Ironing Out the Details: Early Detection and Treatment of Iron Deficiency in a Level 4 NICU

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Background

- Iron plays a key role in multiple metabolic functions within the body.
- Risk factors for iron deficiency (ID) in patients in a Neonatal Intensive Care Unit (NICU) may include prematurity, low birth weight (LBW), growth restriction, maternal obesity, c-section birth and frequent phlebotomy.
- ID that occurs during critical periods of brain development may lead to permanent changes to the brain's structure and function which appear to be irreversible despite later supplementation.
- Neurological consequences of ID in infancy can include delayed nerve conduction, disrupted sleep patterns, impaired memory, motor deficits and lower global development scores.

Practice Problem

- Currently, in one 47-bed Level 4 NICU, no standardized method exists for identifying and treating ID in preterm or LBW infants.
- Common practice has been to increase iron supplementation from baseline once hematocrit levels began to trend below 30%.

Purpose

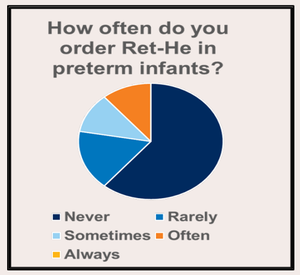
The purpose of this EBP project was to explore evidence to create a guideline for monitoring and treating ID in preterm and LBW infants in a Level 4 NICU.

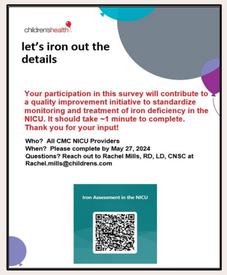
PICO(T) Question

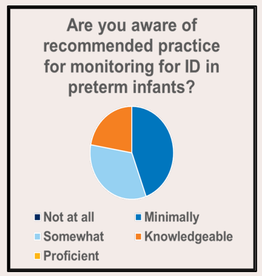
Will monitoring reticulocyte hemoglobin levels (Ret-He) coupled with a standardized guideline improve early detection and treatment of ID in preterm and LBW infants in a level 4 NICU?

Provider Iron Deficiency Knowledge Survey

- A survey was distributed to NICU providers to assess their baseline knowledge of monitoring and treating ID.
- 19 providers responded.
- Providers report never or rarely monitoring Ret-He in preterm and LBW infants.
- There was a lack of consensus on how to monitor for ID in preterm and LBW infants.







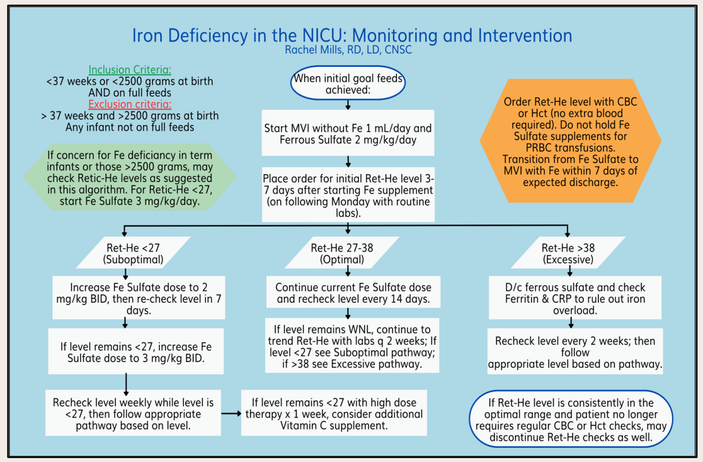
Benchmarking

- A survey was posted on a NICU dietitian social media group (nation-wide) to assess use of Ret-He as an indicator of ID.
- 6 questions were asked. 31 dietitians responded.
- 45% of respondents had a standardized method for monitoring for ID.

42% utilized Ret-He to monitor for ID.

Literature/Evidence

- A comprehensive review of literature regarding detection and treatment of ID in preterm and LBW infants was completed utilizing PubMed database. 34 articles reviewed.
- Over-reliance on hemoglobin and hematocrit for diagnosing ID is common.
- The brain loses iron before the red blood cells; therefore, the practice of screening for ID by assessing hemoglobin and hematocrit should be reconsidered.
- Ret-He provides a snapshot of iron directly available for hemoglobin synthesis and is an early indicator of the body's iron status.
- The American Academy of Pediatrics states that a low Ret-He level is the strongest predictor of ID in children.



Pilot/Testing Phase

- An algorithm was created to provide guidelines for monitoring and treating ID based on Ret-He levels.
- Education was provided to healthcare providers and dietitians on the use of the algorithm.
- The algorithm was piloted for 7 weeks.
- 32 patients met inclusion criteria. 94% (30) of these patients had at least 1 Ret-He level during their hospital admission.
- Prior to the pilot, Ret-He was not ordered in the NICU. Ret-He was ordered 70 times during the pilot period.

Results & Clinical Implications

- 6 occurrences of a low Ret-He level (ID) with hematocrit >30% were identified, indicating ID in these patients. The patients received adjusted iron dosage per the algorithm.
- Use of the algorithm proved beneficial in early detection of ID in infants that might not otherwise have been recognized until later by traditional hematological biomarkers.
- Published work, benchmark data; & pilot results support use of a standardized guideline & Ret-He levels to detect and treat ID in preterm and LBW infants.
- Ongoing monitoring needed to validate algorithm.

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Scan for References