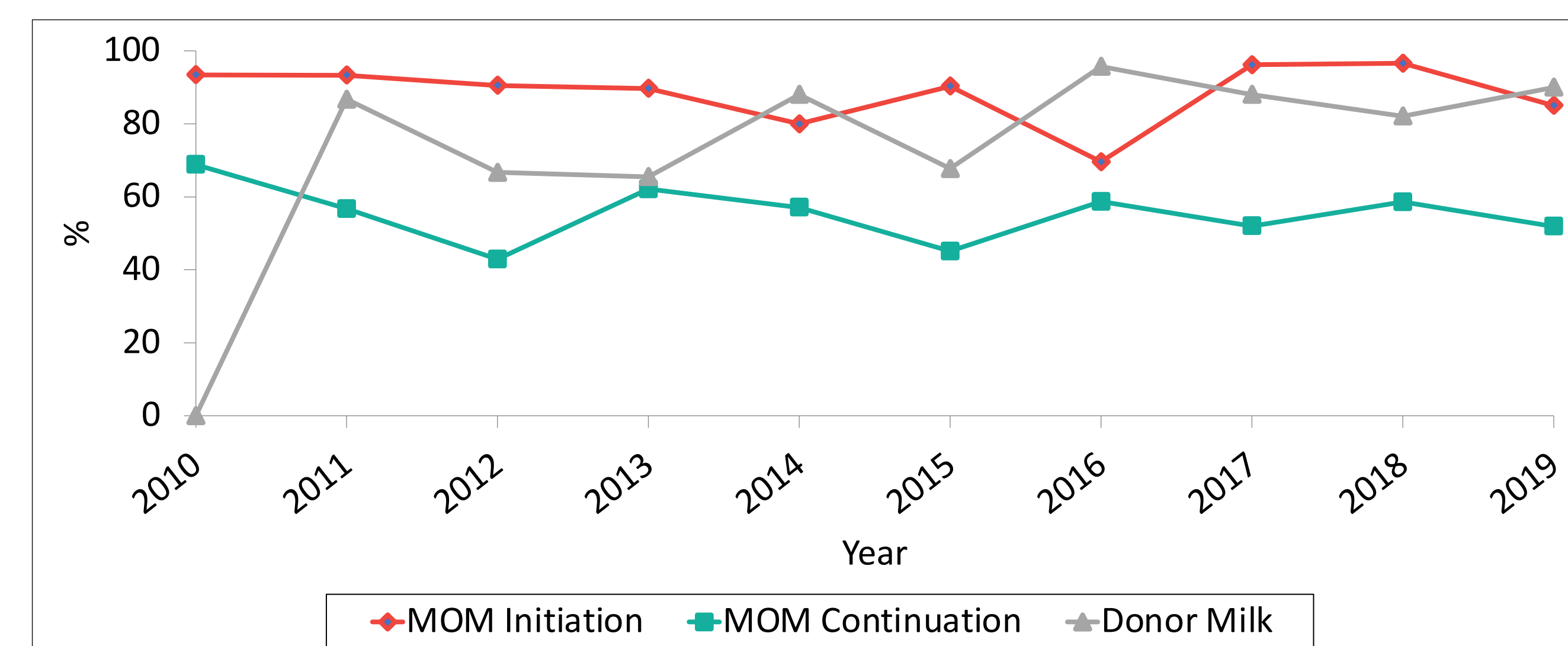


Figure 1. Percentage of premature newborns born < 32 weeks' gestation who initiated MOM, continued MOM, and used donor milk from 2010 to 2019.

