EtD 42b. Should early breastmilk expression vs. delayed breastmilk expression be used for mothers of preterm infants?

POPULATION:	Mothers of preterm infants
INTERVENTION:	Early breastmilk expression
COMPARISON:	Delayed breastmilk expression
MAIN OUTCOMES:	**Critical outcomes** Breastmilk supply/volume Fully breastfed or breastmilk feeding at hospital discharge Necrotising enterocolitis Mortality Neurodevelopmental impairment Sepsis: proven or suspected Time to full enteral feeds **Important but not critical** Adverse effects Faltering growth/body composition Duration of initial hospital stay Bronchopulmonary dysplasia Retinopathy of prematurity Anaemia of prematurity Cost: cost of intervention, cost of neonatal care and life-long cost **Less important for decision making** Time to full sucking feeds
SETTING:	Neonatal care
PERSPECTIVE:	Clinical recommendation- patient perspective
BACKGROUND:	Breastmilk is the optimal source of nutrition for preterm infants, providing essential nutrients, immune protection and developmental benefits. However, many mothers of preterm infants face challenges in establishing and maintaining milk supply, particularly when direct breastfeeding is not immediately possible. Effective breastmilk expression strategies are critical for ensuring sufficient milk production and supporting breastfeeding or breastmilk feeding at discharge. Early initiation of breastmilk expression, within one to six hours of birth, is believed to stimulate milk production by mimicking the natural hormonal responses that occur with direct breastfeeding. Delayed initiation of breastmilk expression may result in lower milk volumes and reduced breastfeeding or breastmilk feeding rates at discharge. The volume of breastmilk available for enteral feeding in the first two weeks after birth is an important determinant of how quickly parenteral nutrition can stop which reduces the risk of sepsis and whether the infant receives infant formula which increases the risk of necrotising enterocolitis. Understanding the evidence and whether it supports these practices and beliefs is essential to optimising milk production, minimising feeding related morbidity and mortality, and supporting breastfeeding success for mothers of preterm infants.

CONFLICT OF INTERESTS:	None

Assessment

Desirable Effects

How substantial are the desirable anticipated effects?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
● Trivial ○ Small ○ Moderate ○ Large ○ Varies ○ Don't know	**Breastmilk expression within 6 hours of birth** [1-4] **Breastmilk supply/volume**: Cohort: Expressing within 6 hours of birth was associated with higher milk yield on day 4 (88.3 g, 95% CI 7.1 to 169.4) and day 14 (155.7 g, 95% CI 12.2 to 299.3) but not on day 21 (73.6 g, 95% CI −91.4 to 238.7). There was an interaction between expressing frequency and time to first expression (p<0.005), with increased expressing frequency being associated with higher yield only in those who expressed within 6 hours. Cohort study: Women who expressed milk within 6 hours of delivery produced more milk than women who started expressing after 6 hours. The increased lactation was attributable to women who commenced expressing within one hour of delivery [Critical]. **Fully breastfed or breastmilk feeding at hospital discharge**: Retrospective case histories: Initiation of breastfeeding in the first 6 hours of life was associated with a relatively high probability of exclusive breastfeeding at hospital discharge (OR 2.38; 95% CI 1.19–4.75). **Desirable effects for Māori** No additional evidence available	**Breastmilk expression within 6 hours of birth** [1] Infants 23+0 to 31+6 weeks postmenstrual age [2] Infants' gestational age of 34–36 weeks [3] ≤1500 grams and ≤32 weeks' gestation [4] ≤1500 grams and ≤32 weeks' gestation

Outcomes	№ of participants (studies) Follow-up	Certainty of the evidence (GRADE)	Relative effect (95% CI)	Anticipated absolute effects* (95% CI)	
				Risk with breastmilk expression (, delayed,)	Risk difference with breastmilk expression (early,)
Breastmilk supply/volume: RCT: 60 (early), 61–180 (intermediate) or 181–360 (late) minutes following delivery assessed with: Milk volume	180 (1 RCT)	⨁⨁◯◯ Low[a,c]	-	For mothers who initiated early mother's own milk production over time was significantly lower through the 42 days (p=0.045) compared to the late group but did not differ between the intermediate and late groups when controlling for covariates (mode of delivery and prior lactation experience). While the late expression group produced more others own milk during the first three days, there were no differences for days 4 to 7 or weekly for six weeks.	
Breastmilk supply/volume: Cohort: (early <6 hours vs. later >6 hours from birth) assessed with: Milk yield (g)	120 (2 non-randomised studies)	⨁◯◯◯ Very low[a,b,c]	-	One cohort study (UK) reported 51.7% expressed within 6 hours of birth (62/120) and 48.3% expressed more than 6 hours after birth (58/120). Expressing within 6 hours of birth was associated with higher milk yield on day 4 (88.3 g, 95% CI 7.1 to 169.4) and day 14 (155.7 g, 95% CI 12.2 to 299.3) but not on day 21 (73.6 g, 95%	

