Early Human Development 118 (2018) 32–36

Contents lists available at ScienceDirect

Early Human Development

journal homepage: www.elsevier.com/locate/earlhumdev

Use of pasteurised human donor milk across neonatal networks in England

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North East London (Homerton Hospital: Dr. N Aladangady; King George Hospital, Queen's Hospital: Dr. B Sharma; Newham General Hospital, North Middlesex University Hospital: Dr. L Alsford; The Royal London Hospital, Whipps Cross University Hospital: Dr. C Sullivan)

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https://doi.org/10.1016/j.earlhumdev.2018.01.017
Received 15 November 2017; Received in revised form 16 January 2018; Accepted 23 January 2018

ARTICLE INFO

Keywords:
Pasteurised human donor milk
Human milk bank
Preterm
Infant feeding
Newborn
England

ABSTRACT

Objectives: To describe the use of pasteurised human donor milk (pHDM) in England and the influence of a human milk bank in the network.
Design: Prospective observational study
Setting: All 163 neonatal units (23 networks) in England 2012–2013.
Patients: Preterm infants born at < 32 weeks gestational age (GA).
Main outcome measures: Proportion of infants and care-days fed pHDM during the first 30 postnatal days by network
Methods: We extracted daily patient-level data from the National Neonatal Research Database (NNRD). We fitted a logistic regression of pHDM exposure on the presence of a pHDM bank within the network, with GA, BW z score and network as covariates. Significance was assessed by the likelihood ratio (chi-squared) test.
Results: Data for 13,463 infants were included in the study. Across the networks, the proportion (95%CI) of infants ranged from 2.0% (1.0, 3.0) to 61.0% (57.4%, 64.6%), and the proportion of care-days in which pHDM was fed from 0.08% (0.04%, 0.10%) to 21.9% (19.9%, 24.0%). In three networks < 5%, and in seven networks > 30% of infants received any pHDM. Variation in the use of pHDM across networks remained significant after adjustment for presence of a human milk bank within the network and all covariates ($p < 0.001$).
Conclusions: Wide variation of pHDM use in England is not fully explained by presence of a pHDM bank or patient characteristics. This suggests clinical uncertainty about the use of pHDM.

1. Introduction

Preterm birth affects about one in ten pregnancies worldwide and is a leading cause of death in children under the age of five years [1]. Long-term survival has improved steadily in high-income countries and the focus of contemporary neonatal care has shifted from reducing mortality to improving long-term outcomes and optimising nutrition. Mother's own milk (MOM) confers a wide range of benefits, including improved neuro-cognitive and motor outcomes, and a reduction in sepsis. However, when MOM is unavailable, the European Society of Pediatric Gastroenterology and Nutrition, American Academy of Pediatrics and World Health Organization support the use of pasteurised human donor milk (pHDM) for preterm infants [2–4] although robust evidence of short and long-term benefits, particularly when used as a supplement to MOM, is lacking [5–8]. Earlier studies surveying UK clinicians' practices suggest wide variation in use of pHDM [9,10]. We analysed population patient-level daily data, recorded as part of a wider study [11], to describe how pHDM is used across neonatal networks in England, and investigate whether presence of a pHDM bank is an influencing factor.

2. Methods

2.1. Data source

Daily clinical data are recorded by clinical teams in the UK in a point-of-care electronic patient record (EPR). A defined data extract, the Neonatal Dataset (NHS Information Standard SCCI595) is transmitted quarterly to the Neonatal Data Analysis Unit at Imperial College London and Chelsea and Westminster NHS Foundation Trust, where patient episodes across different hospitals are linked, data are cleaned and entered into a national resource, the National Neonatal Research Database (NNRD). Contributing neonatal units (NNU) are known as the UK Neonatal Collaborative (UKNC). The NNRD is approved by the National Research Ethics Service (10/H0803/151), Confidentiality Advisory Group of the Health Research Authority (8–05(f)/2010) and the Caldicott Guardians and Lead Clinicians of contributing hospitals. Neonatal units participating in the UKNC-NEC study committed prospectively to recording a complete set of pre-specified data [11] (UK Clinical Research Network Portfolio ID 11853; National Research Ethics Service ref. 11/LO/1430).

2.2. Study population and variables

We extracted data from the NNRD on infants born below 32 weeks gestational age (GA) admitted to all 163 neonatal units in England over the complete two-year period 2012–2013. We excluded infants cared for in non-English units, without feeding data in the first two postnatal days, all infants from one tertiary NNU due to technical problems with data transfer, and those that received care in more than one network. We extracted the following variables from the NNRD: gestational age (GA) at birth, birth-weight (BW), booking network, neonatal unit on the first day of life, daily feeding data (formula, MOM, pHDM) from day of birth until day of discharge or death. Where daily feeding records were missing, we made the assumption that the infant was not given that milk.

2.3. Statistical analysis

Analyses were restricted to the first 30 postnatal days. We assessed the proportion (95% CI) of infants fed enterally and the type of feed exposure (pHDM, MOM, formula) within the first 2 postnatal days. For each network, we determined the postnatal day (median, IQR) of the first enteral feed and, where used, the first exposure to pHDM. We used two measures to evaluate pHDM use during the first 30 postnatal days by GA and network i) the proportion (95% CI) of infants fed any pHDM and ii) the proportion of care-days on which pHDM was used, classified as low (< 25%), moderate (25–50%) and high (> 50%) intensities. We fitted a logistic regression model for the outcome 'exposure to pHDM', defined as receiving pHDM on at least one of the first 30 postnatal days. We included variables considered relevant (GA, BW z score, presence of a pHDM bank in the network, and an indicator variable for each network). We assessed network variation by relating the spread of the estimates associated with the networks to the associated standard errors. As references, we arbitrarily selected one network with, and one without a pHDM bank. The significance of the parameter that represented the networks was assessed by the chi-squared test. Analyses were performed using R software [12]; p-values < 0.05 were considered as statistically significant.

3. Results

3.1. Study population

In 2012 and 2013, 14,678 infants < 32 weeks GA were admitted to