Inequities Among Hospital Donor Human Milk Access

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Abstract

Objective

Donor human milk (DHM) can provide nutritional benefits to neonates. This study examines access to DHM and how structural barriers may exacerbate inequities.

Study Design

The median test and ANOVA test were used to compare the distribution maternal race/ethnicity and insurance status variables with DHM access for California NICUs in 2021.

Result

Across 124 NICUs, those serving a higher percentage of white families were more likely to have access to DHM (p = 0.04). NICUs with a higher percentage of Hispanic families were less likely to have access to DHM (p = 0.03). Hospitals that had higher proportions of uninsured patients were also less likely to have access to DHM (p = 0.015).

Conclusion

Inequities in DHM access and use among NICU infants begin at the structural level. Policies that reduce barriers to DHM access may reduce health inequities for Hispanic and uninsured families.

Introduction

Human milk should be the primary source of nutrition for preterm infants, as mother's own milk (MOM) contains many nutrients and bioactive components associated with improved preterm health outcomes [1]. Additionally, preterm MOM contains higher concentrations of proteins, growth factors, and metabolic hormones, specifically in colostrum, compared to mature MOM [1, 2]. However, mothers of preterm babies can face biological barriers to milk production due to inadequate mammary development as a result of early delivery [3].

In the case that MOM is not available or is contraindicated due to maternal illness [4] or medications [5], the American Academy of Pediatrics (AAP) recommends feeding the infant pasteurized donor human milk (DHM) [6]. Despite the well-documented health benefits of human milk for very low birth weight (VLBW) infants, including decreased risk of necrotizing enterocolitis [7], bronchopulmonary dysplasia [8], urinary tract infections [9], and sepsis [10]⁻[11], many VLBW infants are not being fed human milk as measured at discharge from the NICU hospitalization [12]. DHM, usually obtained from term mothers and received by preterm infants, may contain different bioactive and nutritional properties compared to MOM due to factors including shelf life, processing, storage in a freezer, mammary gland maturity, and stage of lactation [2, 13]. However, when MOM is unavailable, DHM is the next best alternative for preterm infants [14]. Research from California (CA) hospitals demonstrated that access to DHM is associated with a 10% increase in breastfeeding rates [15]. Additionally, it has been found that DHM access is not associated with decrease in MOM provision during the infant's hospitalization [16].

Yet racial and ethnic gaps in rates of both MOM and DHM feedings exist. Black VLBW infants receive less MOM compared to non-Black VLBW infants [1]. Similarly, DHM use is lower among infants born to Black and Hispanic mothers compared to infants born to non-Hispanic White mothers [17]. Much of the current literature examines human milk

inequities at the time of discharge [18, 19]; however, not much is known about inequities that may exist around access to DHM at the hospital level. In order to gain access to DHM, California hospitals need to be licensed in handling, storing, and preparing DHM, following similar guidelines to other human tissue banking [20]. Due to the need for a milk bank supplier, increased costs for personnel training, and DHM product maintenance, some hospitals choose not to acquire DHM licensure despite the potential for cost savings by reducing NEC rates [21]. DHM provided by milk banks are often not reimbursed by health insurance companies [22]. Since hospitals would need to find a source of funding or cover these costs themselves, they may be less inclined to offer DHM to their patients. Hospitals that are more likely to have access to DHM include Level 3 and Level 4 facilities and those that are designated as 'Baby Friendly' [23]. At the national level, safety net hospitals, which serve a higher percentage of patients with Medicaid, are less likely to have access to DHM [24, 25]. Both the United States Surgeon General and the American Academy of Pediatrics have called for improvements in equitable access to and the affordability of DHM [26, 27]

We examined access to DHM at the hospital level among California NICUs to evaluate whether equitable access exists along racial, ethnic, or insurance lines. Our aim was to understand potential drivers of decreased overall human milk use among marginalized populations, specifically DHM, with the broader goal of decreasing health disparities among NICU infants. Throughout this paper, the authors often use the term MOM as this was the term most commonly used in the literature referenced. The authors recognize that not every lactating person refers to themselves as "mother" and hope to build a more inclusive body of research that celebrates patient- centered care for all bodies.

