

# A Practical Approach to Monitor, Manage and Prevent Iron Deficiency in Pediatric Intestinal Failure Patients

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Children's Intestinal Rehabilitation Program



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## Disclosure

- No commercial relationships to disclose



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## Learning Objectives

Upon completion of this educational activity, the learner will be able to:

- Describe the challenges in diagnosing iron deficiency
- Assess alternative diagnostic laboratory monitoring parameters
- Distinguish between iron deficiency and iron deficiency anemia
- Utilize an effective treatment plan



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## Presentation Outline

- Iron deficiency and iron deficiency anemia
  - Causes
  - Contributing factors
- Monitoring parameters
  - Specific tests and their uses
  - Confounding factors
- Supplementation and treatment of iron deficiency
  - Oral vs Intravenous
  - Product options



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## Proposed Guideline Tool

**Step #1 Screening for Iron Deficiency in Children with Intestinal Failure**

**Step #2 Treatment Planning**

**Step #3 IV Iron Dose for Treating Iron Deficiency Anemia (Replacement)**

**Step #4 IV Iron Doses to Replenish Iron Stores (Maintenance Dose)**



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## Factors Contributing to ID in PIF

Low Iron Intake

Poor Iron Absorption

Blood Loss

- Parenteral Nutrition lacking in iron
- Prematurity
- Foods low in iron content

- Lower surface area
- Rapid intestinal transit
- Jejunal feeds
- Acid suppression
- Low vitamin C intake

- Surgical procedures
- Frequent blood draws
- Anastomotic ulcers
- Menstrual cycle



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# Screening for Iron Deficiency



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## Iron Status in Phases of Iron Deficiency

Biochemical Marker of Iron Deficiency (ID)	Early Phase ID	Mid phase ID with compensation	Late Phase ID Established ID
Serum Ferritin (SF)	↓	↓↓	↓↓↓
Soluble Transferrin Receptor (sTfR)	↑	↑↑	↑↑↑
Serum Iron	↓	↓↓	↓↓↓
Transferrin Saturation %	↓	↓↓	↓↓↓
Total iron binding capacity (TIBC)	Normal	↑	↑↑
Mean corpuscular volume (MCV)	Normal	↓	↓↓
Red blood cell distribution width (RDW)	Normal	Normal	↑
Hemoglobin (Hg)	Normal	Normal	↓

Adapted from: Corkins, M. R. (Ed.). (2025). Table 30-11: [Progression of Biochemical Indicators of Iron Status]. In The A.S.P.E.N. pediatric nutrition support core curriculum (3rd ed., pp. 632). Silver Spring, MD: American Society for Parenteral and Enteral Nutrition.



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## Step #1: Screening for Iron Deficiency

### Lab Frequency

- < 1 year of age: every 1-2 months
- > 1 year of age: every 3-6 months
- Any age, 1 month after:
  - IV iron (all infusions)
  - pRBC administration
  - Hospital discharge
  - Blood loss (e.g. surgery)

**What are the ideal labs to use for screening and monitoring patients with the potential for inflammation?**

## Potential Sources of Inflammation in Children

- Surgery
- Diaper rashes
- Gastrostomy skin-site irritation or infection
- Central line skin-site irritation or infection
- Infections
  - Urinary tract infections
  - Acute otitis media
  - Upper respiratory tract viral infections
  - Strep throat
  - CLABSI
  - Sepsis
- Vaccinations
- Tooth eruption



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## Impact of Inflammation on Iron Biomarkers

	Change in deficiency	Influenced by inflammation?
<b>Ferritin</b>	↓	<b>yes</b>
<b>Hemoglobin</b>	↓	<b>no</b>
<b>Soluble transferrin receptor</b>	↑	<b>no</b>
<b>Mean red cell volume (MCV)</b>	↓	<b>yes</b>
<b>Transferrin</b>	↑	<b>yes</b>
<b>Transferrin saturation</b>	↓	<b>yes</b>
<b>Total iron binding capacity (TIBC)</b>	↑	<b>yes</b>
<b>Plasma iron</b>	↓	<b>yes</b>

Adapted from: Berger MM, Shenkin A, Schweinlin A, et al. ESPEN micronutrient guideline. *Clin Nutr.* 2022;41(6):1357-1424.