				CI −91.4 to 238.7). There was an interaction between expressing frequency and time to first expression (p<0.005), with increased expressing frequency being associated with higher yield only in those who expressed within 6 hours. Expressing within 2 hours of birth was not associated with further milk yield increase. One cohort study (USA) compared breastmilk volume in women who started expressing 6 hours or less after delivery versus more than 6 hours. Women who expressed within 6 hours after delivery produced more breastmilk during the initial expression session and on Days 6, 7, and 42. When mothers who began milk expression prior to 1 hour following delivery were removed from analysis, benefits of milk expression within 6 hours were no longer apparent. Initiation of milk expression within 6 hours following delivery may not improve lactation success in mothers of VLBW infants unless initiated within the first hour.	
Fully breastfed or breastmilk feeding at hospital discharge: Retrospective case histories: early <6 hours vs. later >6 hours from birth	84 (1 non-randomised study)	⨁◯◯◯ Very low[a,d,e]	-	Initiation of breastfeeding in the first 6 hours of life was associated with a relatively high probability of exclusive breastfeeding at hospital discharge (OR 2.38; 95% CI 1.19–4.75).	
Necrotising enterocolitis - not measured	-	-	-	-	-
Mortality - not measured	-	-	-	-	-
Neurodevelopmental impairment - not measured	-	-	-	-	-
Sepsis: proven or suspected - not measured	-	-	-	-	-
Time to full enteral feeds - not measured	-	-	-	-	-
Adverse effects - not measured	-	-	-	-	-
Faltering growth/body composition - not measured	-	-	-	-	-
Duration of initial hospital stay - not measured	-	-	-	-	-
Bronchopulmonary dysplasia - not measured	-	-	-	-	-
Retinopathy of prematurity - not measured	-	-	-	-	-
Anaemia of prematurity - not measured	-	-	-	-	-
Cost: cost of intervention, cost of neonatal care and life-long cost - not measured	-	-	-	-	-
Time to full sucking feeds - not measured	-	-	-	-	-

a. Downgraded one level for indirectness as evidence is only reported in a single study
b. Downgraded one level for indirectness as studies were not generalisable as only in very preterm infants and Very low birthweight infants
c. Downgraded two levels for imprecision due to extremely wide confidence intervals
d. Downgraded two levels for concerns with risk of bias
e. Downgraded one level for indirectness as study was in late preterm infants only

Undesirable Effects

How substantial are the undesirable anticipated effects?		
JUDGEMENT	**RESEARCH EVIDENCE**	**ADDITIONAL CONSIDERATIONS**
● Trivial ○ Small ○ Moderate ○ Large ○ Varies ○ Don't know	**Breastmilk expression within 6 hours of birth** [1-3] **Breastmilk supply/volume**: RCT: For mothers who initiated early mother's own milk production over time was significantly lower through the 42 days (p=0.045). While the late expression group produced more others own milk during the first three days, there were no differences for days 4 to 7 or weekly for six weeks. **Undesirable effects for Māori** No additional evidence available	

Certainty of evidence

What is the overall certainty of the evidence of effects?

JUDGEMENT	**RESEARCH EVIDENCE**	**ADDITIONAL CONSIDERATIONS**
● Very low ○ Low ○ Moderate ○ High ○ No included studies	Low to very low certainty of evidence overall. **Certainty of evidence for Māori** No additional evidence available	

Outcomes	**Importance**	**Certainty of the evidence (GRADE)**
Breastmilk supply/volume: RCT: 60 (early), 61–180 (intermediate) or 181–360 (late) minutes following delivery assessed with: Milk volume	CRITICAL	⨁⨁◯◯ Low
Breastmilk supply/volume: Cohort: (early <6 hours vs. later >6 hours from birth) assessed with: Milk yield (g)	CRITICAL	⨁◯◯◯ Very low
Fully breastfed or breastmilk feeding at hospital discharge: Retrospective case histories: early <6 hours vs. later >6 hours from birth	CRITICAL	⨁◯◯◯ Very low
Necrotising enterocolitis - not measured	CRITICAL	-
Mortality - not measured	CRITICAL	-
Neurodevelopmental impairment - not measured	CRITICAL	-
Sepsis: proven or suspected - not measured	CRITICAL	-

