

BMJ Open Feeding infants directly at the breast during the postpartum hospital stay is associated with increased breastfeeding at 6 months postpartum: a prospective cohort study

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ABSTRACT

Objective: To explore whether feeding only directly from the breast in the first 24–48 h of life increases the proportion of infants receiving any breast milk at 6 months.

Design: A prospective cohort study.

Setting: Three maternity hospitals in Melbourne, Australia.

Participants: 1003 postpartum English-speaking women with a healthy singleton term infant, who intended to breast feed, were recruited between 2009 and 2011. Women were excluded if they or their infant were seriously ill. 92% (n=924) were followed up at 6 months postpartum.

Primary and secondary outcome measures: *Main exposure variable*—type of infant feeding in hospital up to time of study recruitment (24–48 h postpartum), categorised as ‘fed directly at the breast only’ or ‘received at least some expressed breast milk (EBM) or infant formula’. *Primary outcome*—proportion of infants receiving any breast milk feeding at 6 months postpartum. *Secondary outcomes*—proportion of infants receiving only breast milk feeding at 6 months; breast milk feeding duration; and maternal characteristics associated with giving any breast milk at 6 months.

Results: Infants who had fed only at the breast prior to recruitment were more likely to be continuing to have any breast milk at 6 months than those who had received any EBM and/or infant formula (76% vs 59%; adjusted OR 1.76, 95% CI 1.24 to 2.48 (adjusted for parity, type of birth, breastfeeding intention, breastfeeding problems at recruitment, public/private status, epidural for labour or birth, maternal body mass index and education)).

Conclusions: Healthy term infants that fed only directly at the breast 24–48 h after birth were more likely to be continuing to breast feed at 6 months than those who received any EBM and/or formula in the early postpartum period. Support and encouragement to initiate breastfeeding directly at the breast is important.

Strengths and limitations of this study

- This prospective cohort study found that many mothers of healthy term infants in Melbourne, Australia, are giving expressed breast milk in addition to breastfeeding in the early postpartum period.
- Infants fed only directly at the breast in the first 24–48 h postpartum are more likely to be continuing to breast feed at 6 months.
- Where possible, clinicians should provide support for mothers of healthy term infants to feed their infants directly at the breast in the early postpartum period.
- The study recruited English-speaking participants from three hospitals in urban Australia, so the findings may not be generalisable to other populations.

BACKGROUND

While WHO recommends that all infants be exclusively breast fed until 6 months of age,¹ there has been little focus on the way in which breast milk is given to the infant. Our publication reporting baseline data for this study identified that (similar to our pilot study,²) more than 50% of a large sample of healthy term infants of Australian mothers who intended to breast feed were not breastfeeding directly at the breast in their first 24–48 h of life.³ These findings were not affected by hospital admission status (public/private) or length of hospital stay, and adjusting for education or parity made no difference.^{2 3} The early introduction of breast milk substitutes is associated with cessation of breastfeeding before 6 months, or sooner than planned,^{4–9} however, the consequences of feeding breast milk other than

directly at the breast, particularly in the very early postpartum period are less well known.

Strong breastfeeding intention is associated with increased breastfeeding initiation and duration.^{10 11} Other associations include higher maternal education,^{12–14} paternal preference for breastfeeding,¹² and the mother being breast fed herself.¹³ Some studies report a positive association between expressing breast milk and the success and duration of breastfeeding,^{15–17} while others report the opposite.^{18 19} For women expressing for specific reasons such as difficulty attaching the baby to the breast, or other reasons such as to maintain supply when the infant is ill, expressing might be expected to improve longer term breastfeeding outcomes. However, where feeding at the breast is possible, the outcomes of expressing to feed either instead of, or in addition to, feeding directly at the breast are not known. No studies were identified that compared breastfeeding outcomes for women feeding solely at the breast in the very early postpartum period with those also using either expressed breast milk (EBM) and/or infant formula.