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## Screening for Iron Deficiency

### Serum Ferritin (SF)

- Primary form of iron storage
- Check CRP or ESR
- WHO definitions
  - <5 years old ferritin <30mcg/L *with inflammation*
- If chronically elevated, consider:
  - Chronic inflammation
  - Iron overload
  - Other disease states

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## Screening for Iron Deficiency

- NASPHGAN Recommended Definitions

	Serum Ferritin	TSAT
Iron Deficiency	<30 mcg/L	
Iron Deficiency	30-100mcg/L	<15
Indeterminate	30-100 mcg/L	>15
Iron Overload	100-200+ mcg/L	>50

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## Screening for Iron Deficiency and Iron Deficiency Anemia

- Complete Blood Count (CBC)
  - Hemoglobin and Hematocrit
    - Nadir (after 8-12 weeks) = 9.5 g/dL in babies born between 35-42 weeks GA
    - Nadir (after 4-8 weeks) = 8.0g/dL in babies born between 29-34 weeks GA
  - Mean corpuscular volume (MCV)
  - Red cell distribution width (RDW)
- Reticulocyte count (RC)

	Change in deficiency	Influenced by inflammation?
Hemoglobin	↓ late	no
Mean red cell volume (MCV)	↓ microcytosis	Yes

Berger MM, Shenkin A, Schweinlin A, et al. ESPEN micronutrient guideline. *Clin Nutr.* 2022;41(6):1357-1424. doi:10.1016/j.clnu.2022.02.015

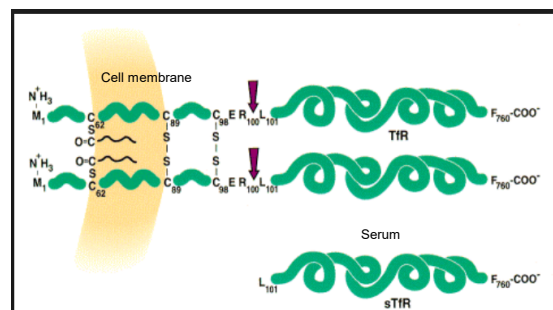
Widness JA. Pathophysiology of anemia during the neonatal period, including anemia of prematurity. *Neoreviews.* 2008;9(11):e520-e525



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## Screening for Iron Deficiency

- SOLUBLE TRANSFERRIN RECEPTOR (sTfR)
  - Iron transport in the plasma is carried out by TRANSFERRIN
  - Transferrin donates iron to cells via the transferrin receptor (TfR)
  - Soluble Transferrin Receptor is a truncated monomer of the TfR
    - Erythroblasts are the source of sTfR, and sTfR increases with erythropoiesis
    - sTfR is strongly impacted by iron deficiency



Beguín Y. Soluble transferrin receptor for the evaluation of erythropoiesis and iron status. *Clinical Chimica Acta.* 2003;329:9-22

Ahluwalia N. Diagnostic utility of serum transferrin receptors measurement in assessing iron status. *Nutr Rev* 1998;56:133-41



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## Soluble Transferrin Receptor (sTfR)

- False High Values
  - Hemolysis
  - Thalassemia and sickle cell
  - Gastrointestinal bleed
  - Nutrient deficiency anemia
- False Low Values
  - Aplastic anemia
  - Chronic renal failure

	Change in deficiency	Influenced by inflammation?
Soluble transferrin receptor	early	No

Berger MM, Shenkin A, Schweinlin A, et al. ESPEN micronutrient guideline. *Clin Nutr.* 2022;41(6):1357-1424. doi:10.1016/j.clnu.2022.02.015



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## Screening for Iron Deficiency

- Iron Studies
  - Serum iron
  - Transferrin
  - Total iron binding capacity (TIBC)
  - Transferrin saturation (iron transport)

