Iron Deficiency Anemia (IDA)

Inpatient

Nationwide Children's — When your child needs a hospital, everything matters.

Center for Clinical Excellence

Concern for iron deficiency anemia based on history, physical exam, or prior labs

Inclusion Criteria

- ≥ 6 months of age with history, symptoms or laboratory findings concerning for IDA
- Admitted patients incidentally noted to have IDA

Exclusion Criteria

- Active bleeding
- Traumatic etiology for blood loss
- Anemia related to chronic disease (e.g. oncologic, inflammatory, gastrointestinal)
- Inflammatory bowel disease
- Anemia related to abnormal uterine bleeding

If not already obtained, collect labs

- Consider IV placement - *Place away from flexible joints if possible*
- Type and screen if hypotensive or ill appearing requiring transfusion
- CBC w/ Diff (if > 24 hours since last value)
- Reticulocytes
- CMP*
- Phosphorous**
- Iron w/ Total Iron Binding Capacity (TIBC)
- Ferritin
- Consider Soluble transferrin receptor***

***** If edema/concern for associated protein losing enteropathy
** helpful to determine type of infusion
***identifies IDA cause by anemia of chronic disease/ inflammation

Definitions

Risk Factors

Clinical History

Infusion Reactions

Lab results Indicating anemia due to iron deficiency?

- Yes
- No → **Off Pathway** Consider Differential Diagnosis

Symptomatic Anemia or hemoglobin ≤ 4?

- Yes → Hematology consult
- No

Hemoglobin ≥ 6.1?

- Yes → **Oral iron supplementation** Follow-up with PCP in 1 week, consider Hematology follow-up for follow-up labs

Hemoglobin 4.1 – 6.0?

- Yes → Consult Hematology → **Administer IV iron**

Hematology consult → Any of the following?

- Hgb < 3
- Hypotension

- No → **Symptomatic anemia**, Hypoxia, acute respiratory failure?
- Yes → Call ACT. Consider transfer to ICU.

Call ACT. Consider transfer to ICU. → Initiate transfusion of RBCs 5 mL/kg (not to exceed 1 unit) *Run slowly over 3 hours*

Symptomatic anemia, Hypoxia, acute respiratory failure?

- Yes → Initiate transfusion of RBCs 5 mL/kg (not to exceed 1 unit) *Run slowly over 3 hours*
- No → **Administer IV iron**

Initiate transfusion of RBCs 5 mL/kg (not to exceed 1 unit) *Run slowly over 3 hours* → If transferred to the ICU, transfer to the floor when vitals stable and symptoms improve. → **Administer IV iron**

Administer IV iron

- IV Iron Discharge Instructions
- Oral iron supplementation
- Follow up in 3-5 days with hematology for follow-up labs and possible repeat FCM infusion

Definitions

Anemia: Hemoglobin value below the 2.5% for age and biological gender, as per institutionally established laboratory standards (See table below – the lower end of the range represents the 2.5%)

Symptomatic Anemia: presence of one or more of the following symptoms with laboratory confirmed anemia:

- Hypoxemia, shortness of breath
- Acute respiratory failure
- Hypotension
- Positive orthostatic vital signs
- Sustained tachycardia
  - To meet the definition of symptomatic, tachycardia should be observed in a calm and resting child
  - Age-appropriate values for heart rate should be used in assessment

Asymptomatic Anemia: No evidence of any of the above noted symptoms

Test Name	Units	Age Range	Normal Range Male	Normal Range Female
Hemoglobin	g/dL	6M to <2Y	10.5-13.5	10.5-13.5
Hemoglobin	g/dL	2Y to <6Y	11.5-13.5	11.5-13.5
Hemoglobin	g/dL	6Y to <12Y	11.5-15.5	11.5-15.5
Hemoglobin	g/dL	12Y to <15Y	12.5-16.4	12.0-16.0
Hemoglobin	g/dL	15Y to <18Y	13.1-16.9	12.0-16.0

Return to Algorithm

Risk Factors

- Excessive ingestion of cow's milk (> 24 oz of milk daily)
- Obesity
- Restrictive diets
- Menorrhagia
- Inflammatory Bowel Disease
- Severe and frequent epistaxis
- Gastrointestinal bleeding

Return to Algorithm

Clinical History

- Fatigue
- Pallor (palmar creases, evaluate conjunctiva, oral mucosa and nail beds)
- Lethargy
- Poor feeding
- Cardiomegaly
- Pica

Return to Algorithm

Differential Diagnosis of Anemia

- Acute blood loss anemia
- Hemolytic anemia
- Thalassemia
- Viral suppression
- Leukemia
- Lead poisoning
- Renal Disease
- Hypothyroidism

Return to Algorithm

Laboratory Results Indicative of IDA

- Hemoglobin (HGB) < 2.5% for age and gender (lower number in range on table below)
- MCV < 80
- Low:
  - Iron
  - Transferrin Saturation
  - Ferritin
- High
  - Total Binding Iron Capacity (TIBC)
  - RDW