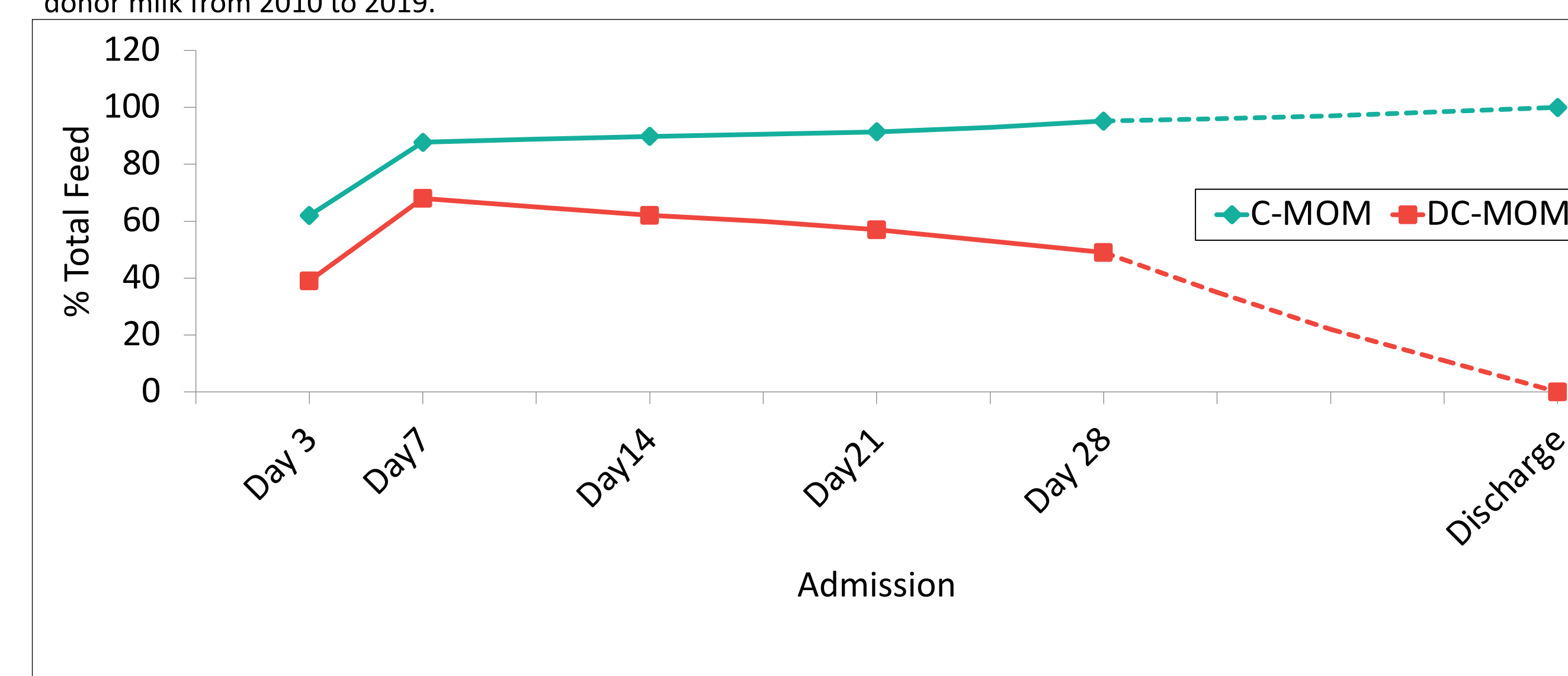


Figure 2. MOM Feeding trajectories throughout admission, comparing percentage MOM of total feed of those that continued MOM to those that discontinued MOM prior to discharge.

continuation included: **higher BMI** (29.8 (SD 6.4) vs. 32.0 (SD 7.3); p=0.009), **cigarette smoking** (1.1% vs. 7.3%; p=0.004) and **other substance abuse** (0.5% vs. 9.6%; p=0.0001), and **remote residence** (11% vs. 28%; p=0.002) (Table 1). There were otherwise no significant differences in antenatal or other pregnancy complications between groups, including similar C-section rates. Already by postnatal day 3, there are significant differences in volumes between groups: C-MOM had a **higher percentage of feeds with MOM** (62% vs. 39%; p=0.0002), **larger volumes of MOM fed** (5.4ml [IQR 0 to 10.8] vs. 0ml [IQR 0 to 6]; p=0.003) and **greater percentage volume of total feeds of MOM** (25% [IQR 0 to 75] vs. 0% [IQR 0 to 50]; p=0.0007). Of note, there were no differences in donor milk usage between groups. The percentage of feeds with MOM and volumes of MOM received in the C-MOM group **continued to increase significantly** more than the DC-MOM group over the duration of the NICU stay (Figure 2). Both groups increase the percentage of total feeds by MOM up to day 7 (albeit more so in the C-MOM group), however the volume continues to steadily increase throughout the admission in the C-MOM group (r=0.788; p<0.001) compared to the significant decline in DC-MOM group that begins after day 7 (r= -0.799; p<0.001).

Table 1. Newborn and maternal characteristics associated with C-MOM vs. DC-MOM amongst neonates born <32 weeks admitted to NICU.

Perinatal Characteristics	C-MOM (n=187)	MOM-DC (n=100)	p-value
Gestational Age at Delivery in days, mean (SD)	199.42 (15.4)	197.48(15.29)	0.309
Multiples, %	20.9%	32%	0.038
Cesarean delivery, rel%	65.8%	65%	0.892
5-minute Apgar score <7, %	36.4%	30%	0.277
Birthweight in grams, mean (SD)	1138 (312.7)	1074 (309.9)	
Female biological sex, rel%	46.5%	47%	0.937
NICU Length of stay in days, median [IQR]	72 [47 to 102]	77.5 [56 to 114.5]	0.046
Maternal age in years, mean (SD)	31.3 (5.6)	28.5 (6.5)	0.0002
Body mass index, mean (SD)	29.8 (6.4)	32.0 (7.3)	0.009
Gravidity, median [IQR]	2 [1 to 3]	3 [2 to 5]	0.012
Primiparous, %	49.2%	35%	0.021
Residence ^a , %			0.002
Urban	49.4%	39%	
Rural	39.6%	33%	
Northern/ Out of Province	11.0%	28%	
Smoking, %	1.1%	7.3%	0.004

CONCLUSION

- **Only 50%** of newborns were feeding MOM at discharge → Trend towards **declining initiation** of MOM over the study period.
- There are **identifiable** perinatal characteristics that could be targets and improve breastfeeding.
- Admission **day 7** is a critical turning point for **continuing MOM feeds at discharge** independent of formula feeds/ donor milk usage.
- Moving forward, future investigation is needed about specific time-at-breast feeding and general barriers to breastfeeding in the NICU environment.

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