	Change in deficiency	Influenced by inflammation?
Plasma iron	↓	yes
Transferrin	↑	yes
Transferrin saturation	↓	yes
Total iron binding capacity (TIBC)	↑	yes

Berger MM, Shenkin A, Schweinlin A, et al. ESPEN micronutrient guideline. *Clin Nutr.* 2022;41(6):1357-1424. doi:10.1016/j.clnu.2022.02.015

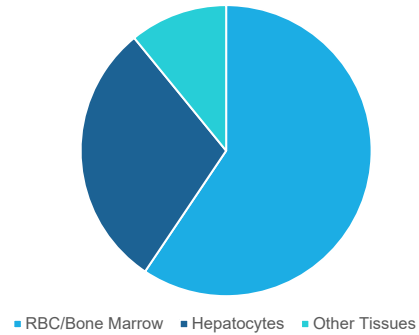


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## Screening for Iron Overload

- Monitoring for complications
- Iron is not excreted
- 2/3 of total body iron found in RBC and bone marrow
- Approximately 1/3 of total body iron found in hepatocytes and splenic and hepatic macrophages
- Other tissues
- NASPHGAN thresholds for iron overload:
  - Serum Ferritin >200mcg/L and TSAT > 50

Storage sites of iron



Talathi S, Namjoshi S, Raghu V, et al. Evaluation and management of iron deficiency in children undergoing intestinal rehabilitation—A position paper from the NASPHGAN Intestinal Rehabilitation Special Interest Group. *JPGN*. 2023;76(5):672-683.



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## Identifying Laboratory Markers for ID and ACD

Biochemical Marker	Iron Deficiency without Anemia (ID)	Iron Deficiency Anemia (IDA)	ID and ACD	Anemia of Chronic Disease (ACD)
<b>Complete Blood Count (CBC)</b>				
Hemoglobin	Normal to Low	Low	Low	Low
MCV	Normal to Low	Low	Normal or Low	Normal
RDW	High	High	Normal to High	Normal to High
RBC	Low	Low	Low	Low or Normal
<b>Iron Studies</b>				
Ferritin	Low	Low	Normal or High	High
TIBC	High	High	Normal or High	Low
Serum Iron	Low	Low	Low	Low
sTfR	High	High	High	Normal
Ret-He	Normal to Low	Low	Low	Normal
Ratio of sTfR/log ferritin	High	High (>2)	High (>2)	Low (<1)

Adapted from Talathi S, Namjoshi S, Raghu V, et al. Evaluation and management of iron deficiency in children undergoing intestinal rehabilitation—A position paper from the NASPHGAN Intestinal Rehabilitation Special Interest Group. *JPGN*. 2023;76(5):672-683.



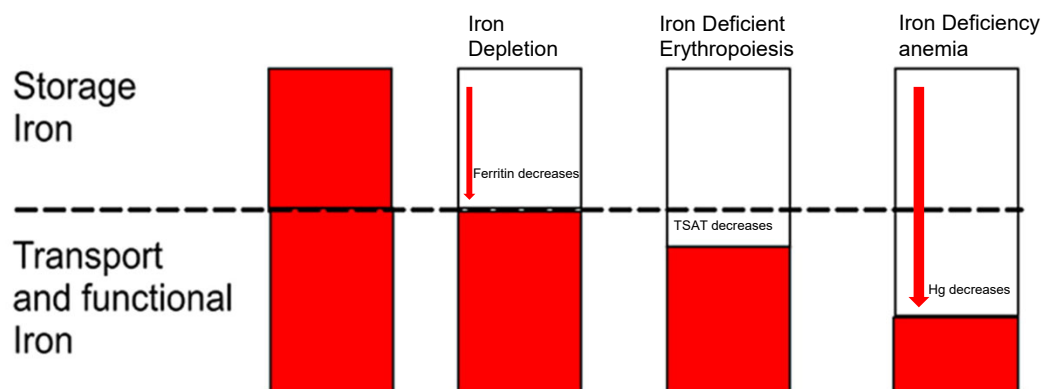
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## Step #1: Screening for Iron Deficiency-Definitions

