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Human milk feeding for moderate and late preterm infants at age 2 months: Insights from a cluster randomized controlled trial 2-month follow-up

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ABSTRACT

Objective: Human milk (HM) is the optimal nutrition for infants; preterm infants demonstrate shorter HM feeding duration. Care interventions may increase HM feeding among preterm infants after NICU discharge. We compared Alberta Family Integrated Care (FICare) versus Standard Care on HM feeding in preterm infants at age 2 months.
Methods: We conducted a follow-up of a cluster randomized controlled trial of 455 infants and their mothers with data linked to the infant's 2-month public health visit. We used partial proportional odds to model group differences and factors associated with feeding type: exclusive HM (EHM), Non-EHM, or no HM (NHM).
Results: Compared to Standard Care, mothers in Alberta FICare were less likely to provide EHM versus NHM. There was no group difference between EHM and Non-EHM. Mothers with higher education who were on maternity leave or employed were more likely to provide EHM. Infants who received EHM at discharge were more likely to continue at age 2 months. Higher maternal breastfeeding self-efficacy at discharge was associated with a greater likelihood of EHM.
Conclusion: Alberta FICare was not associated with EHM feeding at age 2 months.
Innovation: Different factors predicted the three HM feeding categories, suggesting the need to individualize feeding supports.
Trial Registration.
ClinicalTrials.gov Identifier NCT02879799, retrospectively registered August 26, 2016.

1. Introduction

In Canada, 7.9 % of infants were born preterm at less than 37 weeks gestation [1], and in Alberta, the 2021 preterm birth rate was 8.69 % [2]. The World Health Organization (WHO) [3] defines infants born between 32 and 36 completed weeks gestation as moderate and late preterm infants. Most moderate and late preterm infants (MLPI) are cared for in Level II Neonatal Intensive Care Units (NICUs). MLPI often experience short-term complications, including jaundice, hypothermia, respiratory distress, and feeding challenges [4]. Additionally, these infants are at increased risk for long-term neurodevelopmental delays [5,6] and feeding difficulties [7]. The added cost of prematurity per infant over the first 10 years of life is estimated at $54,554 for moderate preterm infants and $10,010 for late preterm infants [8]. Recognizing that MLPI makes up the largest proportion (>80 %) of preterm births [4,9], there is an estimated impact of $463.8 million to the Canadian healthcare system for this population in the first 10 years of life [8].

Human milk (HM) feeding, specifically mothers' own milk, is the optimal nutrition for infants and has significant protective effects, even greater for infants born prematurely [10]. Although establishing oral feeding is generally a requirement for discharge from the NICU, preterm infants often encounter feeding challenges that continue even after discharge home [7]. Compared to full-term infants, a lower proportion of MLPI achieve the recommended exclusive HM feeding to age 6 months [7,11,12]. Rollins et al. [13] reported a positive association between suboptimal rates of HM feeding and higher treatment costs for

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childhood disorders. Rollins et al. [13] recommended interventions focussed on increasing rates of HM feeding to reduce medical and societal costs. Given that mothers feeding exclusive HM (EHM) at discharge are more likely to sustain it after discharge [12,14], care interventions of healthcare providers supporting mothers in the NICU may increase the proportion of HM feeding among MLPI after discharge from the NICU. It is unknown whether interventions involving mothers caring for their infant during their time in NICU influence HM feeding after discharge. The purpose of this study was to compare the proportions of HM feeding in MLPI at age 2 months with Alberta Family Integrated Care (FICare) versus Standard Care.

1.1. Theoretical framework

Building upon Bandura's self-efficacy theory [15], breastfeeding self-efficacy (BSE) is influenced by four domains: performance accomplishments, vicarious experience, verbal persuasion, and physiologic and/or affective state [16]. Systematic reviews and meta-analyses revealed that interventions based on BSE theory positively affected breastfeeding duration [17-20]. With the exception of vicarious experience, mothers of MLPI experienced the influence of BSE domains on HM feeding in the NICU [21], and those with higher BSE scores were more likely to provide exclusive HM at NICU discharge [22]. As such, applying BSE theoretical frameworks is a strong foundation for our hypothesis that mothers in the Alberta FICare group would demonstrate a higher proportion of EHM feeding duration for MLPI compared to the Standard Care group at age 2 months.

