Prevention and Treatment of Anemia in premature and/or SGA Infants with Prolonged NPO status

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Introduction:

Treatment with an erythropoiesis-stimulating agent (ESA), often in conjunction with intravenous iron supplementation, constitutes the standard of care for correction of anemia. Erythropoietin (EPO) stimulates erythropoiesis and decreases red blood cell transfusion in preterm infants.

Purpose: Stimulate red cell production and decrease need for packed red blood cell transfusions in premature and/or SGA infants with prolonged NPO status.

Benefits of EPO/ESA:

- ✓ Early dosing reduces pRBC transfusions → Avoids further inflammation from blood transfusions.
- ✓ Neuroprotective effects in animals and possibly infants.
- ✓ Protective against NEC in VLBW infants with increased migration and injury protection in cultured intestinal cells.
- ✓ Improve intestinal villous surface area in cell cultures and animals, something beneficial in gastroschisis patients who experience postoperative intestinal hypoperistalsis, malabsorption, and shortened bowel length.
- ✓ Close monitoring of iron status is needed for EPO/ESA-treated infants. Plasma **ferritin** values of **70-100 mcg/L** are cutoff values in premature infants.

Primary Prevention:

- ✓ Delayed cord **clamping for 1-2 minutes** if clinical condition allows for surgical patients. Exceptions if abruption, or extremely poorly controlled diabetes
- ✓ Minimize phlebotomy losses (use ABL point of care if possible)

Secondary Prevention:

- ✓ Monitor Hemoglobin/Hematocrit and ferritin every 1-2 weeks on ABL
- ✓ Check Ferritin, CRP, reticulocyte count, hemoglobin, and hematocrit at 28 days before immunizations.
- ✓ Early Iron supplementation.
- ✓ Treating with erythropoietic doses of EPO/ESA.

Management:

EPO treatment:

- ✓ Start EPO at 14 days of life in all infants <36 weeks with prolonged NPO status. Continue through 35 weeks and can prolong up to 38 weeks CGA if hematocrit <28 or Hb <9g/dL and on oxygen/vent support.
- ✓ Route SQ/IV.
- ✓ Epoetin alfa can be administered as either IV or subcutaneous. It is considered compatible at the y-site so would not have to interrupt TPN for administering.
- ✓ Starting dose: 250-300/Kg 3 times per week so 750-1000/Kg/Wk

- ✓ Continue current dose if the Hb is stable within the target range
- ✓ Dose adjustments: (see figure 1)
    - If Hb does not increase by 1g/dL after 4 weeks of treatment: Increase EPO dose by 25%. Do not increase the dose more frequently than once every 4 weeks.
    - If Hb increases >1g/dL in any 2-week period: Reduce dose by 25%. No dose reduction restrictions.
    - Hold EPO if suspicion of infection.
    - Hold the dose if hematocrit >45.

Do not hold EPO after blood transfusion if anemia related from phlebotomy losses, anemia of prematurity or bleeding.

<u>IV iron sucrose therapy</u>:

- ✓ If anticipate infant will be NPO for more than 2 weeks, start IV iron at **14 days** of life.
    - Start dose of 3mg/Kg of IV iron sucrose to run over 4 hours once per week for 2 weeks. Based on tolerance may run over 1 hour.
    - Repeat doses based on algorithm.
    - If complications from IV iron infusion such as tachycardia, tachypnea, changes in blood pressures. (See figure 2)
    - **Target Ferritin 70-100.**
    - Withhold IV iron infusion after blood transfusion for 2 weeks.
    - Hold on IV iron if infection.

<u>Reticulocyte Hemoglobin</u>:

- ✓ Reticulocyte hemoglobin (Ret-Hb) provides information about the availability of iron for hemoglobin synthesis in the days immediately preceding the specimen collection.
- ✓ It has shown to be an early indicator of iron-restricted erythropoiesis.
- ✓ It remains the same in reticulocytes from the time they enter the blood until they are senescent and removed from the circulation
- ✓ Ret-Hb has advantage over serum ferritin as it is run as part of the CBC and does not require additional phlebotomy.