- Iron Deficiency (ID)
  - **Serum Ferritin** < 15 mcg/L
    - *Varies by age, gender, underlying inflammation (<30 mcg/L with inflammation)*
  - **Soluble Transferrin Receptor (sTfR)**
    - *Varies by age, gender*
  - **CRP**
  
- Iron Deficiency Anemia (IDA)
  - Anemia caused by iron deficiency
  - **Hemoglobin** less than the lower limit of normal for age and gender

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## Progression of Iron Deficiency



**\*\*There is no one singular gold standard laboratory test for iron deficiency\*\***

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## CASE STUDY

- Former 37-week GA baby boy with IF due to spontaneous volvulus s/p significant resection
- Anatomic summary
  - Small bowel length: 5 cm
  - Duodenum present: yes
  - Terminal ileum present: no
  - ICV present: no
  - Colon present: yes - partial (left colon and distal)
  - Ostomy present: no
- He is on continuous HPN with some PO intake. G-tube in place

Initial thoughts?

Age	3 mo
Hg (10-13 g/dL)	9.7
MCV (74-108 fl)	73
RDW (11.5-15%)	13.9
Ferritin 6-155ng/ml	49.2
sTfR (1.8-4.6mg/L)	4.6
CRP (0-0.6 mg/dL)	<0.4



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## CASE STUDY

- Patient is currently 4 months old

Age	3 mo	4 mo
Hg (10-13 g/dL)	9.7	10.9
MCV (74-108 fl)	73	73.7
RDW (11.5-15%)	13.9	14.2
Ferritin 6-155ng/ml	49.2	
sTfR (1.8-4.6mg/L)	4.6	
CRP (0-0.6 mg/dL)	<0.4	



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## CASE STUDY

- Patient is currently 5 months old

Age	3 mo	4 mo	5 mo
Hg (10-13 g/dL)	9.7	10.9	8.7
MCV (74-108 fl)	73	73.7	71.9
RDW (11.5-15%)	13.9	14.2	15.2
Ferritin 6-155ng/ml	49.2		
sTfR (1.8-4.6mg/L)	4.6		
CRP (0-0.6 mg/dL)	<0.4		

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## CASE STUDY

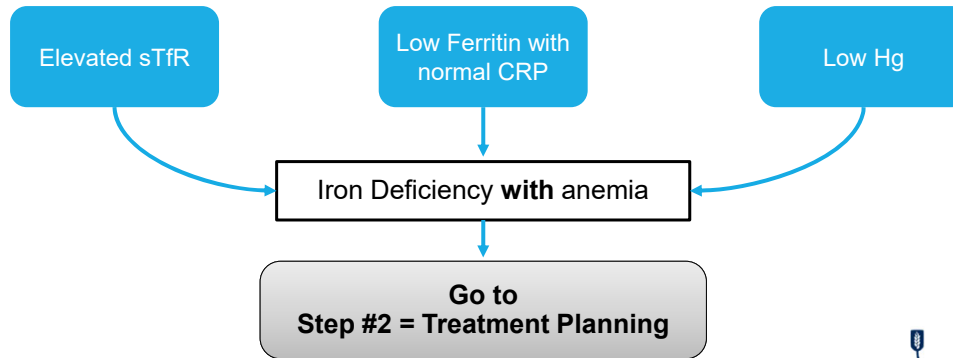
- Patient is currently 6 months

Age	3 mo	4 mo	5 mo	6 mo
Hg (10-13 g/dL)	9.7	10	8.7	8.4
MCV (74-108 fl)	73	73.7	71.9	68.4
RDW (11.5-15%)	13.9	14.2	15.2	16.1
Ferritin 6-155ng/ml	49.2			5.8
sTfR (1.8-4.6mg/L)	4.6			12.8
CRP (0-0.6 mg/dL)	<0.4			<0.4