2. Methods

2.1. Research design and setting

We conducted a 2-month follow-up of MLPI in the Alberta FICare cluster randomized controlled trial (cRCT) [23] in Alberta, Canada. Alberta has a single, integrated health system that serves 4.4 million people [24] with approximately 46,000 births per year [25]. The study was approved by the University of Calgary, Conjoint Health Research Ethics Board (REB 15–0067), Covenant Health, Health Research Ethics Board (ID 1762), and the University of Alberta, Health Research Ethics Board (Pro00060324) with annual renewals.

2.2. Participants

For the cRCT, between December 2015 and August 2018, we recruited mothers and their MLPIs born between $32^{0/7}$ weeks to $34^{6/7}$ weeks gestational age with a primary admission, or transfer within 72 h, to one of 10 Level II NICUs (five Alberta FICare, five Standard Care). Given that typically developing preterm infants are frequently discharged at $36^{0/7}$ weeks, we excluded infants $\geq 35^{0/7}$ [23] to ensure a minimum of one week's exposure to the intervention. We excluded

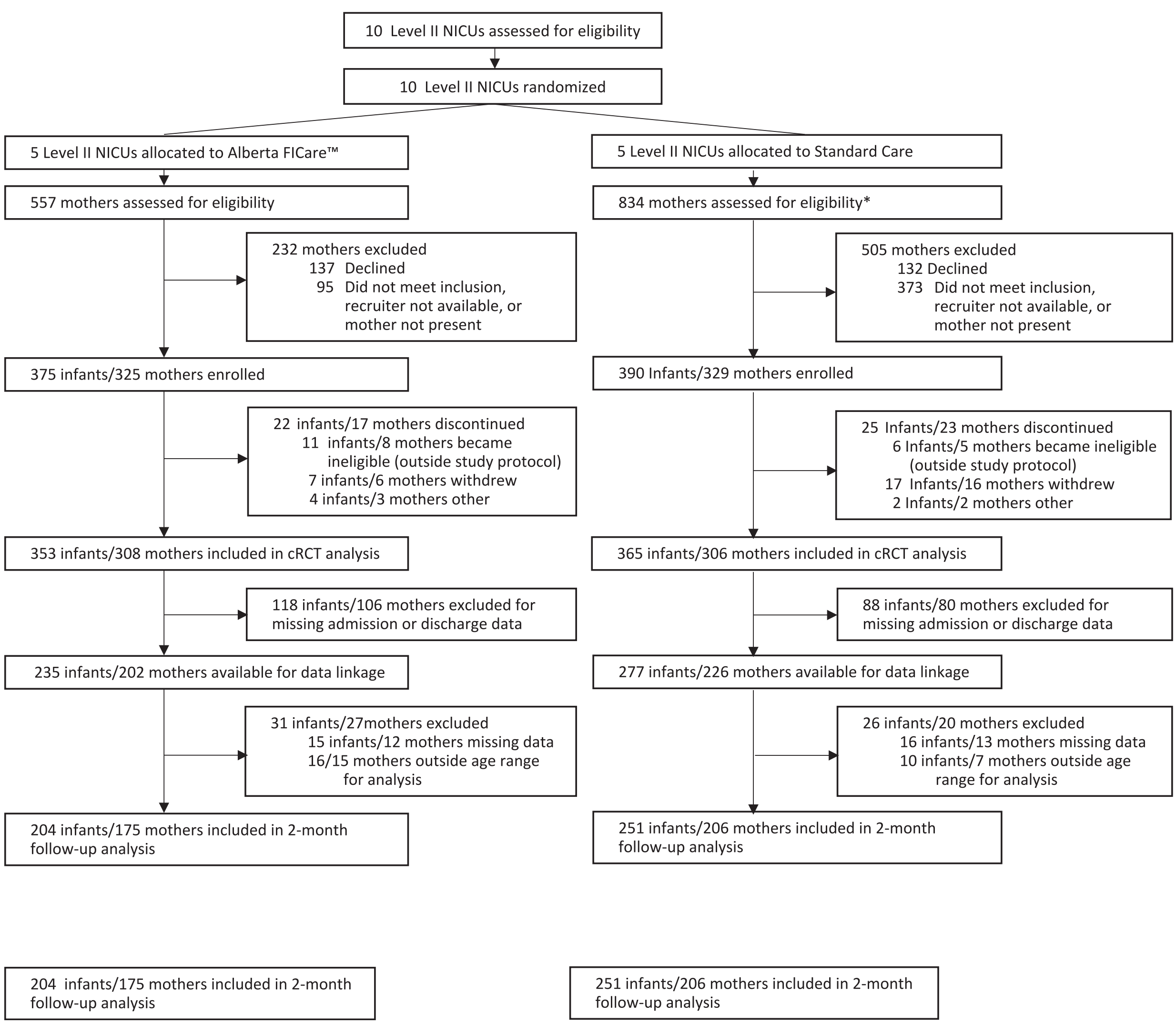

Fig. 1.. CONSORT flow diagram.

mothers (1) who could not communicate in English, (2) with high social risk, and (3) with higher-order multiple births. We excluded infants with (1) severe congenital or chromosomal anomalies and (2) those requiring palliative care. A total of 765 infants and 654 mothers were enrolled in the cRCT. At the 2-month follow-up, we included 455 infants (204 Alberta FICare and 251 Standard Care) and 381 mothers (175 Alberta FICare and 206 Standard Care). See Fig. 1. Mothers who were included were more likely to be older ($M = 31.44$, $SD = 5.27$, $t(596) = -2.694$, $p = .007$), Caucasian ($p = .017$), and be employed or on maternity leave ($p = .004$) than those not included.

2.3. Intervention

Alberta FICare is a psychoeducational model of care that empowers parents/caregivers to build their knowledge, skills, and confidence in caring for their preterm infant in the NICU [23]. Parents are educated and supported to provide non-medical care, emphasizing relational communication, parent education, and parent support. Alberta