Methods

The California Perinatal Quality Care Collaborative (CPQCC) collects data from over 90% of NICUs in California, representing > 95% of VLBW births. Definitions of variables collected by CPQCC overlap with and are aligned with those of the Vermont Oxford Network. The Mothers' Milk Bank of San José (MMB) supplies DHM to the majority of NICUs in California. Data were collected using both MBB records and surveys to CPQCC member hospital on whether NICUs had access to DHM in 2021. Data on the use of DHM in the NICU were collected from the MMB for 80 of the 138 CPQCC member hospitals. For the remaining 58 CPQCC member hospitals for whom MMB did not have any data, a survey was sent to NICU Medical Directors to assess the use of DHM in their units. Fourteen did not respond yielding a 10% unknown rate.

Maternal Race/Ethnicity

Access to DHM data were stratified by maternal race/ethnicity rates using CPQCC data averaged from 2016 to 2020 (most recent complete data). Data are collected for all VLBW infants, those born between 22 weeks, 0 days and 31 weeks, 6 days of gestation or having birthweight between 401–1500 grams. Additionally, older infants with birth weights > 1,500 grams were eligible for entry into the CPQCC database according if meeting one of the following criteria when admitted to the NICU: death, acute transport into/out of the NICU, noninvasive ventilation for more than four continuous hours, intubated assisted ventilation for greater than four continuous hours, early bacterial sepsis, major surgery requiring anesthesia, previously discharged home and then readmitted for a total serum bilirubin of greater than or equal to 25 mg/dl, suspected encephalopathy or perinatal asphyxia, active therapeutic hypothermia, or seizures. Maternal race/ethnicity was categorized as Black, Hispanic, White, Asian or Pacific Islander, Native American, and Other.

Insurance

Access to DHM data were also stratified by delivery insurance among CA births, according to CA Department of Health Care Access and Information (HCAI) data averaged from 2014 to 2018 (most recent complete data at that time). Delivery insurance was categorized as *Private, Public*, and *Uninsured.*

Statistical Analysis

Statistical analyses comparing hospital distribution of sociodemographic variables with DHM accessibility were performed. All statistical analyses were performed using SAS version 9.4 (SAS Institute Inc, Cary, NC). The median test and the Analysis of Variance (ANOVA) test were used to determine if there were any statistically significant differences between the groups in both the maternal race/ethnicity category and between the groups in the delivery insurance category. For both tests, a probability value < 0.05 was considered statistically significant.

Results

In total, data from 124 hospitals were collected on whether NICUs had access to DHM in 2021. Out of 124 hospitals for whom data were available, 80 (64.5%) received DHM from the MMB with 72 (58%) using the MMB as their only source of DHM and 8 (6%) using DHM from the MMB along with another source. Twenty-two (17.7%) of the hospitals received DHM from other sources excluding the MMB; 102 of the 124 (82.3%) of the NICUs for which we had data had access to DHM use.

Maternal Race/Ethnicity:

The ANOVA test was used to compare the distribution of sociodemographic variables according to CPQCC data with DHM accessibility.

Data on maternal race and ethnicity (averaged from 2016 to 2020) found that 46.2% of mothers identified as Hispanic, 29% as white Non-Hispanic, 9.4% as Black, 11.6% as Asian or Pacific Islander, 0.3% as Native American, and 2.6% as Other [Table 1].

Table 1
Maternal race among CPQCC 2016–2020
NICU infants

Maternal Race	Frequency # (%)
Unknown	718 (0.9)
Black	7125 (9.4)
Hispanic	35098 (46.2)
White	22075 (29.0)
Asian/Pacific Islander	8792 (11.6)
Native American	229 (0.3)
Other	1968 (2.6)

NICUs with a higher percentage of white maternal race were more likely to have access to DHM (p = 0.04, ANOVA). NICUs with a higher percentage of Hispanic maternal ethnicity were less likely to have access to DHM (p = 0.03, ANOVA). There was no significant difference noted for other racial / ethnic groups [Figure 1].

Insurance Status:

There were 8 hospitals with missing insurance data, leaving 116 hospitals in the analytic cohort. From 2014 to 2018, 47.7% of families had private insurance, 44.4% had public/government insurance (MediCAL), 4% were uninsured, 1% were designated "Other", and 2.8% were missing [Table 2].

Table 2
Delivery insurance among OSHPD 2014–2018 CA births.