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## Step #1 Screening for Iron Deficiency

Hg (10-13 g/dL)	8.4
Ferritin 6-155ng/ml	5.8
sTfR (1.8-4.6mg/L)	12.8
CRP (0-0.6 mg/dL)	<0.4



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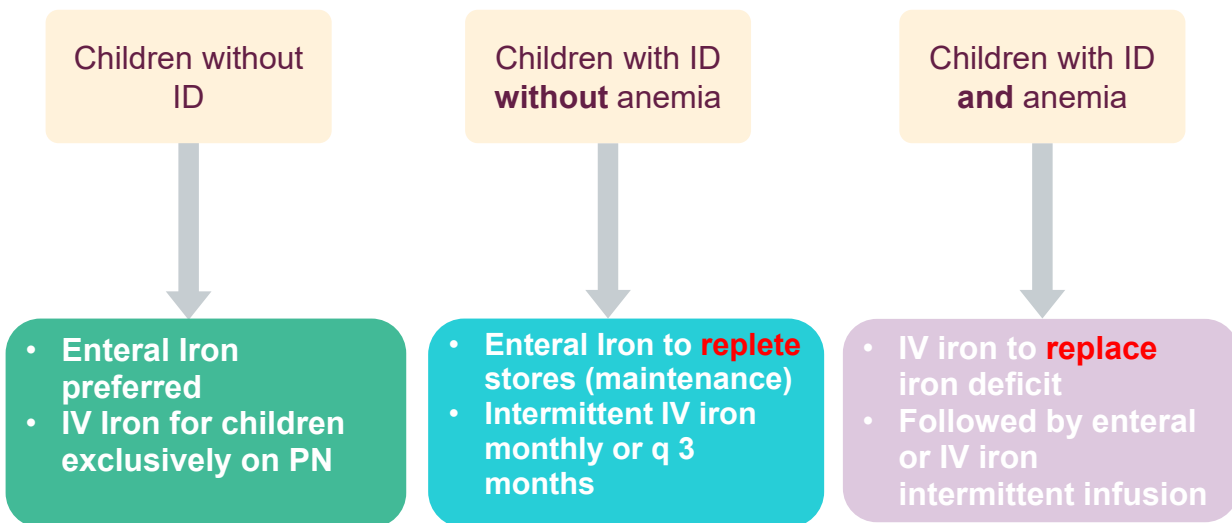
# Treatment Planning

Identifying Iron Deficiency with or without Anemia  
 Determine the Route (enteral versus parenteral) of Iron



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## Treatment Option Considerations