FICare demonstrated positive effects on various indicators for infants and mothers [23,26,27]. Mothers and infants at Standard Care sites received care as usual. There is some variability in care practices across province for both intervention and non-intervention sites. For example, sites have different parent education processes, access to lactation consultants, and unit design whereby some sites are single room layout and others offer rooming-in nearer to discharge.

2.4. Measurement and statistical analysis

For the cRCT, mother and infant data were collected using a web-based platform. For this follow-up study, these data were linked to infant feeding data collected at the 2-month public health visit. See Table 1 for a description of measures. We examined data for missing values, which ranged from 0 %–20 % depending on the variable. Under the assumption that the observations were missing at random, we imputed the continuous missing values using the Expectation-Maximization [28] algorithm and categorical variables with the 'mode' value. We conducted a sensitivity analysis and determined that imputation would not bias the results. To assess for differential attrition, independent samples *t*-test and Chi-square tests of independence were conducted to identify group differences in maternal and infant characteristics. To identify multicollinearity and control for potential confounders, we conducted bivariate Pearson's correlations between variables of interest and feeding at age 2 months (see Supplementary Table 1). If two or more independent variables were collinear, we used a theoretical rationale to select one variable for the model. Next, we examined the correlation of these independent variables with feeding at age 2 months and identified those associated at $p < 20$ %. Despite differences in the two groups on ethnicity and born in Canada, there was no correlation with infant feeding ($p = .226$ and $p = .224$ respectively). Our final model included the following independent variables: intervention group, birth weight, feeding at discharge, pre-eclampsia, education, employment, PSS NICU on discharge, and BSES-SF on discharge.