Test Name	Units	Age Range	Normal Range Male	Normal Range Female
Hemoglobin	g/dL	6M to <2Y	10.5-13.5	10.5-13.5
Hemoglobin	g/dL	2Y to <6Y	11.5-13.5	11.5-13.5
Hemoglobin	g/dL	6Y to <12Y	11.5-15.5	11.5-15.5
Hemoglobin	g/dL	12Y to <15Y	12.5-16.4	12.0-16.0
Hemoglobin	g/dL	15Y to <18Y	13.1-16.9	12.0-16.0

Return to Algorithm

Ferric Carboxymaltose/Injectafer™

- Indications for Ferric Carboxymaltose (FCM):
  - Age ≥ 1 year
  - Previous laboratory assessment and clinical evaluation consistent with iron deficiency anemia
  - Patient is not a candidate for oral iron, or has failed oral iron therapy, or has hgb < 6
- If able, obtain phosphorous level prior to administration of FCM
  - This will be followed up as outpatient and does not need to be resulted prior to giving the FCM.
  - If unable to obtain phosphorous level, appropriate to proceed with FCM infusion
  - If level is normal, appropriate to proceed with FCM infusion
  - If level is low, appropriate to proceed with FCM infusion, or alter therapy in discussion with heme-onc
    - Clinicians can transition therapy to **iron sucrose** (often preferred by insurance), however, this therapy will likely require an increased number of dose administrations and IV placements
    - Risks and benefits for both infusions should be discussed with patient and family, and arrive at therapy option through shared decision making

- Peripheral IV placement
  - IV placement must be away from joints and/or “bends”
    - This is not a contraindication to giving the infusion if no other IV sites can be obtained
    - Utilize arm immobilization devices
    - Instruct patients to keep arm straight and instruct patients/parents to notify RN if patient is experiencing pain during the infusion.
  - FCM may be administered through central venous access if present
- FCM administration instructions
  - Infusion will be run via pump for 20 minutes
  - FCM is ordered as 15mg/kg, with maximum one-time infusion dose of 750mg
  - Vital signs to be measured at baseline, 5 minutes into the infusion, at the completion of the infusion, and at completion of observation period
  - Post-infusion 10mL flush will be administered
  - Patients should be observed for a 40-minute observation period, to evaluate for **hypersensitivity reactions**

Return to Algorithm

Iron Sucrose/Venofer™

Please note: Iron sucrose should only be used for patients <1 year old; or low phosphorus; AND in direct consultation/recommendation by Hematology; otherwise FCM is preferred therapy

Age	Dose
≥ 6 months – 17 years	Initial dose: 7 mg/kg not to exceed 100 mg Maintenance dose: 7 mg/kg not to exceed 300 mg
≥ 18 years	Initial & Maintenance dose: 7 mg/kg not to exceed 300 mg

*Iron sucrose doses up to 100 mg: 15 minute infusion

*Iron sucrose doses between 100 mg - 500 mg: 60 minute infusion

Return to Algorithm

Return to Infusion Practice

Discharge Criteria

- Discharge when symptoms are improved and hypoxia and hypotension have resolved
- Discharge is not dependent on hemoglobin level and determined on a case-by-case basis with involvement of hematology

Oral Iron Supplementation

Oral Iron Supplementation:

- If patient can swallow pills and is ≥ 35 kg:
  - Ferrous sulfate 325 mg (65 mg elemental iron) once per day x 3 months

- If patient cannot swallow pills or are < 35 kg:
  - Fer-in-sol 3 mg/kg of elemental iron (max 100 mg elemental iron) once per day x 3 months