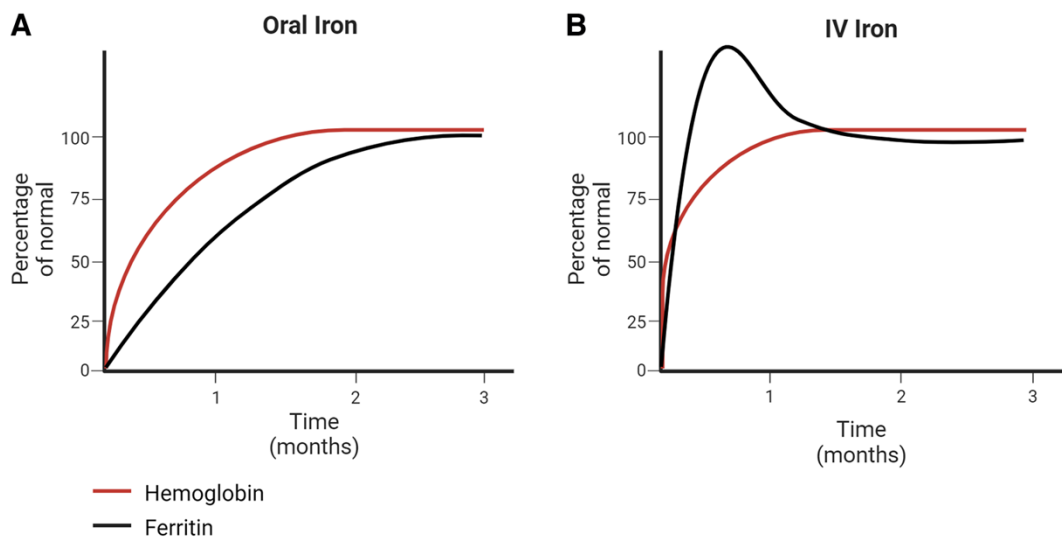


Talathi S, Namjoshi S, Raghu V, et al. Evaluation and management of iron deficiency in children undergoing intestinal rehabilitation—A position paper from the NASPGHAN Intestinal Rehabilitation Special Interest Group. *JPGN*. 2023;76(5):672-683.



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## Choosing the Right Supplementation



Cohen CT, Powers JM. Intravenous iron therapy in pediatrics: who should get it and when is the right time? *Hematology Am Soc Hematol Educ Program*. 2023 Dec 8;2023(1):630-635.



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## Enteral Iron

- Standard dose in healthy child for prevention of ID
  - 3-6 mg/kg/day of elemental iron
- Standard dose for treatment of IDA
  - 4-6 mg/kg/day of elemental iron
- Oral iron absorption test (OIAT)
- Alternate day dosing



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## Table of enteral iron products

DRUG	Formulation	Elemental Iron Content
Ferrous sulfate	Drops, solution	15 mg elemental iron per 1ml (75 mg ferrous sulfate) per 1ml
	Elixir, Liquid	44 mg elemental iron per 5ml (220 mg ferrous sulfate) per 5ml
	syrup	60 mg elemental iron per 5ml (300 mg ferrous sulfate) per 5ml
	Tablet, chewable tablet	33 mg elemental iron per 100 mg tablet
Ferrous gluconate	Tablet	27 mg elemental iron per 240 mg tablet
Polysaccharide-iron complex	Drops	15mg elemental iron per 1ml
	Liquid	125mg elemental iron per 5ml
Carbonyl Iron	Chewable tablet	50 mg per dose



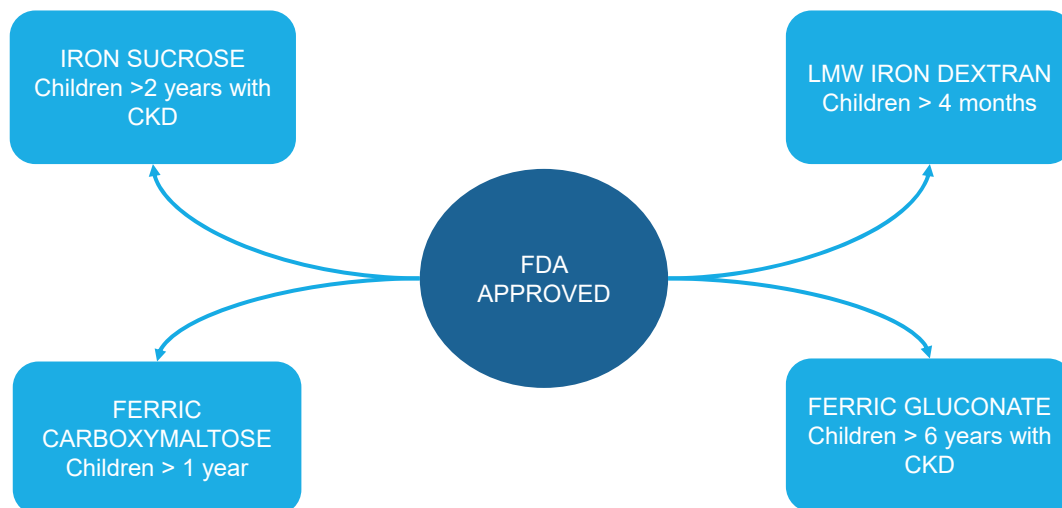
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## Parenteral Iron

