

# Implementing a milk bank in the province of Québec: from evidence to practice

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## Abstract

**Background:** Milk banks, which supply human milk prescribed by physicians primarily to premature and ill infants, are well-established worldwide. In Canada, only one milk bank is currently operating in Vancouver and another one is in development in Toronto. Both banks are hospital-based.

**Objective:** To examine the feasibility for the implementation of a human milk bank, administered by a blood bank, in the province of Québec.

**Methods:** A systematic review of the literature was performed to identify available evidence (clinical, economic, epidemiological) on banked donor milk. This data was supplemented with contextual data collected during interviews with a wide range of stakeholders in Québec.

**Results:** Banked donor milk reduces the rate of necrotizing enterocolitis (NEC) with a risk factor ranging from 0.21 to 0.4 compared to formulas. Given the burden associated with NEC and its costs (70 cases among very low birth weight infants in Québec in 2008-2009, costing a total of 5 324 011\$ [2009CAN \$]) and the rising number of preterm births in Québec, the use of donor milk could have a positive clinical and economic impact. Preliminary data from a survey conducted with pediatricians, neonatologists, lactation consultants, midwives, public health representatives and breastfeeding mothers in the province of Québec suggests that a milk bank administered by a blood bank would receive support from many stakeholders.

**Conclusion:** Evidence suggests that the implementation of a milk bank in Québec could be clinically and economically beneficial and would be supported by a wide range of stakeholders, although further validation is required before a final recommendation can be made.

## Methods

### Literature search

An extensive literature search was conducted to identify articles published until September 2010 pertaining to the clinical impacts of feeding preterm and very low birth weight (VLBW) newborns with human milk from milk banks compared to preterm formulas of bovine origin

### Comparative analysis of clinical studies

Only studies comparing banked donor milk – mother's milk was excluded – to formulas were considered in the analysis of clinical impacts

### Epidemiological analysis

To determine the burden of infections and conditions affecting the target population, Québec historical data for the fiscal year 2008-2009 were obtained from Med-Echo, a database managed by the Québec Ministry of Health that contains medical data on patients hospitalized in Québec

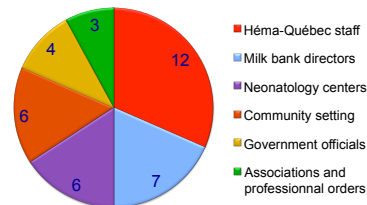
### Economic analysis

To determine the financial burden due to NEC cases in the province of Québec, data were obtained from the Québec Ministry of Health for the 2008-09 fiscal year (combined sources: APR-DRG V24 and Med-Écho)

### Stakeholders interviews

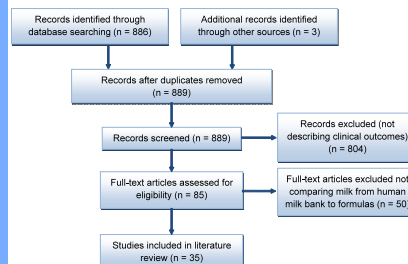
Standardized questionnaires were established and used to interview a wide range of key stakeholders relevant to the feasibility study

## Key stakeholders surveyed



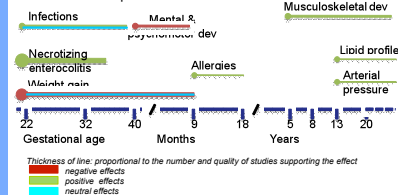
## Literature search results

- 886 studies pertaining to milk banking were retrieved
- 35 studies compared the clinical impacts of banked donor milk to preterm formula for feeding preterm or VLBW newborns



## Synthesis of clinical impacts

- Potential effects of using banked donor milk versus preterm formula to feed preterm or VLBW infants



The most documented benefit of using banked donor milk instead of formulas is a reduction in the number of cases of necrotizing enterocolitis (NEC)

Note: studies reporting a negative effect on weight gain and mental/psychomotor development were performed in the 80's using drip milk (low nutritional value)

Sources: literature review.