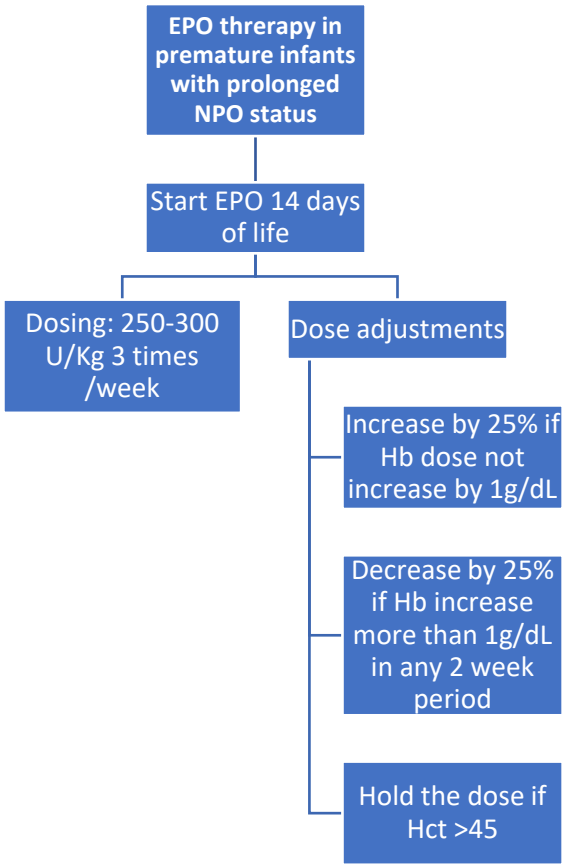
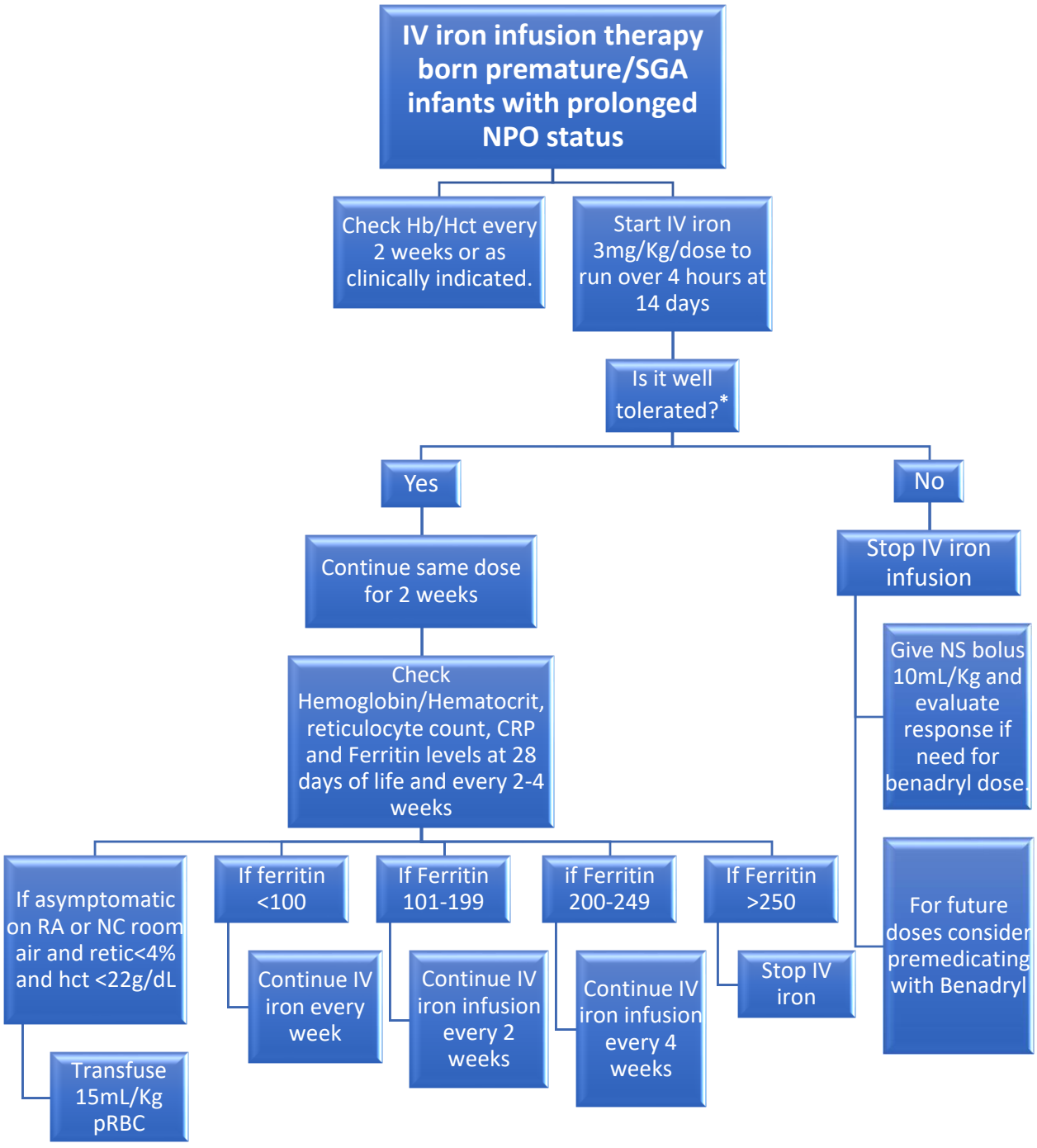


Figure 1: Algorithm for EPO use and dose adjustment



* Presence of Tachypnea, Tachycardia, rash, changes in blood pressures.

