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Managing mother's own milk for very preterm infants in neonatal units in 11 European countries

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Feeding with human milk has been recognised as an essential component of newborn care and is especially important for infants born very preterm (VPT, below 32 weeks of gestation) who face higher risks of adverse outcomes. WHO recommends that infants who cannot be fed mother's own milk (MOM) should receive donor human milk. Direct feeding at the breast takes time to establish after VPT birth and procedures are required for expressing, collecting, storing and administering breast milk that respect microbiological safety rules and ensure nutritional and immunological quality. However, as recommendations are scarce, these procedures appear to be dependent on organizational structures and policies of the units (1-3).

Breast milk is one of the most common modes of postnatal human cytomegalovirus (HCMV) transmission in preterm infants with rates for fresh or frozen MOM ranging from 8% to 37%, and about 10% probability of infant infection (2). The debate on the-risk of neonatal morbidity and long-term neurodevelopmental impairment in VPT infants with HCMV infection is ongoing (4), raising additional challenges for establishing best practices for managing MOM (1, 2). In 2012, the American Academy of Paediatrics stated that the benefits of fresh MOM from HCMV-seropositive mothers outweighed the risk of HCMV infection. In 2018, the working group of the French Neonatal Society on fresh human milk use in preterm infants advised pasteurisation of MOM from HCMV-seropositive mothers for infants born <28 weeks or <1000 grams (2). In addition to HCMV transmission, also bacterial contamination of expressed milk is suspected to lead to significant problems in VPT infants (2).

Published reports have revealed differences in MOM management among neonatal intensive care units (NICUs) and countries (1, 3). We aimed to compare practices for handling MOM for VPT infants using standardised questions in European NICUs.

Data were collected as part of the area-based EPICE (Effective Perinatal Intensive Care in Europe) study set up to investigate the use of evidence-based practices for the care of VPT infants in 19 regions in 11 countries (5).

In 2012, structured questionnaires were sent to the head of all NICUs with at least 10 VPT admissions during the study period. The unit questionnaire recorded information on the units'

characteristics and policies, including procedures for managing MOM. Of the 135 eligible NICUs, 134 (99.3%) replied.

Descriptive statistics are presented as numbers and valid proportions.

Ethical approval was obtained in each region from appropriate ethics committees, as required by national legislation, and for the European database by the French data protection committee.

As shown in Table 1, 72% of the 134 neonatal units were level III and 91% had a written protocol (developed at unit or regional level) for breastfeeding/human milk use; when MOM was not available, 34% used human banked milk for all VPT infants (range: 0% to 100% in Sweden) and 13% for some groups only (range: 0%-50%).

Management of MOM varied widely across the countries. Overall, 56% of units reported using fresh MOM (not frozen and unpasteurized milk) without restrictions regarding gestational age, birth weight or risk of HCMV transmission (range: 0% in Germany to 100% in Netherlands and Denmark). Different practices were also observed between units in the same country, particularly in France and Italy. In most units (70%) MOM was not pasteurised (range: 23%-100%); and in 29 (22%) units all VPT infants received pasteurised MOM, (range: 0% to 73% in France).

HCMV serology on all mothers who express their milk (or HCMV Polymerase Chain Reaction of the milk) was required in 29% of units (range: 0% in 6 countries to 93% in Germany). Wide differences were found between NICUs in France and Italy. Among these units (n=36), 47% used human bank/MOM pasteurised, 26% frozen-thawed MOM, 3% untreated fresh MOM and 24% formula in the case of HCMV-seropositive mothers.

Systematic bacteriological analyses of the fresh or frozen-thawed MOM were not performed in 76% of units (range: 29%-100%); performed in less than 10% for the first milk feeding only, and every week in 7%.

These large variations in practice between countries could reflect differences in local regulations or guidelines, as well as lack of strong recommendations at international and national level. Heterogeneity was also observed between units within the same country, revealing that different options can operate locally, such as milk bank availability which may differ between regions within countries. Study limitations include data collected in 2012, which may underestimate current human milk bank availability, and a smaller number of units in participating regions in some countries; however, no more recent comparable information on practices is available from so many European countries.

While it is recognised that MOM should be encouraged as the primary feeding method for VPT infants, this variation indicates substantial differences in attitudes about what constitutes best practices for the management of MOM among European neonatologists. To guide practice, further studies are needed to reinforce the evidence-base on ensuing outcomes of HCMV infection as well as practices for managing these risks whilst ensuring that VPT infants can benefit from MOM.