We proposed an ordinal logistic regression analysis to identify the association between infant feeding at age 2 months (dependent variable) and independent variables. Three independent variables (intervention group, feeding at discharge, and BSES-SF at discharge) violated the proportional odds assumption. The remaining independent variables (pre-eclampsia, education, employment, birth weight, and PSS: NICU) met the assumptions and could be treated as ordinal variables. Therefore, a partial proportional odds model for infant feeding (dependent) was conducted where constraints for parallel lines were not imposed for variables in the model that violated the proportional odds assumptions. Statistical analyses were performed with IBM SPSS for Windows, version 26 (IBM Corp., Armonk, N.Y., USA) and STATA, version 14 (StataCorp LLC, College Station, TX), with two-sided tests and significance set at $p < .05$.

Table 1
Description of measures.

	Description	Collection Time Point		
		Admission	Discharge	2 Months[a]
Infant Variables				
Intervention Group	Alberta FICare = 1; Standard Care = 2 (ref)	X	–	–
Birth Weight	Grams	X	–	–
Feeding at Discharge	Maternal reported exclusive human milk (EHM) = 1 or Non-EHM = 2 (ref) verified with infant's medical record.	–	X	–
Feeding at age 2 months	In last 7 days prior to public health visit, maternal reported EHM = 2, Non-EHM = 1, or no human milk (NHM) = 0 (ref).	–	–	X
Maternal Variables				
Pre-eclampsia	No = 0 (ref); Yes = 1	X	–	–
Education	High school diploma or less = 1 (ref); Certificate or diploma after high school = 2; College or university degree = 3	X	–	–
Employment	Unemployed or other = 1 (ref); Homemaker = 2; Maternity leave = 3; Employed full time or part time = 4	X	–	–
Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) [29]	50 items rated on a 5-point Likert scale 1 (*not at all stressful*) to 5 (*extremely stressful*) to measure three dimensions: infant behaviour and appearance, parental role alteration, and sights and sounds. Higher scores indicate higher parental stressors in the NICU. Metric 2 was used to capture overall stress level so that items related to stress sources not experienced by parents are recoded to 1 (*not at all stressful*). Internal consistency reliability for the total scale was high, with Cronbach's alphas ranging from 0.89 to 0.94.	X	X	–
Breastfeeding Self-Efficacy Scale – Short Form (BSES-SF) [30]	18 items measuring maternal breastfeeding confidence on a 5-point Likert scale of 1 (*not at all confident*) and 5 (*always confident*).	X	X	–

(*continued on next page*)

Table 1 (*continued*)

Description	Collection Time Point		
	Admission	Discharge	2 Months[a]
Theoretical range 18 to 90; higher scores indicate higher BSE. Internal consistency was 0.88. Takes <10 min to complete.			

[a] Collected at 2 months chronological age.

3. Results

See Table 2 for infant and maternal characteristics by Alberta FICare versus Standard Care group and Table 3 for feeding outcomes at age 2 months. Compared to mothers in the Standard Care group, mothers in the Alberta FICare group were more likely to be Caucasian, born in Canada, and earn more than $80, 000 CAD at the 2-month follow-up. At discharge, mothers in the Alberta FICare group had lower mean Parental Stressor Scale: Neonatal Intensive Care Unit (PSS: NICU) scores (2.36, $SD = 0.75$) (2.52, $SD = 0.71$, $t(453) = -2.355$, $p = .019$), and higher BSES-SF mean scores (75.80, $SD = 11.93$) compared to mothers in the Standard Care group (72.03, $SD = 11.39$, $t(453) = 3.433$, $p = .001$). At the age 2 month follow-up, infants in the Alberta FICare group were 1.44 days older on average (67.75 days, $SD = 7.312$) than infants in the Standard Care group (66.31 days, SD = 7.439, $t(453) = 2.081$, $p = .038$).