Figure 2: IV iron sucrose infusion algorithm and dose adjustments based on Ferritin values

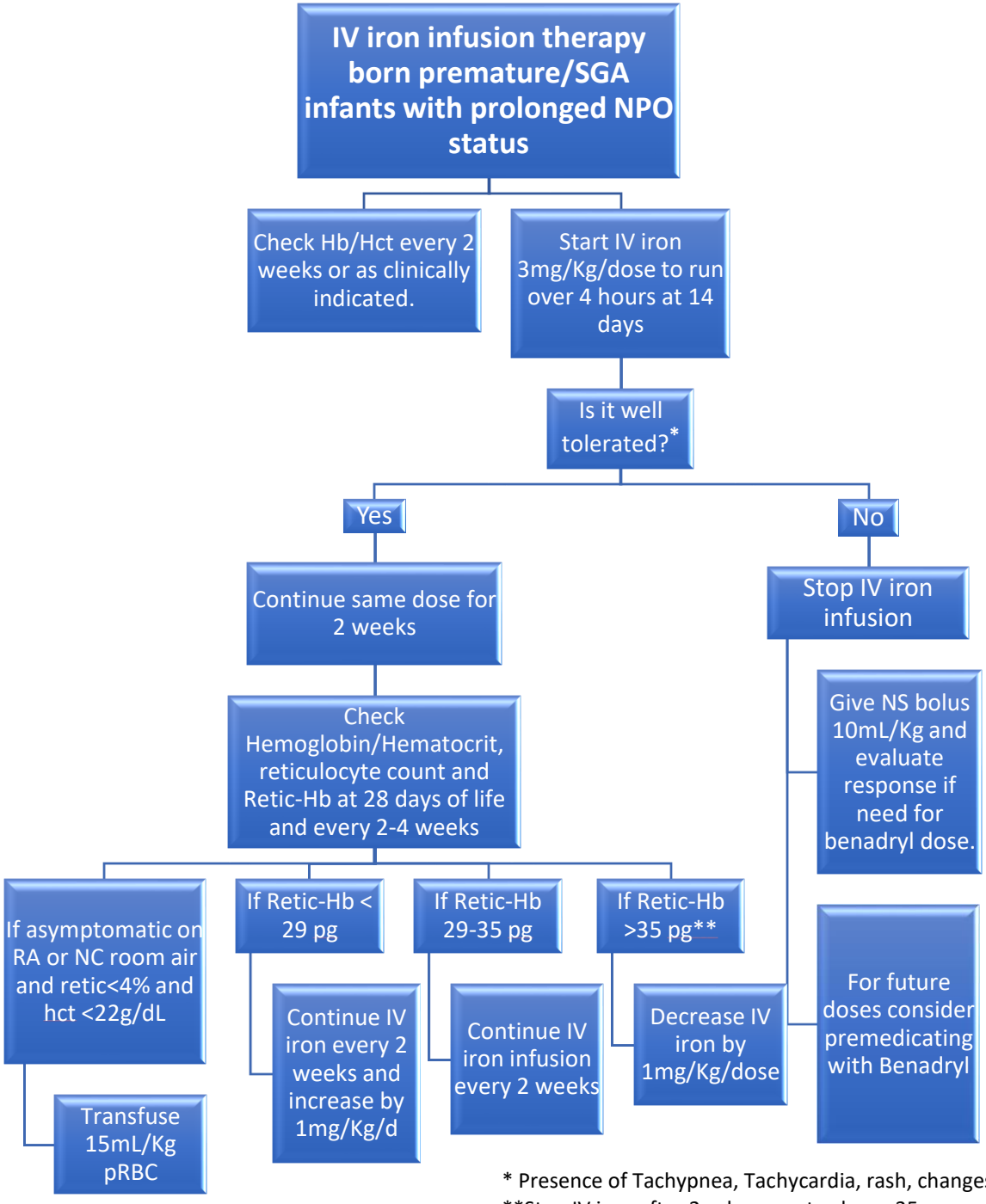


Figure 2: IV iron sucrose infusion algorithm and dose adjustments based on Reticulocyte Hemoglobin values