Payer	Frequency # (%)
Private Insurance	1191266 (47.7)
Public/Government	1106911 (44.4)
Uninsured	100604 (4.0)
Other	27443 (1.1)
Unknown	69481 (2.8)

Access to DHM among hospitals with more private (p = 0.115) or public/government insured patients (p = 0.236) was similar (median test). Hospitals with more uninsured patients were less likely to have access to DHM (p = 0.015) [Figure 2]; however, these numbers represent only 4% of the population for the years examined.

Discussion

We explored the racial, ethnic, and economic factors that might be involved in hospital level access to DHM. Despite the data and recommendations supporting the use of DHM for prematurely born infants when MOM is not available, this important nutritional support is not available for many of these infants in the US. Many factors may contribute to this gap. Previously, research examining DHM use in California NICUs found that although access was increasing in Regional Centers, many hospitals still did not have DHM available [22].

Our data show that infants in NICUs with a higher proportion of white mothers have a greater likelihood of DHM access, while the likelihood of having access to DHM is less for those in hospitals with a higher proportion of Hispanic mothers. Of note, there are racial trends in NEC, with some data indicating that Hispanic infants are at greater risk [28]. Although much of the prior research discusses the racial and ethnic inequities in DHM use [1, 17], this research indicates there may be more structural barriers by inequities in access. Further, hospitals with more uninsured patients are also less likely to have DHM available for NICU patients.

The limitations of this research include missing data on DHM access for 10% of CPQCC hospitals which may impact the results. Another limitation was the year for most recent data available for each variable (DHM access, race/ethnicity, and insurance). DHM access data are based on 2021 information, while race/ethnicity data represent the average from 2016–2020 data, and insurance data is from 2014–2018 as this was the most recent data available. Averaging the rates across 5 years should limit any significant discrepancies, but this is worth noting.

While exploring the specific reasons behind poor DHM access was not within the scope of this research, it is plausible that financial issues are a reason for these inequities. Others have shown similar trends suggesting that the availability of DHM is negatively impacted by its cost [23, 24, 29]. Though small in number among the cohort used in this research, the lowest availability of DHM was for infants in units with more uninsured patients, implying a role for financial constraints. While California has covered the use of DHM through MediCAL since 1998, it is only is specific situations and there are still additional costs associated with providing DHM that the hospital incurs such as milk storage, preparation time, and licensing [30]. Many reports indicate that the use of DHM lowers overall medical costs in the long run [10, 11, 17, 20, 29, 31]. However, financially constrained institutions might feel required to respond to short-term direct costs rather than long-term cost savings [32]. In some reports, the use of DHM in the NICU actually increased the likelihood of babies discharged on MOM [22, 24].

Inequities in DHM access and use for NICU infants, specifically Hispanic and uninsured families, begin at the structural level. Policies that reduce the barriers to DHM licensure and management and which consequently increase patient access to DHM may lead to better health outcomes for NICU infants [30, 33]. Funds should be made available to hospitals to make DHM access possible and increase provision of this important, evidence-based source of nutrition for vulnerable infants.

Declarations

Contributors Statement Page

Caroline Toney-Noland conceptualized and designed the study, designed the data collection instruments, drafted the initial manuscript, and critically reviewed and revised the manuscript.

Dr. Ronald S. Cohen drafted the initial manuscript and critically reviewed and revised the manuscript.

Lenae Joe drafted the initial manuscript, and critically reviewed and revised the manuscript.

Peiyi Kan collected data and carried out the data analysis.

Dr. Henry C. Lee conceptualized and designed the study, and critically reviewed and revised the manuscript.

All authors approved the final manuscript as submitted and agree to be accountable for all aspects of the work.