- Replacement Dose: treats an Iron Deficiency Anemia (IDA)
  - A large dose aimed to correct ID anemia based on the iron deficit
- Maintenance Dose: treats an iron deficiency **without** anemia
  - Routine iron dose to recover a patient's iron stores (ferritin)

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## IV Iron Products



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## Iron Sucrose in < 2 years of Age

TABLE 1 Characteristics of the five children receiving iron sucrose

Pt	Sex	Primary diagnosis	Age, mo	Nutrition from enteral feeds, %	Dose of IV iron sucrose, mg (mg/kg)	Total no. of individual doses
1	M	Gastroschisis with atresia	22	2	100 (7)	2
2	M	Jejunal atresia	10	81	100 (12)	1
			14	84	100 (10)	1
3	F	Gastroschisis with atresia	4	24	40 (7)	1
			6	6	55 (7)	1
			12	33	50 (5)	1
			22	47	56 (5)	2
4	F	Intrauterine volvulus	7	20	50 (5)	3
5	M	Intrauterine volvulus	5	64	50 (7)	3
			10	63	70 (7)	1

Lepus CA, Samela K, Mokha JS. Efficacy and safety of intravenous iron sucrose in children younger than 2 years with intestinal failure. Nutr Clin Pract. 2023;38:899-903



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## Step #2 Treatment Planning

Determine if patient needs:

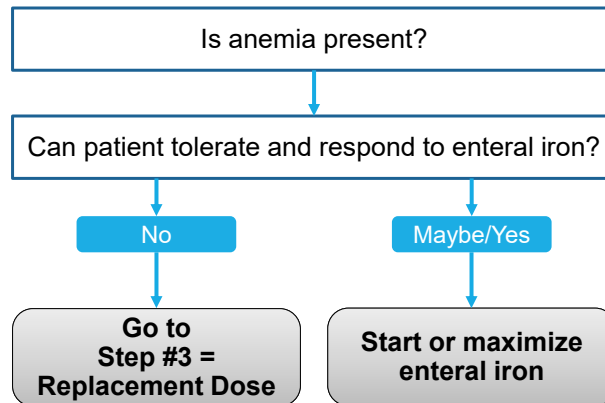
- IV iron storage repletion (a maintenance iron dose intended to replete the patient's iron stores) = maintenance dose
- IV iron deficit dose (a large dose aimed to correct an iron-deficiency anemia, and replete iron stores) = replacement dose
- Enteral iron



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## Step #2 Treatment Planning

Case study	3 mo	6 mo
Hg (10-13 g/dL)	9.7	8.4
Ferritin 6-155ng/ml	49.2	5.8
sTfR (1.8-4.6mg/L)	4.6	12.8
CRP (0-0.6 mg/dL)	<0.4	<0.4



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## Additional Causes of Anemia

- Copper
  - Essential cofactor involved in iron absorption and transport
- Zinc
  - Excessive amounts of zinc can hinder absorption of iron (enterally)
  - Zinc deficiency can disrupt the pathways for iron metabolism affecting how iron is transported and used
- Vitamin B12
  - Deficiency causes increased MCV

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## CASE STUDY

- Patient is currently 6 months old

	3 mo	4 mo	5 mo	6 mo
Hg (10-13 g/dL)	9.7	10	8.7	8.4
MCV (74-108 fl)	73	73.7	71.9	68.4
RDW (11.5-15%)	13.9	14.2	15.2	16.1
Ferritin 6-155ng/ml	49.2			5.8
sTfR (1.8-4.6mg/L)	4.6			12.8
CRP (0-0.6 mg/dL)	<0.4			<0.4
Copper(0.7-1.4 mcg/ml)	0.8			1.1
Ceruloplasmin(18-24mg/dl)	16			23
MMA(<0.4nmol/ml)	0.23			0.11
Folate(3-999ng/ml)	>24			>24
Zinc (0.55-1.5mcg/mL)				1.1

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# Treatment Planning

## Dosing and Administration for IV Iron Replacement

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## Iron Deficit Calculations