## Necrotizing enterocolitis (NEC)

- Clinical presentation: abdominal distension/dyscoloration, gastrointestinal hemorrhage, lethargy, necrosis of the digestive tract
- Affects 5 to 6% of newborns in neonatology in Canada
- Therapeutic approach: broad-spectrum antibiotics, I.V. hydration, gastric decompression, respiratory support, pain relief and surgery
- Mortality: 25%

## NEC and breast donor milk

The risk of NEC is significantly reduced with banked donor milk

Design	N	RR	95% CI	P	NNT	
Sullivan 2010	RCT	207	0.23	0.08-0.66	P=.007	10
Boyd 2007	Meta-analysis	268	0.21	0.06-0.76	P=.017	18.5
Quigley 2007	Meta-analysis	823	0.40	0.2-0.8	Significant*	33
McGuire 2003	Meta-analysis	307	0.34	0.12-0.99	Borderline*	20
Average*	-	-	0.30	-	-	20

\*Exact value not reported; \*Unweighted  
RR: Relative risk; CI: confidence interval; NNT: Number needed to treat; RCT: Randomized controlled trial

Sources:  
Boyd CA, Quigley MA, Brookshurst P. Arch Dis Child Fetal Neonatal Ed 2007; 92(3):F169-F175.  
McGuire W, Anthony MY, Arch Dis Child Fetal Neonatal Ed 2003; 88(1):F11-F14.  
Quigley MA, Henderson G, Anthony MY, McGuire W. Cochrane Database Syst Rev 2007;(4):CD002971.  
Sullivan S, Schanler RJ, Kim JH, Patel AL, Traweger R, Kiechl-Kohlendorfer U, et al. J Pediatr 2010; 156(4):562-7.

## NEC in the province of Québec

Preterm births and associated NEC cases in 2008

	Cumulative data		
	≤28	≤32	≤34
Gestational age at birth			
Infants alive at discharge	260	1018	2209
Cumulative stays (days)	15840	38851	54469
Necrotizing enterocolitis %*	13	6	5
Necrotizing enterocolitis, N	44	68	78
Surgical interventions, N	15-18†	19	19

\*Percentage based on the number of live births and not on the number on infants alive at discharge  
†Inferred value due to personal information protection

Sources: 2008 historical data obtained from the Québec provincial health insurance (RAMQ-Régie d'Assurance Maladie du Québec) database (Med-Écho).

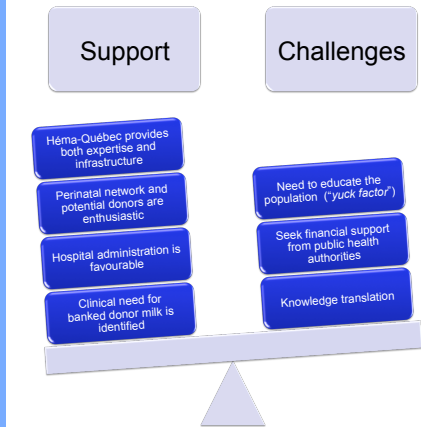
Economic burden associated with NEC cases

	Neonates weighing <1500g		Neonates (overall)	
	Cases	Cost (\$Can2009)	Cases	Cost (\$Can2009)
Requiring surgery	16	2 231 207	35	3 226 577
Without surgery	54	3 092 804	98	4 203 710
Total	70	5 324 011	133	7 430 287
Cost per case	-	76 057	-	55 867

\*Neonates with a birth weight under 1500g hospitalized since their birth

Sources: Québec ministry of health 2008-09 fiscal year data from combined sources (APR-DRG V24 and Med-Écho).

## Survey Results



## Conclusions

The use of banked donor milk to feed preterm and VLBW infants is widely supported at several levels: international (WHO, UNICEF), national (Canadian Paediatric Society) and provincial (Québec government).

The evidence collected and analyzed during the course of the study suggests that the implementation of a milk bank by a blood bank in the province of Québec:

- could contribute to reduce
  - the number of NEC among preterm and VLBW infants
  - the economic burden associated with NEC
- would be supported by a wide range of stakeholders

Sources:  
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Kim JH, Unger S. Les banques de lait humain. Paediatr Child Health 2010; 15(9):599-602.  
UNICEF. Déclaration: 100 ans sur la protection, la promotion et l'encouragement de l'allaitement maternel. 2005. [http://www.unicef.org/franch/fran/declaration\\_24807.html](http://www.unicef.org/franch/fran/declaration_24807.html). (Accessed 2 Dec 2010).  
WHO/UNICEF meeting on infant and young child feeding. J Nurs Midwifery 1980; 25(3): 31-9.

## Perspectives

Héma-Québec is now aware of the results of this study. The Québec Ministry of Health and Social Services (MSSS) will be analysing these results over the next few months and will decide on the next steps regarding this initiative.

Should the MSSS decide to go ahead with this project, Héma-Québec has expressed its interest in taking responsibilities for managing and operating a public milk bank for the province of Québec.

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