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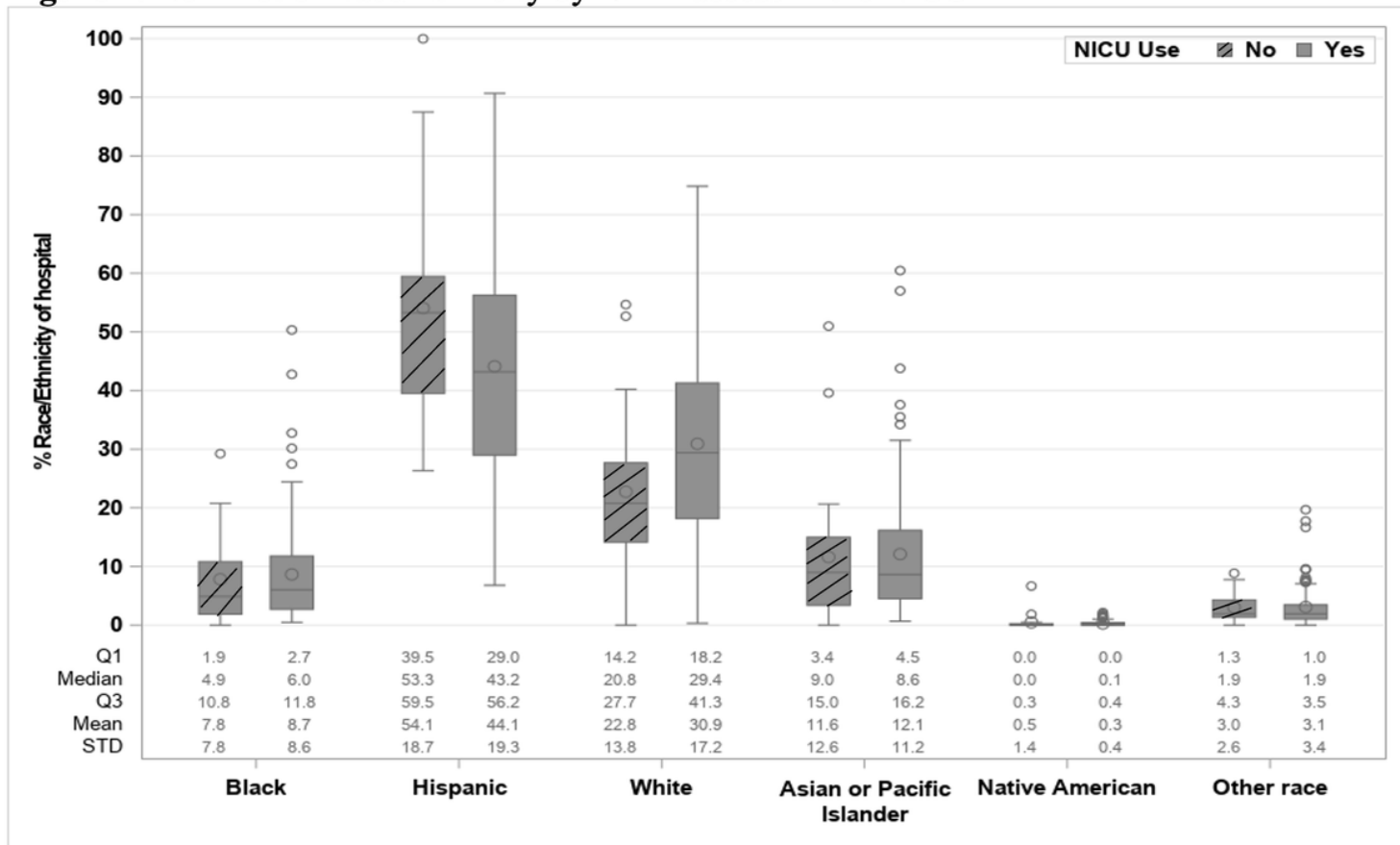5. Hale T, Rowe H. Medications and Mothers' Milk. New York, New York: Springer; 2017.