Time to full enteral feeds - not measured	CRITICAL	-
Adverse effects - not measured	IMPORTANT	-
Faltering growth/body composition - not measured	IMPORTANT	-
Duration of initial hospital stay - not measured	IMPORTANT	-
Bronchopulmonary dysplasia - not measured	IMPORTANT	-
Retinopathy of prematurity - not measured	IMPORTANT	-
Anaemia of prematurity - not measured	IMPORTANT	-
Cost: cost of intervention, cost of neonatal care and life-long cost - not measured	IMPORTANT	-
Time to full sucking feeds - not measured	NOT IMPORTANT	-

Values

Is there important uncertainty about or variability in how much people value the main outcomes?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Important uncertainty or variability ● Possibly important uncertainty or variability ○ Probably no important uncertainty or variability ○ No important uncertainty or variability	Possibly important uncertainty or variability **Values for Māori** No additional evidence available.	

Balance of effects

Does the balance between desirable and undesirable effects favour the intervention or the comparison?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS

○ Favours the comparison ○ Probably favours the comparison ● Does not favour either the intervention or the comparison ○ Probably favours the intervention ○ Favours the intervention ○ Varies ○ Don't know	**Breastmilk expression within 6 hours of birth - low certainty evidence** Lower milk volume **Breastmilk expression within 6 hours of birth - very low certainty evidence** Increased initial milk volume Increased exclusive breastfeeding at hospital discharge **Balance of effects for Māori** No additional evidence	

Resources required

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Large costs ○ Moderate costs ● Negligible costs and savings ○ Moderate savings ○ Large savings ○ Varies ○ Don't know	Access to breast pumps Prenatal educational resources Access to breastfeeding support specialist and staff **Resourcing for Māori** No additional evidence available	

Certainty of evidence of required resources

What is the certainty of the evidence of resource requirements (costs)?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Very low ○ Low ● Moderate ○ High ○ No included studies	The costs are moderately certain. **Certainty of evidence of required costs for Māori** No additional evidence available.	

Cost effectiveness

Does the cost-effectiveness of the intervention favour the intervention or the comparison?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Favours the comparison ○ Probably favours the comparison ○ Does not favour either the intervention or the comparison ○ Probably favours the intervention ○ Favours the intervention ○ Varies ● No included studies	No studies reported on the cost effectiveness of breastmilk expression for mothers of preterm infants. **Cost effectiveness for Māori** No additional evidence available	

Equity

What would be the impact on health equity?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ Reduced ● Probably reduced ○ Probably no impact ○ Probably increased ○ Increased ○ Varies ○ Don't know	**Equity for Māori** Māori mothers of preterm pēpi Māori face systemic barriers that affect their ability to establish and maintain breastfeeding. Early and frequent breastmilk expression is vital to improving milk supply and long-term breastfeeding success, yet pēpi Māori are less likely to be exclusively breastfed at discharge. Delayed or infrequent expression may worsen these outcomes and reinforce existing inequities. Given the impact of colonisation on health systems and whānau support, structured support for early and consistent expression can empower wāhine Māori. Prioritising these practices in neonatal care may enhance breastfeeding rates and promote culturally responsive care for whānau Māori with preterm pēpi. **Equity for Pacific families** Pacific mothers may face barriers to early and frequent milk expression due to limited support, inconsistent staff engagement or lack of culturally aligned guidance. Although Pacific infants had high rates of transition to mother's own milk only, 22% still received alternative nutrition by day three, suggesting gaps in consistent breastfeeding support. Delayed or less frequent breastmilk expression may contribute to reduced supply and interrupted feeding progress. Equity requires respectful education and proactive lactation support that affirms Pacific values and promotes confidence in maintaining milk supply from birth.	

	Equity for underrepresented groups Mothers from migrant, rural or low-income backgrounds may experience delays in accessing pumps, lactation advice or culturally appropriate care. These barriers can reduce early expression and long-term supply. Equity demands timely resources, interpreter services and individualised support to ensure all mothers can establish and maintain breastmilk feeding. Promoting early and frequent expression can improve outcomes by creating more equitable opportunities for breastfeeding success. Ensuring access to equipment, culturally appropriate education and staff support across all neonatal settings is essential to closing the gap in feeding disparities.	

Acceptability

Is the intervention acceptable to key interest-holders?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes ○ Varies ○ Don't know	While early breastmilk expression is clinically recommended to support milk supply for preterm infants, acceptability will vary across mothers and families depending on a range of personal, cultural and systemic factors. **Emotional readiness**: Parents of preterm infants are often under intense emotional stress. Some may feel overwhelmed by the expectation to express milk especially in the first hours after birth. **Physical discomfort or health**: Breastmilk expression—especially with a pump—can be physically uncomfortable. Some mothers recovering from a complicated birth or surgery may not feel able to express immediately. **Time and capacity**: Mothers caring for other children, managing work or without consistent support may struggle to commit to a strict schedule. **Acceptability for Māori** No studies available	

Feasibility

Is the intervention feasible to implement?

