

# Timely maternal milk provision for improved outcomes in babies born preterm

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## BACKGROUND

Greater exposure to maternal milk (MM) in preterm infants provides positive short and long term health outcomes. In a previous 1 year audit, we found benefits, including reduced necrotising enterocolitis (NEC), specifically associated with the earlier timing of 1<sup>st</sup> MM feeds. Given the low incidence of NEC, we wished to explore the potential benefits of earlier MM feeding in a larger cohort.

## AIM

To explore the impact of time of 1<sup>st</sup> exposure to MM feeding on outcomes in preterm infants.

## METHODS

This is a longitudinal audit of very preterm infants ( $\leq 31^{+6}$  weeks gestation or birthweight  $\leq 1.5$  kg) born at the National Maternity Hospital, Dublin from January 2013 to March 2021. Data was extracted from dietetic and medical records by a dietitian. Comparison of feeding, anthropometric and clinical variables was made between those who received MM for the first time within 24 hours of birth and those who experienced a delay beyond 24 hours. Non-normally distributed data were log-transformed prior to analysis. Relationships were explored through Pearson's correlations. Independent T-tests were used to identify differences between groups while chi-square tests compared categorical variables. The level of significance was set at  $<0.05$ .

## RESULTS I

971 babies received MM for the first time in the neonatal unit and were included for analysis. Babies were born at median (IQR) 29.71 (27.57,31.14) weeks gestation and with an average birthweight of 1.20 (0.38) kg. The median (IQR) time to receive MM was 33.63 (16.33, 48.97) hours. 393 (40%) received MM  $\leq 24$  hours of birth (early group) and 578 (60%) received MM  $>24$  hours (delayed group). There was no difference between groups in birth weight, gestation or nationality of mother; but delayed MM was more common amongst those born following a multiple pregnancy or delivery by caesarean section. See table 1.

Table 1: Comparison of baseline data

	n	Early MM (n=393)	Delayed MM (n=578)	P
Time to receive 1 <sup>st</sup> MM – hours median (IQR)	971	14.1 (8.5, 18.9)	45.5 (33.7, 62.1)	$<0.001^*$
Gestation at birth – weeks median (IQR)	971	29.9 (27.6, 31.2)	29.7 (27.4, 31.1)	0.411
Birth weight – kg mean (SD)	971	1.24 (0.39)	1.20 (0.37)	0.065
Ethnicity - Irish number (%)	971	303 (77.1)	450 (77.9)	0.782
Multiple birth pregnancy (twin, triplet) number (%)	971	118 (30.0)	235 (40.7)	$<0.001^*$
Mode of delivery - Caesarean section number (%)	971	249 (63.4)	411 (71.1)	0.011 <sup>*</sup>

Amongst babies who received MM early, the duration of parenteral nutrition (PN) and time to achieve full feeds (150 mL/kg/day) was shorter; a higher proportion received exclusive MM feeds and breastfed during their neonatal stay; fewer needed pasteurised donor milk or formula milk; and less than half the incidence of NEC, including surgical NEC, was observed. See table 2.

## RESULTS II

Table 2: Comparison of clinical outcomes

	n	Early MM (n=393)	Delayed MM (n=578)	P
Duration of parenteral nutrition <sup>a</sup> – days median (IQR)	920	7.38 (6.04, 8.98)	7.95 (6.30, 10.30)	0.002 <sup>*</sup>
Time to reach 150 mL/kg/d feeds <sup>b</sup> – days median (IQR)	968	9.45 (7.79, 11.39)	9.96 (8.49, 12.53)	0.006 <sup>*</sup>
Exclusive MM feeds in neonatal unit number (%)	971	202 (51.4)	211 (36.5)	$<0.001^*$
Any pasteurised donor milk feeds in neonatal unit number (%)	971	46 (11.7)	113 (19.6)	0.001 <sup>*</sup>
Any formula milk feeds in neonatal unit number (%)	971	180 (45.8)	349 (60.4)	$<0.001^*$
Any breastfeeding in neonatal unit <sup>c</sup> number (%)	637	135 (44.1)	105 (31.7)	$<0.001^*$
Any breastfeeding at discharge to home <sup>d</sup> number (%)	501	114 (48.7)	112 (41.9)	0.129
Incidence of NEC stage 2 or 3 number (%)	971	9 (2.3)	33 (5.7)	0.010 <sup>*</sup>
Incidence of NEC stage 3 number (%)	971	5 (1.3)	20 (3.5)	0.035 <sup>*</sup>
Death associated with NEC number (%)	971	4 (1)	11 (1.9)	0.272
Length of stay (those discharged to home) <sup>e</sup> – days median (IQR)	575	42.0 (31.0, 62.5)	43.0 (32.0, 66.0)	0.330
Gestation at discharge home <sup>e</sup> – weeks median (IQR)	575	36.49 (35.14, 38.00)	36.43 (35.29, 38.14)	0.770
Weight at discharge home <sup>e</sup> – kg mean (SD)	575	2.49 (0.56)	2.50 (0.56)	0.959
Neonatal death number (%)	905	25 (6.4)	41 (7.1)	0.656

NEC stage 2 refers to NEC with radiological evidence; NEC stage 3 refers to NEC requiring surgical intervention

<sup>a</sup>Of those that received PN

<sup>b</sup>Of those that established feeds at 150 mL/kg/day

<sup>c</sup>Of those that received oral feeds 2016–2021 (oral feeding method in neonatal unit recorded from 2016)

<sup>d</sup>Of those discharged to home 2014–2021 (feeding method at discharge to home recorded from 2014)

<sup>e</sup>Of those discharged to home : 1<sup>st</sup> MM  $\leq 24$  h, n=249; 1<sup>st</sup> MM  $>24$  h, n=326

Time to first MM was also associated with shorter PN duration ( $r = 0.111$ ,  $p < 0.001$ ) and time to achieve full feeds (150 mL/kg/day) ( $r = 0.156$ ,  $p < 0.001$ ).

## CONCLUSION

The clinical advantages associated with earlier MM feeding was replicated in this larger cohort - over 8¼ years. As well as increasing MM feeding, earlier MM has the potential to protect from NEC with its devastating impact on morbidity and mortality. These positive outcomes are also expected to result in cost savings. Our findings re-enforce the need to support efforts to ensure the earlier provision of MM for vulnerable babies to improve neonatal outcomes. Mothers of babies born following a multiple birth pregnancy or caesarean section appear to require particular support. Our PRIME quality improvement initiative is ongoing to achieve this.

\*Significance  $p < 0.05$ . Normally distributed variables are mean (standard deviation (SD)); non-normally distributed variables are median (inter-quartile range (IQR)); and categorical variables are number (percentage (%)).



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Thank you to everyone who contributed to this data and results. Further information: Roberta McCarthy, Dietitian  
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