OR

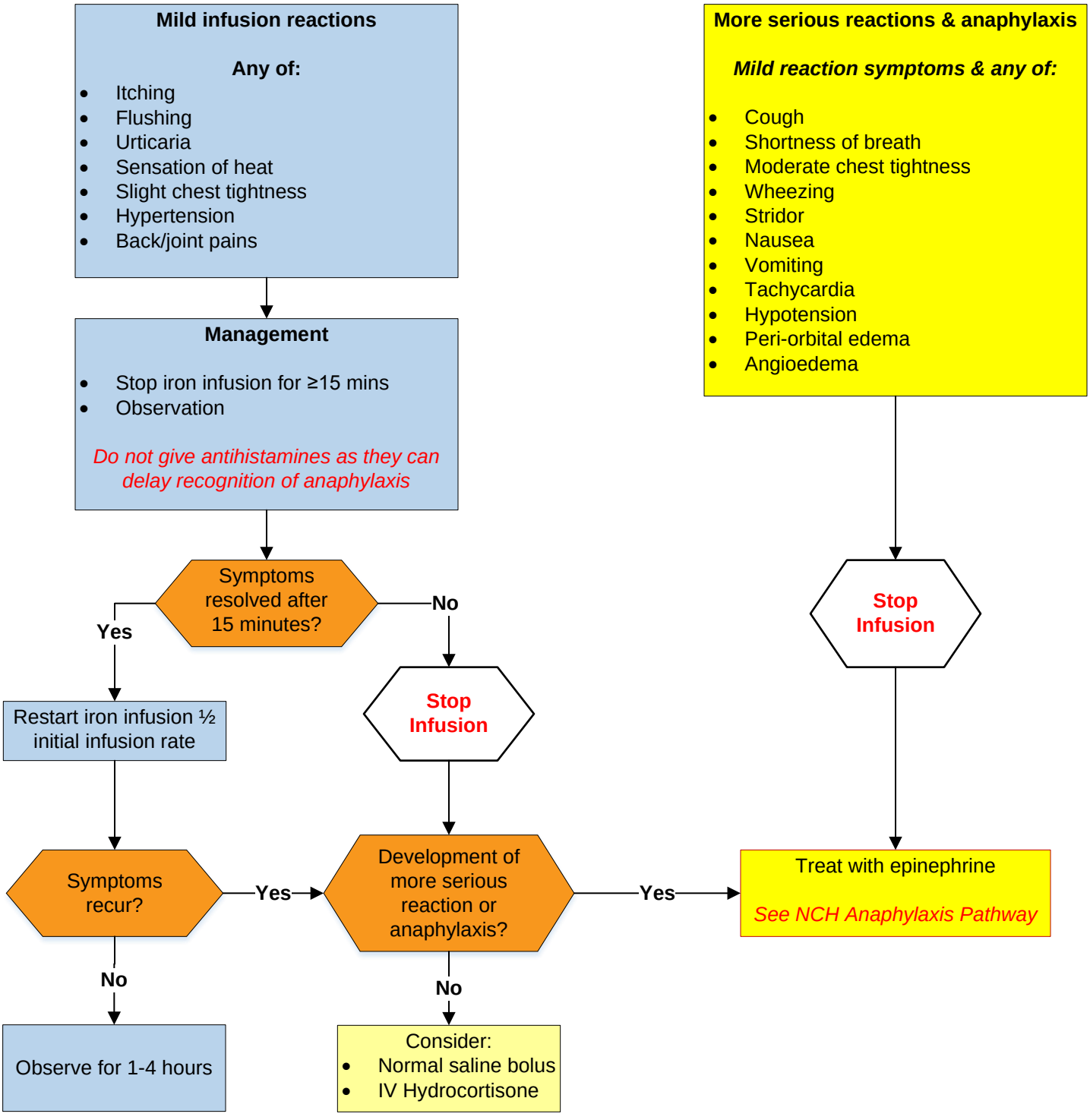
  - Novaferrum liquid (polysaccharide-iron complex) 3 mg/kg of elemental iron (max 100 mg elemental iron) once per day x 3 months

Follow-up Labs & Recurrent FCM Infusion

- Laboratory Evaluation for moderate/severe anemia – 1-2 weeks
  - Hematological labs (CBC, Retic)
  - Repeat phosphorous level if low baseline phosphorus/FCM infusion
- Laboratory Evaluation – 12 weeks
  - Hematological Labs (CBC, Retic, Ferritin)
- Clinical determination if repeat FCM dose required
  - 2nd dose of FCM should be given at least 7 days after administration of 1st dose

Return to Algorithm

Hypersensitivity Reactions



Return to Algorithm

Adapted from:
Rampton D, Foklersen J, et al. Hypersensitivity reactions to intravenous iron: guidance for risk minimization and management. Hematologica. 2014;99(11):1671-1676.

Return to Infusion Practice

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Return to Algorithm

Quality Measures

Goal: Appropriate evaluation and treatment of iron deficiency anemia that minimizes inappropriate blood transfusions and facilitates appropriate admissions to an inpatient unit, when indicated.

Process Metrics:

- Pathway visualization
- Order panel utilization

Outcome Metrics:

- Length of stay
- Blood transfusion rates

Balancing Measures:

- Return to the Emergency Department/Urgent Care for anemia related concern within 72 hours
- Iron infusion reactions

Return to Algorithm

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Clinical Pathway Development

This clinical pathway was developed using the process described in the NCH Clinical Pathway Development Manual Version 6, 2022. Clinical Pathways at Nationwide Children's Hospital (NCH) are standards which provide general guidance to clinicians. Patient choice, clinician judgment, and other relevant factors in diagnosing and treating patients remain central to the selection of diagnostic tests and therapy. The ordering provider assumes all risks associates with care decisions. NCH assumes no responsibility for any adverse consequences, errors, or omissions that may arise from the use or reliance on these guidelines. NCH's clinical pathways are reviewed periodically for consistency with new evidence; however, new developments may not be represented, and NCH makes no guarantees, representations, or warranties with respect to the information provided in this clinical pathway.

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Return to Algorithm