See Table 4 for the partial proportional odds model of human milk feeding at age 2 months. When all other variables in the model were held constant, intervention group was significantly associated with infant feeding. Contrary to our hypothesis, mothers in the Alberta FICare group were less likely to provide EHM versus NHM compared to mothers in the Standard Care group. No intervention group difference was observed between EHM and Non-EHM feeding. Feeding at discharge contributed significantly to feeding at age 2 months. Compared to mothers feeding Non-EHM at discharge, mothers feeding EHM at discharge were more likely to provide EHM at age 2 months. BSES-SF scores at discharge contributed significantly to feeding at age 2 months. As BSES-SF scores increased, mothers in both groups were more likely to provide EHM at age 2 months. We found that for each one-point increase in BSES-SF scores, the odds of providing EHM increased by 10 %. PSS: NICU scores at discharge and pre-eclampsia did not contribute significantly to feeding at age 2 months. Education and employment contributed significantly to feeding at age 2 months. Mothers with a college or university degree were more likely to provide EHM at age 2 months compared to mothers who had a high school diploma or less. No difference in feeding at age 2 months was observed for mothers with a certificate or diploma after high school. Mothers either on maternity leave or employed at admission were more likely to provide EHM at age 2 months when compared to mothers who were unemployed. No difference in feeding at age 2 months was observed for mothers who were homemakers. Infant birth weight did not contribute to feeding at age 2 months.

4. Discussion and conclusion

4.1. Discussion

In this follow-up of the Alberta FICare cRCT, we examined whether participation in the Alberta FICare group was associated with HM feeding at age 2 months after controlling for birth weight, feeding at discharge, pre-eclampsia, education, employment, PSS: NICU at discharge, and BSES-SF at discharge. We found that mothers in the Standard Care group were more likely to provide EHM at age 2 months than mothers in the Alberta FICare group when comparing EHM and

Table 2
Infant and mother characteristics.

Characteristic	Alberta FICare	Standard Care	χ^2	p
	n (%)	n (%)		
Infant	$N = 204$	$N = 251$		
Male (% yes)	113 (55.4)	140 (55.8)	0.007	0.935
Singleton (% yes)	150 (73.5)	165 (65.7)	3.208	0.073
Gestational age			3.644	0.162
32 weeks	35 (17.2)	37 (14.7)		
33 weeks	66 (32.4)	65 (25.9)		
34 weeks	103 (50.5)	149 (59.4)		
Caesarean delivery (% yes)	105 (51.5)	129 (51.4)	0.000	0.987
Feeding at Discharge[a]			4.315	0.038*
Exclusive Human Milk	139 (69.2)	140 (59.6)		
Non-exclusive Human Milk	62 (30.8)	95 (40.4)		
Feeding at 2 Months			17.604	0.000**
Exclusive Human Milk	93 (45.6)	85 (33.9)		
Non-Exclusive Human Milk	53 (26.0)	113 (45.0)		
No Human Milk	58 (28.4)	53 (21.1)		
Maternal Baseline	$N = 175$	$N = 206$		
Relationship status[b]			0.567	0.452
Single	8 (4.6)	13 (6.3)		
Partnered	167 (95.4)	193 (93.7)		
Education			1.112	0.574
High school diploma or less	37 (21.1)	35 (17.0)		
Certificate or diploma after high school	46 (26.3)	55 (26.7)		
College or university degree	92 (52.6)	116 (56.3)		
Income[c]			7.311	0.026*
< $40,000	6 (4.1)	21 (12.0)		
$40,000 to $79,999	33 (22.4)	43 (24.6)		
≥ $80,000	108 (73.5)	111 (63.4)		
Employment[+,d]			0.482	0.923
Unemployed/Other	19 (11.0)	20 (9.7)		
Homemaker	24 (13.9)	25 (12.1)		
Maternity leave	82 (47.4)	101 (49.0)		
Employed	48 (27.7)	60 (29.1)		
Born in Canada (% yes)[e]	139 (79.9)	140 (68.3)	6.512	0.011*
Ethnicity (% Caucasian)[f]	133 (76.4)	133 (65.2)	5.691	0.017*
Diabetes (% yes)	30 (17.2)	39 (18.8)	0.185	0.667
Pre-eclampsia (% yes)	30 (17.1)	39 (19.0)	0.250	0.617