JUDGEMENT	RESEARCH EVIDENCE	ADDITIONAL CONSIDERATIONS
○ No ○ Probably no ● Probably yes ○ Yes	Probably feasible. **Feasibility for Māori**	Huang *et al* [5] reported on an implementation project to promote early, frequent and effective breastmilk expression. Breastmilk expression within 6 hours of birth of preterm infants (<37 weeks) increased from 23% to

○ Varies ○ Don't know	No additional evidence available.	87%. Compliance of expression for 8–12 times daily in the first 48 h after delivery also experienced dramatic improvement from 0 to 50%. The volume of breastmilk expression in the first 24 hours increased from 2.10 +/- 5.45 to 7.72 +/-17.19 mL on average. In the following 24 h, the volume improved from 7.08 +/-12.98 to 43.77 +/-80.86 mL.

Summary of judgements

	JUDGEMENT						
DESIRABLE EFFECTS	**Trivial**	Small	Moderate	Large		Varies	Don't know
UNDESIRABLE EFFECTS	**Trivial**	Small	Moderate	Large		Varies	Don't know
CERTAINTY OF EVIDENCE	**Very low**	Low	Moderate	High			No included studies
VALUES	Important uncertainty or variability	**Possibly important uncertainty or variability**	Probably no important uncertainty or variability	No important uncertainty or variability			
BALANCE OF EFFECTS	Favours the comparison	Probably favours the comparison	**Does not favour either the intervention or the comparison**	Probably favours the intervention	Favours the intervention	Varies	Don't know
RESOURCES REQUIRED	Large costs	Moderate costs	**Negligible costs and savings**	Moderate savings	Large savings	Varies	Don't know
CERTAINTY OF EVIDENCE OF REQUIRED RESOURCES	Very low	Low	**Moderate**	High			No included studies
COST EFFECTIVENESS	Favours the comparison	Probably favours the comparison	Does not favour either the intervention or the comparison	Probably favours the intervention	Favours the intervention	Varies	**No included studies**

	JUDGEMENT						
EQUITY	Reduced	**Probably reduced**	Probably no impact	Probably increased	Increased	Varies	Don't know
ACCEPTABILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know
FEASIBILITY	No	Probably no	**Probably yes**	Yes		Varies	Don't know

Type of recommendation

Strong recommendation against the intervention	Conditional recommendation against the intervention	**Conditional recommendation for either the intervention or the comparison**	Conditional recommendation for the intervention	Strong recommendation for the intervention
○	○	●	○	○

References

1. Levene, I.; Quigley, M.A.; Fewtrell, M.; O'Brien, F. Does extremely early expression of colostrum after very preterm birth improve mother's own milk quantity? A cohort study. *Arch Dis Child Fetal Neonatal Ed* **2024**, *109*, 475-480, doi:10.1136/archdischild-2023-326784.
2. Prikhodko, E.A.; Belyaeva, I.A.; Kruglyakov, A.Y.; Mikheeva, A.A.; Gorev, V.V. Factors Associated with Exclusive Breastfeeding of Late Preterm Infants in Neonatal Hospital: Cross-Sectional Study. *Voprosy sovremennoi pediatrii — Current Pediatrics* **2022**, *21*, 29–35, doi:10.15690/vsp.v21i1.2384.
3. Parker, L.A.; Sullivan, S.; Kruger, C.; Mueller, M. Timing of milk expression following delivery in mothers delivering preterm very low birth weight infants: a randomized trial. *J. Perinatol.* **2020**, *40*, 1236-1245, doi:10.1038/s41372-020-0688-z.
4. Parker, L.A.; Sullivan, S.; Krueger, C.; Mueller, M. Association of timing of initiation of breastmilk expression on milk volume and timing of lactogenesis stage II among mothers of very low-birth-weight infants. *Breastfeed. Med.* **2015**, *10*, 84-91, doi:10.1089/bfm.2014.0089.
5. Huang, X.; Zhang, J.; Zhou, F.; Yang, Y.; Lizarondo, L.; McArthur, A. Promotion of early breast milk expression among mothers of preterm infants in the neonatal ICU in an obstetrics and gynaecology hospital: a best practice implementation project. *JBI Evid Implement* **2020**, *18*, 278-287, doi:10.1097/xeb.0000000000000223.

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