Evaluating High Human Milk vs. Low Human Milk Diets in Preterm Infants Using Digital Tools

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BACKGROUND

- Human milk is the best source of nutrition for preterm infants, conferring short and long-term health benefits
- It is a complex mixture that promotes the growth and development of the infant and their immune system
- It is difficult to evaluate a high human milk vs low human milk diet and the correlated outcomes given the variable availability of human milk at each individual feed
- Electronic health records (EHR) represent a large quantity of feeding data for individual infants that are difficult to access and analyze

PURPOSE AND HYPOTHESIS

- Develop a digital tool that can quickly and easily extract feeding and nutrition data from the electronic health record (EHR)
- Utilize this digital tool to acquire nutritional data from the EHR and apply it to a proprietary nutrition IQ framework
- Evaluate outcomes associated with feeding differences including growth metrics and adherence to enteral feeding protocols
- Provide accessible, evidence-based information that can promote change and improve long-term health benefits for preterm infants

MATERIALS AND METHODS

- EHR data was extracted using secure Fast Healthcare Interoperability Resources Application Programming Interfaces (FHIR APIs), a standard for exchanging private health information
- Inclusion criteria included infants admitted to the NICU by day-of-life 3 and <33 weeks gestation that were subsequently discharged from the NICU
- 273 infants were identified and divided into three cohorts based on the percentage of their enteral diet that came from human milk
- A proprietary nutrition IQ framework was applied to this data to interpret and evaluate desired outcomes

META DATA: COMPREHENSIVE/QUALITY

Total infant Count = 273	Percent Human Milk Diet Outcomes			
	High HM Diet	Mid HM Diet	Low HM Diet	High vs Low p values
# of Infants	132	119	22	
Mean GA @ Birth	29 3/7	29 0/7	29 6/7	
First Enteral Feed (# days)	5.1	4.9	7.9	0.124089
First Fortification (# days)	15.7	14.5	36.2	0.000104*
First Full Feed (# days)	17.0	18.8	27.8	0.011416*
Return to Birthweight (# days)	11.5	13.8	12.5	0.490969
Avg Growth Velocity (g/kg/day)	13.1	12.2	10.1	0.000125*
Protocol Compliance	55%	55%	24%	1.93E-08*
PN Days	19.4	25.2	46.2	0.000054*
Length of Stay	59.5	89.4	154.0	5.77E-09*
Birth to D/C weight z-score delta	-1.1	-1.1	-1.0	0.546852

RESULTS

- Cohort 1: >75% human milk (132), Cohort 2: 15-75% human milk (119), Cohort 3: <15% human milk (22)

- Comparing cohort 1 to cohort 3 showed improvement in earlier initiation of enteral feeding and return to birthweight
- Cohort 1 demonstrated clinically and statistically significant:
  - Increased growth velocity
  - Decrease in days to fortification
  - Decrease in days to first full feed
  - Better adherence to feeding protocols
- Days on parenteral nutrition, central line days, and length of stay were less in cohort 1 than cohort 3.
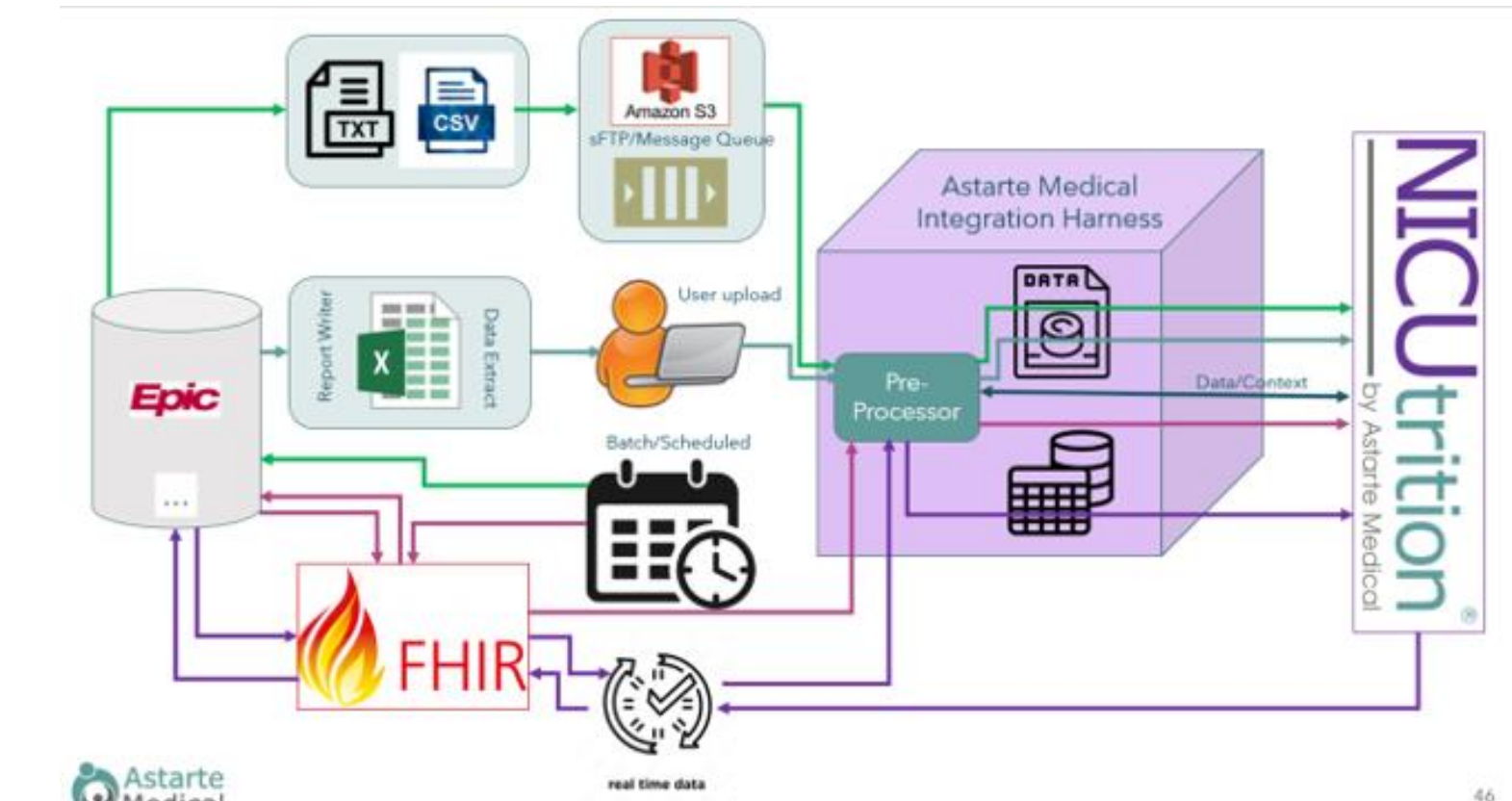
CONCLUSIONS

- The improvements seen in cohort 1 are most likely associated with improved feeding tolerance and lower occurrence of adverse events
- Low human milk diets had substantially longer hospitalizations likely due to the occurrence of comorbidities that occur less frequently in a high human milk diet.
- Applying this nutrition framework to existing data affords the opportunity to quickly analyze large quantities of data and promote necessary changes to feeding protocols
- Further investigation on the optimal dose, length of exposure, and source of human milk would be beneficial for improving understanding of preterm infant needs