While increasing numbers of women in developed countries are expressing to give breast milk feeds, usually in conjunction with breastfeeding directly from the breast,^{16 19–23} measurement of this phenomenon is limited, and the consequences relatively unknown.

Although data regarding the proportion of women breastfeeding in hospital may be routinely collected, such data are inadequate for the current discussion. The need to define breast milk feeding precisely demands accurate measurement of the amount of feeding, as well as its exclusivity and duration.^{24 25} Clear differentiation of the means by which milk is given is also important; directly at the breast or otherwise.²⁶ Many studies about expressing breast milk focus on premature and unwell infants;^{27–31} there is limited research on the impact of early postpartum expressing on the healthy term infant.³

The aim of this study was to compare in-hospital infant feeding practices in relation to breastfeeding outcomes at 6 months in a group of healthy term infants whose mothers planned to breast feed. Specifically, this paper examines whether infants fed only directly at the breast in the first 24–48 h after birth are more likely to be breastfeeding at 6 months.

METHODS

Study design

A prospective cohort study known as the Mothers and Infants Lactation Cohort (MILC) study was undertaken. Our primary research question was: ‘Are healthy term infants fed solely at the breast in the first 24–48 h of life more likely to be having any breast milk at 6 months than those receiving any other combination of feeding, including the use of EBM and/or infant formula?’

Primary outcome

Proportion of infants receiving *any* breast milk feeding at 6 months postpartum.

Secondary outcomes

Proportion of infants receiving *only* breast milk feeding at 6 months; breast milk feeding duration (for those women who had ceased breastfeeding by 6 months); and maternal characteristics associated with giving any breast milk at 6 months.

Main exposure variable

Type of infant feeding in hospital up to time of study recruitment (24–48 h postpartum), categorised as ‘fed directly at the breast only’ or ‘received at least some EBM or infant formula’.

Participants

Women were eligible for the MILC study if they were feeding some breast milk; agreed to participate; had a singleton infant born at term (≥ 37 weeks); and were English speaking. They were excluded if either mother or infant were seriously ill (eg, mothers with severe pre-eclampsia or babies requiring intensive neonatal care). Women were recruited after childbirth, prior to postpartum discharge, from three metropolitan hospitals in Melbourne, Australia: the Royal Women’s Hospital (the Women’s), Frances Perry House (FPH) and Mercy Hospital for Women (MHW). Although only one of the hospitals (the Women’s) was accredited as ‘baby friendly’,³² all three had very similar breastfeeding practices and guidelines, and all practice rooming-in as well as early skin-to-skin contact, and have lactation consultants as well as midwives available in the postnatal period.

Recruitment was undertaken by research staff in the postnatal wards of the three hospitals. Eligible women were approached sequentially, and offered study participation. Women who chose to participate provided written consent. A more detailed account is provided elsewhere.³

Pregnancy care in Australia is provided in both the public and private sectors; Australia’s publicly funded health system provides free maternity care for patients in public hospitals, or private care can be chosen. Two-thirds of women choose public maternity care,³³ and we aimed to recruit in line with population proportions. The Women’s and MHW are public hospitals, and FPH is a private hospital.

Sample size

The primary outcome of the MILC study was *any breast milk feeding* at 6 months. We wanted to be able to detect a difference in the prevalence of breast milk feeding in relation to the primary exposure variable, that is, that the infant was ‘fed directly at the breast only’ from birth to the time of recruitment 24–48 h after birth, and chose 10% as a meaningful clinical difference. To calculate the sample size, the 2009 Victorian State average of any breast milk feeding at 6 months postpartum was used. To detect a 10% difference from 46% (the Victorian data estimate of feeding any breast milk at 6

months³⁴) to 36%, with 95% confidence and 80% power, 399 per group were required. To detect a 10% difference in the other direction (ie, 46–56%), 411 per group were required. Using the larger figure, 822 women were needed in total. We allowed for 18% loss to follow-up, and thus planned to recruit 1000 women. We aimed to recruit an equal population of primiparous and multiparous women, given that local data showed no difference in the percentage breastfeeding at 6 months.