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Figures

Figure 1: Box Plot of Race/Ethnicity by DHM access in the NICU

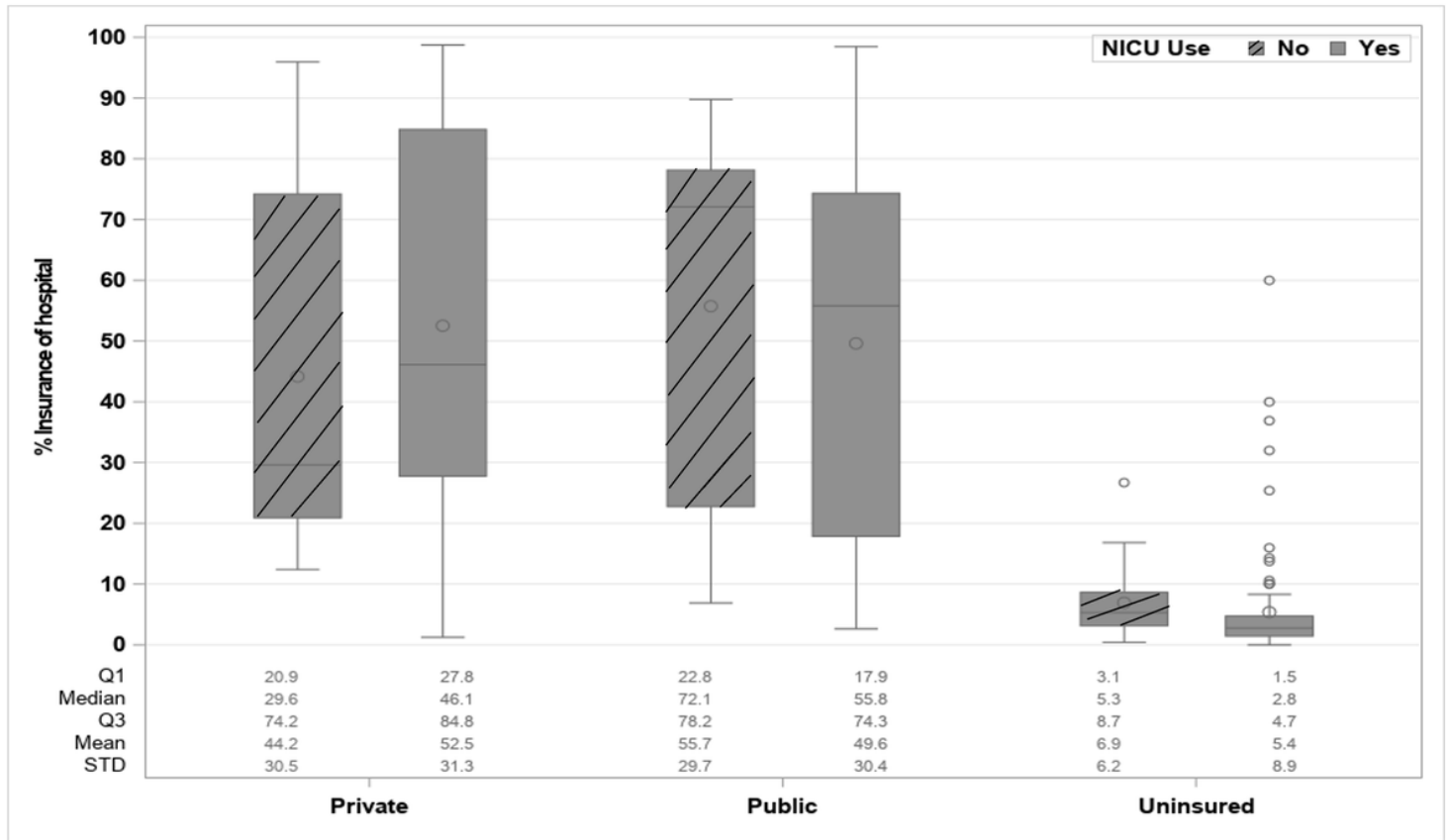|	Black		Hispanic		White		Asian or Pacific Islander		Native American		Other race	
Q1	1.9	2.7	39.5	29.0	14.2	18.2	3.4	4.5	0.0	0.0	1.3	1.0
Median	4.9	6.0	53.3	43.2	20.8	29.4	9.0	8.6	0.0	0.1	1.9	1.9
Q3	10.8	11.8	59.5	56.2	27.7	41.3	15.0	16.2	0.3	0.4	4.3	3.5
Mean	7.8	8.7	54.1	44.1	22.8	30.9	11.6	12.1	0.5	0.3	3.0	3.1
STD	7.8	8.6	18.7	19.3	13.8	17.2	12.6	11.2	1.4	0.4	2.6	3.4

Figure 1: Box Plot of Race/Ethnicity by DHM access in the NICU illustrating differences in access according to maternal race and ethnicity for California hospitals.

Figure 1

See image above for figure legend

Figure 2: Box Plot of Insurance Status by DHM access in the NICU

	Private		Public		Uninsured	
Q1	20.9	27.8	22.8	17.9	3.1	1.5
Median	29.6	46.1	72.1	55.8	5.3	2.8
Q3	74.2	84.8	78.2	74.3	8.7	4.7
Mean	44.2	52.5	55.7	49.6	6.9	5.4
STD	30.5	31.3	29.7	30.4	6.2	8.9

Figure 2: Box Plot of Insurance Status by DHM access in the NICU illustrating differences in access according to insurance status for California hospitals.

Figure 2

See image above for figure legend