[+] Employment status of Unemployed/Other includes mothers not employed but looking for employment, mothers on disability or employment leave, students, or mothers that did not select any options identified in the admission survey. Homemaker includes mothers not seeking employment and not receiving maternity leave benefits. Maternity leave includes mothers receiving maternity leave benefits. Employed includes mothers receiving income from full-time or part-time employment.
[a] $n = 201$ for Alberta FICare group and $n = 235$ for Standard Care group.
[b] $n = 175$ for Alberta FICare group and $n = 205$ for Standard Care group.
[c] $n = 147$ for Alberta FICare group and $n = 175$ for Standard Care group.
[d] $n = 173$ for Alberta FICare group and $n = 206$ for Standard Care group.
[e] $n = 174$ for Alberta FICare group and $n = 205$ for Standard Care group.
[f] $n = 174$ for Alberta FICare group and $n = 204$ for Standard Care group.
* $p < .05$.
** $p < .01$.

Table 3
Feeding outcome at age 2 months.

	Alberta FICare $N = 204$	Standard Care $N = 251$	χ^2	p
	n (%)	n (%)		
Feeding at 2 Age Months			17.604	0.000**
Exclusive Human Milk	93 (45.6)	85 (33.9)		
Non-Exclusive Human Milk	53 (26.0)	113 (45.0)		
No Human Milk	58 (28.4)	53 (21.1)		

Table 4
Partial proportional odds model - human milk feeding at age 2 months.

Independent Variables		Comparison	aOR (95 % CI)	*p*
Group[a] (Ref: Standard Care)	Alberta FICare	NHM vs EHM	0.51 (0.31–0.83)	0.01
		Non-EHM vs EHM	1.04 (0.66–1.67)	0.85
HM Feeding (at discharge)[a] (Ref: Non-EHM)	EHM	NHM vs EHM	4.16 (2.48–6.96)	<0.001
		Non-EHM vs EHM	8.74 (4.83–15.81)	<0.001
BSES-SF (at discharge)[a,c]		NHM vs EHM	1.04 (1.02–1.06)	<0.001
		Non-EHM vs EHM	1.09 (1.06–1.12)	<0.001
PSS: NICU (at discharge)[b,c]			1.28 (0.98–1.67)	0.07
Pre-Eclampsia[b] (Ref: No)	Yes		0.75 (0.45–1.26)	0.28
Education[b] (Ref: High School diploma or less)	Certificate or diploma after high school		1.01 (0.57–1.80)	0.97
	College or University degree		2.22 (1.29–3.79)	0.004
Employment[b] (Ref: Unemployed and other)	Homemaker		1.09 (0.53–2.26)	0.81
	Maternity Leave		2.63 (1.45–4.78)	0.001
	Employed		1.95 (1.03–3.70)	0.04
Birth Weight[b,c]			1.00 (1.00–1.00)	0.15

Note. HM = Human milk; EHM = Exclusive human milk; Non-EHM = Non-Exclusive human milk; NHM = No human milk; PSS: NICU = Parental Stressor Scale – NICU; BSES-SF = Breastfeeding Self-Efficacy Scale – Short Form.
[a] Independent variable that violated proportional odds assumptions.
[b] Independent variable that met the proportional odds assumptions.
[c] Continuous level variable.

NHM feedings. We found no intervention group difference between EHM and Non-EHM feeding. The model also suggests that infants were more likely to receive EHM at age 2 months if their mothers had more education, were on maternity leave or employed, had higher BSES-SF scores at discharge, and provided EHM at discharge. Pre-eclampsia, birth weight, and parental stress were not associated with EHM feeding at age 2 months.