Data collection

Structured questionnaires were used for all data collection; by face-to-face interview at recruitment, then by telephone interview when infants were 6 months old. Questionnaires were designed to ascertain the primary and secondary outcomes and to collect data on confounding variables. Many questions had been used by the research team in previous and concurrent breastfeeding studies,^{35–37} and in earlier work that informed this study.^{2–22} Each questionnaire was piloted rigorously, with women who were similar to the participants in the proposed study. Piloting was iterative; revised questionnaires were piloted, revised again, and re-piloted to eliminate poorly worded or ambiguous questions.³⁸ Pregnancy and birth data were abstracted from the medical record.

Interviews were completed as close to the 6-month time point as possible, and a telephone protocol followed. When there was difficulty making telephone contact, calls were attempted at different times of day and during evenings and weekends. Although no more than two answering machine messages were left when calls were unanswered, further attempts to contact participants were made using designated second and third contact numbers (obtained at recruitment) which were tried where required. When women indicated plans to return to work prior to the 6-month interview, we asked about convenient times to attempt contact for interviewing. Where phone contact was repeatedly unsuccessful, or the given telephone number disconnected, email was used to request contact to arrange an interview.

We define breastfeeding as feeding at the breast, as distinct from feeding EBM. *Breast milk feeding* refers to either breastfeeding or feeding EBM. The primary outcome of the MILC study was *any breast milk feeding* at 6 months. Other outcomes included differentiation of breast milk feeding as either breastfeeding or breast milk feeding, and the amount and methods of expressing.

At recruitment, data on infant feeding as well as *potential confounders* including demographic characteristics such as maternal education, public/private status, breastfeeding intention, perceived breastfeeding problems, maternal smoking and body mass index (BMI) were collected (more detail is provided elsewhere³). The 6-month interview included a range of questions pertinent to maternal and infant well-being, focusing particularly on breastfeeding outcomes. Other topics included

maternal nipple pain, perceptions of adequacy of milk supply, introduction of alternative foods, satisfaction with infant feeding, maternal feelings about breastfeeding in public, and details about expressing and breast pump use (to be reported separately). We also asked about maternal return to paid employment, when women planned to or actually restarted work or study. The question used to elicit the primary outcome was 'In the last 24 hours, how have you been feeding your baby?' A range of mutually exclusive options were available for the interviewer to code the answer appropriately, and this classification allowed us to analyse outcomes as 'any breast milk', 'only breast milk', 'breastfeeding only at the breast', 'giving any EBM', 'giving only formula', 'giving any solids', and any combination of these. Although interviews were conducted as near as possible to 6 months postpartum, where this did not occur, and if breastfeeding had already ceased, other questions ensured we were able to ascertain the age of the infant when any and only breast milk feeding ceased, and what milk the baby was actually receiving at 6 months. Anyone who had answered the survey prior to 26 completed weeks postpartum was removed from the analysis, and for those who answered at 27 weeks or later, feeding at 6 months was assumed to be breast milk feeding if the infant was still breast milk feeding at the time of the survey.

Data management and analysis

Questionnaires were checked and coded, then data entered by a data entry company. Files were downloaded to an access database for data cleaning, which included missing data, range and logic checks. Missing or ambiguous data were checked against the original questionnaires. Quantitative data were analysed in Stata (V.11),³⁹ using descriptive statistics in the first instance, then comparisons undertaken by feeding and parity subgroups. The χ^2 test was used for comparison of categorical data and t tests for comparison of means, except where data were not normally distributed, in which case a Mann-Whitney test was used to compare medians. Logistic regression was used to adjust for confounding variables when appropriate. ORs, adjusted ORs, 95% CIs and p values are given.

RESULTS

Women were recruited between June 2009 and April 2011. Assessment of 8673 medical records identified 4532 eligible women (figure 1), of whom 30% (1357) were invited to participate; on any given day only one researcher undertook recruitment and was therefore unable to approach all potentially eligible women. Women were approached sequentially to avoid selection bias. Of those approached, 74% (1003/1357) agreed to participate. Six-month follow-up interviews were undertaken between December 2009 and November 2011, and a response rate of 91.1% (914/1003) was achieved.

