INCREASING TESTING FOR THYROID DYSFUNCTION IN NEONATES POST IODINE EXPOSURE

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Team members

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Introduction

- Thyroid hormone is critical for normal neurocognitive development in neonates.
- Excessive exposure to iodine can cause thyroid dysfunction through Wolff-Chaikoff effect.
- Transient hypothyroidism can cause adverse neurodevelopmental outcomes.
- Although there have been reports of hypothyroidism after iodine exposure, there are no guidelines to screen such neonates.
Aim

- Goble aim: To achieve uniform screening of thyroid dysfunction after iodine exposure and identify infants who develop hypothyroidism.

- Aim: To achieve 80% thyroid function screening 7-10 days post-iodine exposure in neonates at the East Carolina University Health Medical Center Neonatal Intensive Care Unit over 12 months.

- We defined iodine exposed neonates as neonates who had undergone surgery or have had any exposure to iodine contrast.
Fishbone Diagram

**Cause:** Our unit had one patient with hypothyroidism post-surgery when they had prior normal thyroid function

- Provider training and education
- Providers buy-in and encouragement of screening
- Endocrine input

**Aim statement:** To increase detection of thyroid dysfunction after surgery due to iodine exposure in neonates from 0 to 80% within 12 months

**Materials**
- Known case reports of hypothyroidism with iodine exposure

**Process**
- Lack of guideline and screening protocol
- Lack of substantial literature on subject guiding new recommendations
- No protocol for escalation/communication to endocrine team
- No order sets

**Environment**
- Rotating residents learning new guidelines
- Variable exposure rates month to month
Project Aim

Achieve 80% thyroid function screening 7-10 days post iodine exposure in neonates at ECU Health Neonatal Intensive Care Unit and Special Care Nursery, over 12 months beginning from 08/01/2022.

Primary Drivers

- Known potential neurodevelopmental delay due to hypothyroidism
- No guidelines regarding thyroid testing of neonates post iodine exposure

Secondary Drivers

- Lack of order sets
- Variable exposure month to month
- Lack of guidelines when to test after exposure

Change Ideas

- Staff education regarding excessive iodine exposure and hypothyroidism
- Create order sets
- Create testing algorithm
- Endocrinology input regarding guidelines
Guideline

Post exposure to Surgery and iodine contrast patients: Obtain TSH and Free T4 at 7-10 days post exposure and consult if meet consult criteria or repeat every 2 weeks if borderline

Surgery: Infants undergoing surgery are at risk for iodine-induced thyroid dysfunction. Sudden exposure to excess serum iodine diminishes biosynthesis through Wolff-Chaikoff effect. It is currently unknown how much betadine is absorbed during a surgery.

Iodine contrasts: Current FDA recommendation is to check children <3 after IV exposure. Due to high iodine exposure and unknown absorption we will check post IV, oral, urethral, and rectal iodine containing contrast exposure

- Iohexol (Omnipaque, both IV and PO/PR use; iodine content = 300 mg/mL)
- Iothalamate meglumine (Cysto-conray; both urethral and rectal; iodine content = 81 mg/mL)
- Example of amount of exposure: 1.5 kg baby is given 4 mL of omnipaque for a contrast enema, this would contain 800mg/kg of iodine
Methods

- We identify iodine-exposed patients from pediatric surgery operation lists and pharmacy.
- We collect data on the tests ordered post-exposure, timing of the tests and adherence to the screening algorithm.
- We analyzed results in groups of five patients due to the variability in the number of patients exposed to iodine in any given period.
Methods

- Our outcome measures include the percentage of patients screened post-iodine exposure and the percentage of patients with abnormal thyroid labs (defined as TSH > 5 mIU/L).

- Our process measure is the percentage of cases in which the screening algorithm was adhered to.

- Our balancing measure is the percentage of patients with more than three thyroid function screening tests without any intervention.
PDSA cycles

- In the first PDSA cycle screening algorithm was disseminated to providers and staff via email and reminders posted in provider’s workrooms.

- In the second PDSA cycle providers were asked to create iodine exposure as problem list in the electronic health record (EHR) that serves as a reminder to order thyroid labs.
% Thyroid Function Test (TFT) Checked Post Iodine Exposure

Start of PDSA cycle 2

Patient group (each group is 5 patients)
Results

- To date, three neonates who were initially euthyroid, developed hypothyroidism post-iodine exposure and are being treated with L-thyroxine.

- To date there are no neonates who have had more than three thyroid function tests without starting treatment.

- Since implementing the problem list 60% have the problem listed.
Discussion

- Neonates are at risk for thyroid dysfunction post-iodine exposure. Without this project, we would have missed 3 such neonates.

- We have found that infants being carried by residents need more reminders due to being unfamiliar with the unit guidelines. Another challenge occurs when there are months with less iodine exposure, providers often forget to obtain thyroid function tests after exposure.

- In order to mitigate such problems, we plan to implement universal order sets to link common iodine contrast procedures with thyroid function test for the next PDSA cycle.

- Future study: To explore the relationship between neonatal characteristics, amount of iodine exposure and development of hypothyroidism.
Thank you

Questions?