Multicomponent, psychoeducational interventions positively affect HM feeding rates to 6 months [20]. A scoping review demonstrated positive effects of family integrated care on breastfeeding rates at discharge [31] as did two FICare studies in Level III NICUs [32,33]. However, these studies did not report the extent to which these improvements were sustained to age 2 months. Our study revealed a significant effect favouring the Standard Care group when comparing EHM to NHM. There was no significant intervention group difference in Non-EHM comparisons. These results contrast with the FICare cRCT ($N = 601$) in China that reported significantly more infants in the intervention group were predominantly HM feeding at 1, 3, and 6 months corrected age [34]. In that study, HM was operationalized as >50 % of HM feeding daily [34] instead of the three categories of infant feeding used in our study. It is possible that outcomes of EHM feeding could favour the Alberta FICare group at age 6 months; however, data up to age 6 months were not available for this study.

Alberta FICare was not designed to improve HM feeding rates of premature infants. Primary outcomes were focused on improving parental psychosocial health, reducing infant length of stay, and cost avoidance through parental involvement, education, and support [23]. Thus, opportunities exist to incorporate more substantial HM feeding interventions within the Alberta FICare framework to improve HM feeding duration. It is also possible that HM feeding for MLPI is more heavily influenced by variables not captured in the cRCT or that family environment post-discharge have a stronger influence on feeding than an intervention in the NICU.

In our study, higher maternal education increased the likelihood of EHM feeding at age 2 months. This finding is consistent with other research [35-37] and is aligned with recent information from Statistics Canada [38]. Other studies explicitly aimed at identifying factors associated with HM feeding cessation in preterm infants also report that lower maternal education increased the risk of HM feeding cessation. For example, a population-based cohort study of preterm infants <32 weeks ($N = 3217$) identified low maternal education as a risk factor for HM feeding cessation across 11 European countries [14]. More specifically, a follow-up from an RCT ($N = 493$) by Ericson et al. offering proactive telephone support to mothers of preterm infants (< 37 weeks) in Sweden found those with lower educational levels were 42 % more likely to cease HM feeding in the first 12 months postnatal age when compared to mothers with higher education levels [39]. Mothers with higher education may exhibit greater health literacy with better knowledge and health behaviours related to HM feeding [40]. Given that education is nested within socioeconomic status, isolating the effect of education alone on HM feeding duration is challenging. Mothers with lower education may benefit from additional education and support to improve HM feeding in MLPI.

Our finding that maternal employment was positively associated with HM feeding contrasts with prospective cohort studies in Spain ($N = 969$) [41] and Brazil ($N = 1003$) [42] that did not find an association between employment status and HM feeding continuation. We speculate these differences may be attributable to Canada's paid parental leave (50- or 76-week) that may enable achievement of feeding goals. Countries with shorter maternity leave policies demonstrate shorter HM feeding durations [43,44].

Results from our study affirm that EHM feeding at discharge increases the likelihood of providing EHM feeding at age 2 months. Ericson et al. also found in their RCT follow-up that partial HM feeding at discharge was the strongest risk factor for ceasing HM feeding at 8 weeks post-discharge [39]. Bonnet et al. [14] reported that infants receiving Non-EHM at discharge were half as likely to receive HM at 6 months compared to infants receiving EHM. Several possible explanations exist for the association between HM feeding at discharge and HM feeding duration. BSE and HM feeding, particularly directly at the breast, predict sustained EHM feeding and the long-term breastfeeding relationship [45-47]. While the provision of HM is encouraged in NICUs, the importance of HM feeding directly at the breast is overlooked [45,48]. Expressing milk does not provide the compression, milk ejection reflex, nor release of prolactin in the same way as feeding directly at the breast [49], resulting in impaired lactation. If the transition to efficient HM feeding directly at the breast is not established by discharge, the increased maternal work and subsequent exhaustion with pumping, feeding, and supplementing their infant at home may be unsustainable [21].

Our study showed that mothers with higher BSES-SF scores at discharge were more likely to provide EHM compared to Non-EHM and NHM at age 2 months. This is consistent with two prospective, longitudinal studies of late preterm infants that found higher BSES-SF scores were significantly associated with sustained and exclusive HM feeding [47,50]. We found that for each one-point increase in BSES-SF scores, the odds of providing EHM increased by 10 %, similar to results from a systematic review and meta-analysis [17].