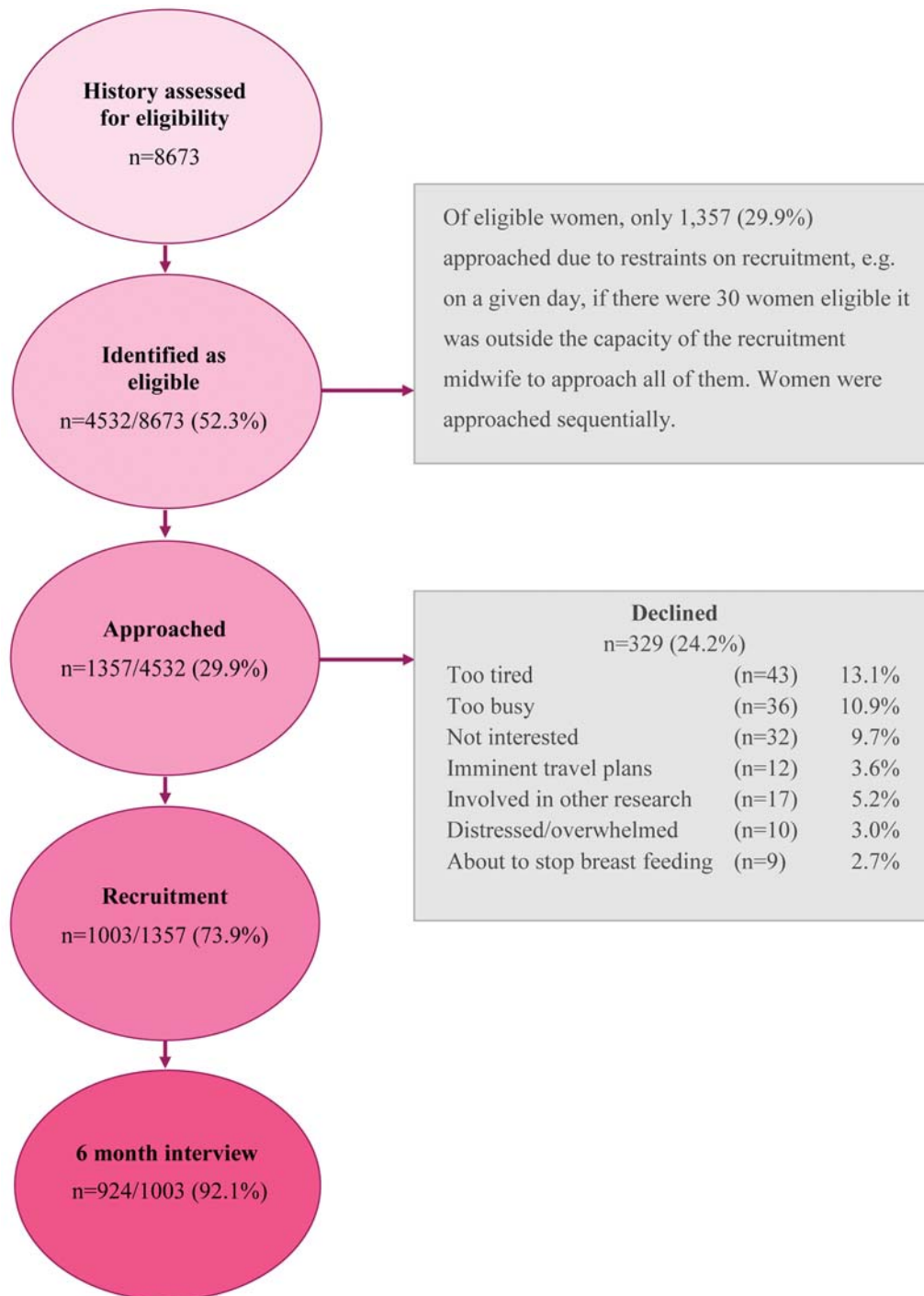


Figure 1 Participant flow chart.