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CONFLICTS OF INTEREST

None to declare.

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Table 1. Management of mother's own milk for very preterm infants in the neonatal unit, by country*.

	Belgium (n= 9) n (%)	Denmark (n= 8) n (%)	Estonia (n= 4) n (%)	France (n= 23) n (%)	Germany (n= 14) n (%)	Italy (n= 22) n (%)	Netherlands (n= 2) n (%)	Poland (n= 4) n (%)	Portugal (n= 17) n (%)	Sweden (n= 4) n (%)	UK (n= 27) n (%)	Total (n= 134) n (%)
Level of care												
Level III	8 (88.9)	2 (25.0)	3 (75.0)	22 (95.6)	13 (92.9)	16 (72.7)	2 (100.0)	1 (25.0)	15 (88.2)	2 (50.0)	12 (44.4)	96 (71.6)
Written protocol for breastfeeding and human milk use												
Yes, regional or network protocols	0 (0.0)	0 (0.0)	3 (75.0)	3 (14.3)	0 (0.0)	3 (13.6)	0 (0.0)	3 (75.0)	5 (29.4)	1 (25.0)	1 (3.7)	19 (14.4)
Yes, unit protocols	6 (66.7)	8 (100.0)	1 (25.0)	15 (71.4)	12 (85.7)	18 (81.8)	2 (100.0)	1 (25.0)	10 (58.8)	3 (75.0)	25 (92.6)	101 (76.5)
No	3 (33.3)	0 (0.0)	0 (0.0)	3 (14.3)	2 (14.3)	1 (4.6)	0 (0.0)	0 (0.0)	2 (11.8)	0 (0.0)	1 (3.7)	12 (9.1)
Use of human bank milk/donor's milk to feed VPT infants whose mothers do not express their milk												
Yes, for all infants less than 32 weeks GA	0 (0.0)	7 (87.5)	1 (25.0)	19 (82.6)	0 (0.0)	9 (40.9)	0 (0.0)	0 (0.0)	1 (5.9)	4 (100.0)	4 (14.8)	45 (33.6)
Yes, for some infants	0 (0.0)	1 (12.5)	0 (0.0)	2 (8.7)	2 (14.3)	2 (9.1)	1 (50.0)	0 (0.0)	1 (5.9)	0 (0.0)	8 (29.6)	17 (12.7)
No	9 (100.0)	0 (0.0)	3 (75.0)	2 (8.7)	12 (85.7)	11 (50.0)	1 (50.0)	4 (100.0)	15 (88.2)	0 (0.0)	15 (55.6)	72 (53.7)
Infants whose mothers express breast milk receive fresh milk*												
Yes, with no restrictions	4 (50.0)	8 (100.0)	3 (75.0)	6 (28.6)	0 (0.0)	11 (50.0)	2 (100.0)	2 (66.7)	11 (64.7)	2 (50.0)	24 (88.9)	73 (56.1)
Yes, but with restrictions	2 (25.0)	0 (0.0)	1 (25.0)	11 (52.4)	14 (100.0)	7 (31.8)	0 (0.0)	1 (33.3)	5 (29.4)	2 (50.0)	3 (11.1)	46 (35.4)
No, all milk is frozen or pasteurised	2 (25.0)	0 (0.0)	0 (0.0)	4 (19.0)	0 (0.0)	4 (18.2)	0 (0.0)	0 (0.0)	1 (5.9)	0 (0.0)	0 (0.0)	11 (8.5)
Infants whose mothers express breast milk receive frozen-thawed milk												
Yes, with no restrictions	6 (66.7)	8 (100.0)	1 (25.0)	3 (13.0)	2 (14.3)	16 (72.7)	2 (100.0)	1 (25.0)	9 (52.9)	3 (75.0)	24 (88.9)	75 (56.0)
Yes, but with restrictions	2 (22.2)	0 (0.0)	1 (25.0)	1 (4.4)	11 (78.6)	3 (13.6)	0 (0.0)	0 (0.0)	1 (5.9)	1 (25.0)	3 (11.1)	23 (17.2)
No	1 (11.1)	0 (0.0)	2 (50.0)	19 (82.6)	1 (7.1)	3 (13.6)	0 (0.0)	3 (75.0)	7 (41.2)	0 (0.0)	0 (0.0)	36 (26.9)

