



National Pediatric Cardiology
Quality Improvement Collaborative

Research Explained

Patterns of Breastfeeding and Human Milk Feeding in Infants with Single Ventricle Congenital Heart Disease: A Population Study of the NPC-QIC Registry

Elgersma KM, Spatz DL, Fulkerson JA, Wolfson J, Georgieff MK, Looman WS, Shah KM, Uzark K, McKechnie AC. *Breastfeed Med.* 2023 Apr;18(4):315-325 doi: [10.1089/bfm.2023.0036](https://doi.org/10.1089/bfm.2023.0036)

Kristin Elgersma (PhD) and Richard James (parent)

ABOUT THIS STUDY

Why is this study important?

- Human milk and direct breastfeeding (BF) are the ideal nutrition for both hospitalized and healthy infants.
- Human milk/BF may be especially important for infants with single ventricle congenital heart disease (CHD), as they protect against diseases like necrotizing enterocolitis and improve neurodevelopment for hospitalized babies.
- There have not been very many studies about human milk/BF for infants with single ventricle CHD.
- This study reports rates of human milk and BF for infants with single ventricle CHD who received care at NPC-QIC sites.
- This study also looked at whether infants who are directly BF at stage 1 discharge are more likely to still be receiving human milk (by any route) at stage 2 palliation.
- This is the largest study yet about human milk/BF for infants with any type of CHD.
- A large study like this one helps us understand current human milk/BF practices across the US and suggests areas for improvement.

How was this study performed?

- This study analyzed data from the NPC-QIC registry, including infants with single ventricle CHD from 2016–2021.

- Infants were included if they completed stage 1 palliation.
- The rates (%) of feeding types were calculated, including:
 - Any human milk feeding
 - Exclusive human milk feeding
 - Any direct BF
 - Exclusive BF
- These rates were calculated at 4 time points:
 - 1) Preoperatively at stage 1 palliation
 - 2) At stage 1 palliation discharge
 - 3) At stage 2 palliation
 - 4) At stage 2 palliation discharge
- Infants who were directly BF at stage 1 discharge were compared with infants who were not BF at stage 1 palliation discharge, to see whether they were more likely to still be receiving human milk at stage 2 palliation.
 - The analysis took into account many things that impact human milk and BF practices, like socioeconomic factors and whether the infant had postoperative complications.

What were the results of the study?

- This study included 2491 infants from 68 NPC-QIC sites.
- The prevalence of human milk feeding and direct BF was low and declined over time.
 - Only 57.8% of infants were fed before stage 1 palliation.
 - Of these infants, 85.7% received at least some human milk. This is similar to rates of all infants born in the US.
 - Only 27.8% of these infants were directly breastfed.
 - Including all 2491 infants before stage 1 palliation (even those who were not fed):
 - 49.3% received any human milk
 - 41.5% received exclusive human milk
 - 16.7% were directly breastfed
 - 7.9% were exclusively directly breastfed
 - By stage 2 palliation (at ~5 months old), human milk and BF rates were much lower than global and national recommendations. For 1849 infants:
 - 37.1% were still receiving any human milk
 - 7.0% were receiving exclusive human milk
 - 9.4% were directly breastfed
 - 2.1% were exclusively directly breastfed
- Human milk/BF rates varied widely across NPC-QIC sites. For example:
 - At some sites 0% of infants received human milk during the stage 1 hospitalization. At other sites, 100% of infants received at least some human milk during this time.

- Similarly, at some sites, 0% of infants were directly BF during the stage 1 hospitalization, compared to other sites where 100% of infants directly BF at stage 1 discharge.
- There were certain NPC-QIC sites that had consistently high human milk and BF rates.
- Variation in human milk/BF rates didn't seem to be related to NPC-QIC site size.
- Infants who were directly BF at stage 1 discharge were over 4 times more likely to still be getting human milk at the stage 2 surgery.

What were the limitations of the study?

- In a large registry like the NPC-QIC data set, it is always possible that there were mistakes in the data entry or inconsistencies in how different sites record information.
- It was not possible to determine which infants were physiologically incapable of direct BF.
- There was no information about how much human milk or BF infants received. An infant in the “any human milk” group could have gotten almost all of their nutrition from human milk, or almost all of their nutrition from commercial formula.
- Non-nutritive BF (practice sucking at the breast) was not recorded.
- Oral care with colostrum (immunotherapy) was not recorded.
- Feeding practices were recorded by the healthcare team based on the medical record; however, actual feeding practices at home could have differed.

What it all means

- Infants with single ventricle CHD experience extremely low rates of human milk and direct BF.
- The variation in human milk/BF rates across NPC-QIC sites indicates that there are things that hospitals can do to better support human milk/BF for these infants and their families.
 - There are hospital practices that help increase human milk/BF rates for preterm infants, but these practices have not been well tested in infants with CHD.
- This is the first study to show that infants who are directly BF at stage 1 discharge are more likely to still be getting human milk at the stage 2 palliation.
 - This is similar to previous studies with preterm infants.
 - In previous studies, parents have talked about the burden of having to pump human milk for a long time without being able to directly BF.
- It is important for hospitals and healthcare teams to improve direct BF support for infants with single ventricle CHD during the stage 1 hospitalization.
- Increasing stage 1 hospitalization direct BF rates could give more infants exposure to the protective benefits of human milk throughout the first 6 months of life.