The mean infant age at the time of the 6-month interviews was 31.2 weeks (SD 5.8 weeks).

The characteristics of the women who were recruited to the study are reported elsewhere;³ those presented here are the characteristics of those women for whom we have data at 6 months. There was no difference in the responders compared with those who were recruited to the study. Half of the women recruited were primiparous, and almost all were married or lived with a partner (table 1). Although the majority of study participants

were Australian born (67.7%), other participants came from 79 different countries, including India (4.4%), the UK (2.6%), New Zealand (2.4%), China (1.8%) and Vietnam (1.3%). At 6 months, 3.5% (32/906) of women had returned to full-time study or employment, and 28.2% (255/906) to part-time study or employment.

In the first 24–48 h postpartum, less than half of these healthy term infants (48.8%; 446/914) had been breastfeeding only at the breast from birth, and 46.1% (421/914) had received at least some EBM (table 2). Breastfeeding

Table 1 Participant characteristics of those who responded to the 6-month survey

Participant characteristics	n (n=914)*	Per cent
Primiparous	457	50.0
Married/living with partner	890	97.3
Degree or higher	547	59.9
Public hospital care	597	65.3
Smoking prior to pregnancy (n=911)	117	12.8
English first language	636	69.6
Australian born (n=913)	618	67.7
Planned to breast feed ≥6 months	751	82.2
Income (\$A) (n=912)	n	Per cent
<650/week	44	4.8
650–999/week	106	11.7
1000–1999/week	348	44.4
≥2000/week	314	34.6
Declined to answer	100	11.0
Maternal BMI (pre-pregnancy) (n=868)	n	%
<18.5 (underweight)	45	5.2
18.5–24.9 (normal weight)	491	56.6
25.0–29.9 (overweight)	206	23.7
30.0–34.9 (class I obesity)	85	9.8
35.0–39.9 (class II obesity)	25	2.9
≥40.0 (class III obesity)	16	1.8
Maternal age, infant gestation and birth weight	Mean	SD
Maternal age (years) (n=901) (range 19–50)	33.2	4.9
Gestational age of infant (weeks) (n=914) (range 35–42)†	39.2	1.25
Birth weight (g) (n=914)	3425	559

*Unless 'n' otherwise stated.
†One woman inadvertently recruited when baby <37 weeks.

directly at the breast was considerably less common among infants of primiparous women (35.5%) than multipara (62.1%) (OR 0.33, 95% CI 0.26 to 0.44, $p < 0.001$) (including only those women who responded at 6 months; however, this was no different from the overall sample³).

When asked why they were not feeding directly at the breast, reasons included professional advice (42.5%; 199/468); attaching and sucking difficulties (35.5%; 166/468); having a sleepy baby (15.6%; 73/468); not having enough milk (12.2%; 57/468); nipple pain and trauma (5.6%; 26/468); the infant having a low blood sugar level (4.9%; 23/468); and staff concern about infant weight loss (3.6%; 17/468) (note: women could give more than one reason).

Breastfeeding at 6 months

At 6 months, the proportion of women giving *any* breast milk was 67.8% (618/912), with 66.0% of primiparous women (301/456) and 69.5% of multiparous women (317/456) giving at least some breast milk. The proportion giving breast milk as the *only* form of milk at 6 months was 50.2% (455/907), comprising 47.9% (216/451) primiparous women and 52.4% (239/456) multiparous women. Only two women had exclusively expressed to feed (ie, had not fed directly at the breast at all) from birth until the 6-month interview. Neither had planned to give EBM exclusively; they expressed because their babies had never effectively attached to feed at the breast. Of those women who had ceased breastfeeding by 6 months, the mean duration of breastfeeding was 12.8 weeks (SD 7.38).

Breastfeeding at 6 months in relation to feeding practices in the first 24–48 h are shown in table 3. Women who fed directly at the breast in the first 24–28 h were the most likely group to be giving any breast milk at 6 months (76.4%; 339/444) (table 3). A similar pattern was found for both primiparous and multiparous women.