Infants whose mothers express breast milk receive own mother's pasteurised milk												
Yes, all babies less than 32 weeks GA	2 (22.2)	1 (12.5)	1 (25.0)	16 (72.7)	1 (7.1)	6 (27.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (7.4)	29 (21.8)
Yes, only some babies less than 32 weeks GA	0 (0.0)	0 (0.0)	0 (0.0)	1 (4.6)	3 (21.4)	6 (27.3)	0 (0.0)	1 (25.0)	0 (0.0)	0 (0.0)	0 (0.0)	11 (8.3)
No, own mother's milk is not pasteurised	7 (77.8)	7 (87.5)	3 (75.0)	5 (22.7)	10 (71.4)	10 (45.4)	2 (100.0)	3 (75.0)	17 (100.0)	4 (100.0)	25 (92.6)	93 (69.9)
Human cytomegalovirus (HCMV) serology on all mothers of VPT infants (or HCMV PCR of the milk) is required, if they express their milk												
Yes, according to GA or weight	1 (11.1)	0 (0.0)	0 (0.0)	5 (31.2)	13 (92.9)	6 (27.3)	0 (0.0)	0 (0.0)	2 (11.8)	0 (0.0)	0 (0.0)	27 (21.4)
Other criteria	0 (0.0)	0 (0.0)	0 (0.0)	3 (18.8)	0 (0.0)	5 (22.7)	0 (0.0)	0 (0.0)	1 (5.9)	0 (0.0)	0 (0.0)	9 (7.1)
No	8 (88.9)	7 (100.0)	4 (100.0)	8 (50.0)	1 (7.1)	11 (50.0)	2 (100.0)	4 (100.0)	14 (82.4)	4 (100.0)	27 (100.0)	90 (71.4)
Type of milk given to VPT infants born to HCMV-seropositive mothers, if HCMV serology performed												
	<i>n= 1</i>	<i>n= 0</i>	<i>n= 0</i>	<i>n= 8</i>	<i>n= 13</i>	<i>n= 11</i>	<i>n= 0</i>	<i>n= 0</i>	<i>n= 3</i>	<i>n= 0</i>	<i>n= 0</i>	<i>n= 36</i>
Human bank or MOM pasteurised	1 (100.0)			7 (100.0)	3 (23.1)	5 (45.4)			0 (0.0)			16 (47.1)
Frozen-thawed breast milk	0 (0.0)			0 (0.0)	4 (30.8)	4 (36.4)			1 (50.0)			9 (26.5)
Untreated fresh breast milk	0 (0.0)			0 (0.0)	0 (0.0)	1 (9.1)			0 (0.0)			1 (2.9)
Only formula	0 (0.0)			0 (0.0)	6 (46.1)	1 (9.1)			1 (50.0)			8 (23.5)
Systematic bacteriological analysis of the mother's fresh or frozen-thawed milk is performed												
Yes, for the first milk feeding	0 (0.0)	0 (0.0)	0 (0.0)	6 (28.6)	4 (28.6)	3 (13.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	13 (9.8)
Yes, every week	0 (0.0)	0 (0.0)	0 (0.0)	9 (42.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (6.8)
Another frequency	1 (11.1)	1 (12.5)	2 (50.0)	0 (0.0)	1 (7.1)	3 (13.6)	0 (0.0)	0 (0.0)	1 (5.9)	0 (0.0)	1 (3.7)	10 (7.6)

No	8 (88.9)	7 (87.5)	2 (50.0)	6 (28.6)	9 (64.3)	16 (72.7)	2 (100.0)	4 (100.0)	16 (94.1)	4 (100.0)	26 (96.3)	100 (75.8)
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GA, Gestational age; HCMV, Human cytomegalovirus; MOM, Mother's own milk; PCR, Polymerase Chain Reaction; UK, United Kingdom; VPT, Very preterm.

* Fresh breast milk corresponds to not frozen and unpasteurized milk, including refrigerated milk.

* Regions included in the EPICE study by country: Flanders in Belgium; the Eastern Region of Denmark; Estonia (entire country); Burgundy, Ilede-France and the Northern regions in France; Hesse and Saarland in Germany; Emilia-Romagna, Lazio and Marche regions in Italy; the Central and Eastern regions of The Netherlands; Wielkopolska in Poland; the Lisbon and Northern regions of Portugal; and the East Midlands, Northern and Yorkshire and Humber regions in the UK; and the Stockholm region in Sweden.

Note: Differences in the total number of units for each item are due to missing data.