Strengths of our study are its focus on MLPI, a specific sub-population that comprises greater than 80 % of preterm infants [4]. In addition, we applied a novel approach by modelling variables associated with three categories of infant feeding (EHM, Non-EHM, NHM), where most previous research dichotomized infant feeding. Socio-demographically homogenous mothers of singletons or twins in a single integrated health system limits generalizability of results to other populations and jurisdictions. Finally, this study included only mothers who brought their infant to the 2-month public health visit and may not be representative of all MLPI. Maternal self-report of feeding in the week prior to the visit was used and information on frequency, quantity, or mode of feeding was not captured for this study. Future research should attempt to recruit more heterogeneous samples and capture more detailed feeding data.

4.1.1. Practice implications

Preterm infants are at an increased risk of early breastfeeding cessation for a multitude of reasons. As such, mothers of this vulnerable population require additional support to sustain exclusive breastfeeding for the recommended 6-month duration [51]. Support must include facilitating maternal confidence in her ability to breastfeed to overcome the challenges of feeding their infant in the NICU and following discharge. The ideal circumstances would create a positive cascade effect whereby breastfeeding education and positive direct-breastfeeding experiences would increase a mother's BSE, thus increasing the likelihood of providing EHM at discharge and beyond. Providing EHM at discharge is a strong influencing factor for EHM feeding duration.

Anticipating the physical and emotional needs of both infants and parents during the early weeks and months of breastfeeding is crucial to decreasing early HM feeding cessation. Sharing education and support before challenges emerge, such as perceived insufficient milk supply and milk transfer, can reduce uncertainties and increase feelings of preparedness [52]. The use of follow-up clinics and home visits for preterm infants are beneficial for continuity of care and bridging the transition from NICU to home [52,53]. Post-discharge community resources must, therefore, be a health system priority to strengthen the long-term HM feeding outcomes in the preterm infant population.

4.2. Innovation

Existing literature is plagued by insufficient data and often dichotomizes infant feeding outcomes using inconsistent approaches to define what constitutes HM feeding versus not. Using three categories for the infant variable is an innovative approach to exploring HM feeding, which provided valuable insights into the complex interplay of maternal and infant factors that affect infant feeding. By delving deeper into the nuanced differences between these categories, we can uncover new strategies and approaches to support EHM feeding beyond the NICU, ultimately benefiting both mothers and their infants. Future research should attempt to capture more granular feeding data using validated and consistent assessment measures.

4.3. Conclusion

Although we expected Alberta FICare to influence HM feeding in MLPI at age 2 months, we found that other factors, including maternal education, employment status, HM feeding status at discharge, and BSE, were more important. Expanding the focus of Alberta FICare to include psychoeducational support for HM feeding combined with increased community support following discharge may increase the proportion of mothers who achieve the WHO recommendation of EHM feeding to age 6 months.

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Authors' contributions

AM and KB conceptualized and designed the study. KB designed the Alberta FICare™ components. KB was responsible for ethics applications and reporting; study implementation and management; fidelity to the protocol; and supervision and training of research staff, trainees, and study nurses. AM was responsible for data management. AM, KB, and AA were responsible for data analysis and interpretation. AM and KB were responsible for drafting the manuscript. All authors critically reviewed and provided feedback on drafts of the manuscript. All authors approved the final version of the submitted manuscript.

CRediT authorship contribution statement

Amanda M. Moe: Writing – review & editing, Writing – original draft, Methodology, Formal analysis, Conceptualization. **Meredith L. Brockway:** Writing – review & editing. **Deborah A. McNeil:** Writing – review & editing. **Arfan R. Afzal:** Writing – review & editing, Formal analysis. **Karen M. Benzies:** Writing – review & editing, Writing – original draft, Supervision, Project administration, Methodology, Investigation, Funding acquisition, Formal analysis, Conceptualization.

Declaration of competing interest

Karen Benzies declares she is the Founder and CEO of Liminality Innovations, a social enterprise to make Alberta FICare available outside Alberta. All other authors have no conflicts of interest to declare.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.pecinn.2024.100345.

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