Women feeding only directly at the breast in hospital were more likely to be continuing to give any breast milk (adjusted OR 1.80, 95% CI 1.27 to 2.55), and to be giving only breast milk (adjusted OR 1.61, 95% CI 1.18 to 2.2) to their infant at 6 months than any other group (adjusted for parity, type of birth, planned breastfeeding duration (intention), public/private healthcare choice, perceived breastfeeding problems at recruitment, epidural use for labour or birth, maternal BMI, being born in Australia, maternal age and maternal education level) (table 4).

Table 2 Infant feeding in the first 24–48 h of life (only those who responded to the 6-month survey)

Feeding	Primipara (n=457)		Multipara (n=457)		All (n=914)	
	n	Per cent	n	Per cent	n	Per cent
Feeding only directly at breast	162	35.5	284	62.1	446	48.8
Directly at breast + EBM	176	38.5	96	21.0	272	29.8
Directly at breast, EBM + formula	91	19.9	48	10.5	139	15.2
Directly at breast + formula	18	3.9	28	6.1	46	5.0
EBM only	5	1.1	0	–	5	0.6
EBM + formula	4	0.9	1	0.2	5	0.6
Fully formula feeding	1	0.2	0	–	1	0.1

EBM, expressed breast milk.

Table 3 Feeding any breast milk at 6 months, stratified by feeding method in hospital

Feeding in hospital 24–48 h*	Primipara (n=457)		Multipara (n=457)		All (n=924)	
	n	Per cent	n	Per cent	n	Per cent
Directly at breast only	124/161	77.0	215/283	76.0	339/444	76.4
Any EBM	169/276	61.2	89/145	61.4	258/421	61.3
Any EBM and any formula	48/95	50.5	34/49	69.4	82/144	56.9
Any formula	56/114	49.1	47/77	61.0	103/191	53.9

*Categories not mutually exclusive, that is, if infant had EBM she/he is included in rows 2 and 3, and if had some formula she/he is included in rows 3 and 4.

EBM, expressed breast milk.

To explore which (if any) of the independent variables had an effect on any breastfeeding at 6 months we used a logistic regression model. Each variable (of those noted above that were adjusted for in the primary outcome) was assessed for its association with any breast milk feeding at 6 months. Where there was an association between breast milk feeding at 6 months and the variable being tested at the univariate level, the variable was entered into the model, along with the primary exposure variable (feeding only directly at the breast prior to recruitment) and all other variables that were associated with any breast milk feeding at 6 months at the univariate level. Variables were then removed one at a time until only those that showed an association remained (the likelihood ratio test was used after each variable was removed to assess that its removal made no significant difference to the model).

Factors positively associated with any breast milk feeding at 6 months were feeding only directly at the breast in the first 24–48 h of life; intending to breast feed for 6 months or longer; and having completed a university degree or higher (table 5). Reporting breastfeeding problems in the first 24–48 h postpartum was negatively associated with any breastfeeding at 6 months. Variables significant at univariate level but not in the full model were parity, public/private admission status, being born in Australia, type of birth, maternal BMI, and the use of epidural analgesia in labour. Maternal BMI was dichotomised at 30 as well as at 35, and neither showed an association in the full model; however, the study was underpowered to look at women with a BMI of 35 or above. Likewise, the study was underpowered to look at women aged less than 26 years compared with women older than this. The effect of birth type was similarly explored in three categories as currently presented,

as well as exploring it as a dichotomous variable, that is, vaginal birth compared with caesarean birth, and this did not change the outcome.

Exclusive breast milk feeding to 6 months

One per cent of women (8/914) fed *only* breast milk from birth to 6 months (ie, these infants had no other fluid and no solid foods). An additional 4% (42/918) were probably exclusively breast milk fed to 6 months, but we were unable to ascertain the age at which these infants were exposed to foods other than breast milk due to incomplete data on some variables for these women. Seventy-three per cent of infants (665/910) had solid foods introduced to their diet prior to 26 weeks, and for this group, the mean age of introduction of solids was 20.4 weeks (SD=2.97). Commencing solids prior to 26 weeks was not associated with feeding any breast milk at 6 months (OR 0.90, 95% CI 0.66 to 1.24).

DISCUSSION

This was a large prospective cohort study with minimal loss to follow-up at the primary outcome point of 6 months postpartum. Our findings demonstrate that women feeding their healthy term infants breast milk only directly at the breast in the first 24–48 h of life (compared with any other feeding combination) were more likely to be breast milk feeding at 6 months, and this association remained after adjusting for other determinants of breastfeeding.

We recruited participants from three hospitals in metropolitan Melbourne, Australia, including two large tertiary sites and a smaller private hospital, a combination deliberately chosen to reflect the proportion of

Table 4 Feeding from the breast directly in hospital compared with any other type of feeding (reference group): association with giving any and only breast milk at 6 months

Feeding at 6 months	Direct breastfeeding only in hospital		Any other feeding in hospital*		OR (95% CI)	Adjusted OR (95% CI)†
	n	Per cent	n	Per cent		
Any breast milk	339/444	76.4	279/468	59.6	2.19 (1.64 to 2.91)	1.80 (1.27 to 2.55)
Only breast milk	259/442	58.6	176/465	42.2	1.94 (1.49 to 2.53)	1.61 (1.18 to 2.2)

*Reference group for ORs.

†Adjusted for parity, type of birth, breastfeeding intention, perceived breastfeeding problems at recruitment, public/private healthcare choice, epidural for labour or birth, being born in Australia, maternal body mass index, maternal age and education.

Table 5 Factors associated with any breast milk intake at 6 months

Factor	n	Per cent	OR	95% CI	Adjusted OR n=866*	95% CI
Maternal education						
No degree (ref)	200/366	54.6	1			
Degree/diploma	418/546	76.6	2.71	2.04 to 3.61	2.80	2.07 to 3.79
Maternal age (years)						
26 to <36 (ref)	382/561	68.1	1			
Less than 26	34/65	52.3	0.51	0.31 to 0.86	†	
≥36	193/273	70.7	1.1	0.82 to 1.50		
Country of birth						
Not Australia (ref)	216/293	73.3	1			
Australia	401/618	64.9	0.66	0.48 to 0.90	†	
BMI						
Under 30 (ref)	519/741	70.0	1			
≥30	68/125	54.4	0.51	0.35 to 0.75	†	
Public admission						
Public (ref)	404/596	67.8	1			
Private	214/316	67.7	1.00	0.74 to 1.33	‡	
Parity						
Multipara (ref)	317/456	69.5	1			
Primipara	310/456	66.0	0.85	0.64 to 1.12	‡	
Breastfeeding intention						
<6 months (ref)	69/161	42.9	1	1		
≥6 months	549/751	73.1	3.62	2.55 to 5.15	3.46	2.39 to 5.00
Type of birth						
Spontaneous vaginal (ref)	279/379	73.6	1			
Instrumental	70/120	58.3	0.50	0.33 to 0.77	†	
Caesarean section	269/413	65.1	0.67	0.49 to 0.91		
Epidural for labour or birth						
No (ref)	266/366	72.7	1			
Yes	352/546	64.5	0.68	0.51 to 0.91	†	
Breastfeeding problems reported at recruitment						
No (ref)	465/646	72.0	1			
Yes	153/266	57.5	0.53	0.39 to 0.71	0.58	0.41 to 0.81
Breast milk feeding method						
Not all direct (ref)	279/468	59.6	1			
Direct only	339/444	76.4	2.19	1.64 to 2.91	1.80	1.30 to 2.49

*n=866 for the adjusted OR calculations analysis.

†These variables were included in the model initially, but not being significant were removed.

‡These variables not being significant at univariate level were not included in full model.

BMI, body mass index; ref, reference category.

women choosing public and private care. Compared with the population of all women giving birth in the State of Victoria, the women in this study were more often older (mean age 33.2 years compared with 30.8 years), partnered (96.8% compared with 86.9%), primiparous (49.8% compared with 42.7%), and less often born in Australia (67.3% compared with 72.8%).³³

Although the method by which breast milk is given to the healthy term infant has received limited research attention,⁴⁰ a positive relationship between early exclusive breastfeeding at the breast and a longer duration of breast milk feeding has been reported in several studies.^{19–41} An Australian prospective cohort study found the opposite, and reported that mothers who expressed breast milk were more likely to continue breastfeeding until 6 months than those who did not express, however, the timing and amount of expressing was not reported.¹⁵

Two studies in the USA found an association between pump use and longer term breast milk feeding, but their focus was the benefits of pump use to facilitate breast milk feeding in the workplace.^{17–42} None of these three studies specified any detail of early or in-hospital EBM feeding. It may be that the effect of feeding any EBM on the duration of breastfeeding is associated with infant age when EBM feeding is initiated.

When reflecting on the findings of this study, the reasons for women not feeding directly at the breast in hospital prior to recruitment, and the rate of breastfeeding at the primary outcome point are both important to consider. The most common reason given for an infant receiving either EBM or formula was professional advice from a doctor or midwife. This issue needs further exploration, as it may be that if a health professional is making this recommendation, it is based on a clinical

judgement of the breastfeeding dyad. However, it is possible that in many instances, there was not sufficient clinical indication for the recommendation. Our analysis of the baseline data showed that women's breastfeeding intention, confidence in their ability to breast feed, and their perception of the adequacy of their milk supply were some of the factors associated with feeding directly from the breast,³ and in the current analysis, where there was a univariate association between any of the factors and breastfeeding at 6 months, the factor was included in the multivariate analysis. The issue of why healthy term infants receive either EBM or formula in the first 24–48 h of life is complex, and requires a separate focused approach including careful clinical audit, and an exploration of reasons from the perspectives of both staff and women.

The other factor to consider is that the breastfeeding rate of 68% at 6 months in this cohort of Melbourne women is high compared with the Victorian State-wide average of 46% at the same time.^{34–43} This is likely to be because study participants were women who intended to breast feed, had a healthy term infant, and chose to participate in a breastfeeding study. However, we have identified no literature to support the notion that the result would be different if this study was undertaken in women whose breastfeeding rate was more aligned with the state average.

We cannot assume that our study findings will be generalisable to other populations, for example, internationally, as maternal workforce participation varies and may influence infant feeding options; however, the definitions we have used, and the differentiation of breast milk feeding, and feeding directly at the breast, provide a baseline for future comparisons within Australia and elsewhere. Very few studies have made this differentiation, and there has been inconsistency in definitions such that the term 'breastfeeding' may include the use of any breast milk regardless of how an infant receives it.^{3–44–47}

CONCLUSION

This study has shown that healthy breastfeeding term infants often receive EBM and/or infant formula in hospital in the first 24–48 h of life and that either or both of these reduce the odds of an infant receiving any breast milk at 6 months. Where possible, and in the absence of any specific clinical or medical need, mothers of healthy term infants should be encouraged and supported to feed directly from the breast right from the start. Where it is necessary to express to provide the infant with breast milk in the immediate postpartum period, information and support to expedite a return to direct breastfeeding is important. We have found that what happens in the first days of life does affect breastfeeding at 6 months, and given this finding, further research should explore the reasons that healthy term infants receive EBM and/or infant formula in hospital in greater depth.

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Contributors DAF and HMJ had the initial idea for the study, and all authors contributed to the study design. DAF, HMJ, HLM and LHA designed data collection tools and all authors contributed to the piloting and refinement of these. The study was coordinated by HMJ and DAF, who also had full access to the data in the study, and take responsibility for the integrity of the data and the accuracy of the data analysis. DAF, HMJ, LHA and HLM contributed towards writing the manuscript. All authors read the drafts, provided feedback, and approved the final draft.

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