Example: 6.25 kg patient; current Hg of 8.4 g/dL, desired Hg of 12 g/dL

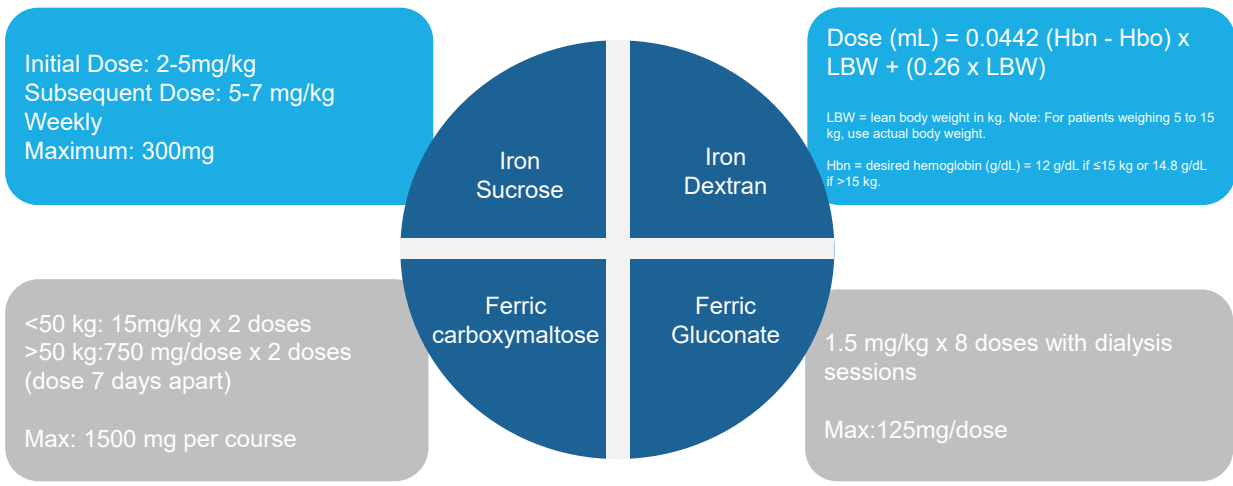
Norman/Pinsk Formula	$0.6 \times 6.25 \text{ kg} \times [100 - 8.4 \text{ g/dL}/12 \text{ g/dL} \times 100] = 112.5 \text{ mg}$
NASPHGAN Formula	$60 \times 6.25 \text{ kg} \times [12\text{g/dL}-8.4 \text{ g/dL}]/12 \text{ g/dL} = 112.5 \text{ mg}$
Ganzoni Formula	$6.25 \text{ kg} \times (12\text{g/dL}- 8.4 \text{ g/dL}) \times 2.4 + (15\text{mg} \times 6.25 \text{ kg}) = 147 \text{ mg}$
Iron Dextran Formula	$0.0442 (12\text{g/dL}-8.4 \text{ g/dL}) \times 6.25 \text{ kg} + (0.26 \times 6.25 \text{ kg}) = 2.6 \text{ ml} = 131 \text{ mg}$

Ganzoni, A.M. "Intravenous iron-dextran: therapeutic and experimental possibilities." *Schweiz Med Wochenschr.* 1970; 100(7): 301-3.  
 Pinsk, M., "Parenteral versus oral iron for treatment of iron-deficiency anemia in infancy." *J Pediatr.* 2008. This context supports adjusted dosing regimens seen in pediatric settings.  
 Talathi, S, et al; Evaluation and management of iron deficiency in children undergoing intestinal rehabilitation-A position paper from the NASPHGAN Intestinal Rehabilitation Special Interest Group. *JPGN* 2023;76:672-683  
 Pfizer. INFeD (iron dextran injection) [package insert]. U.S. Food and Drug Administration website. [https://www.accessdata.fda.gov/drugsatfda\\_docs/label/2020/017441s178lbl.pdf](https://www.accessdata.fda.gov/drugsatfda_docs/label/2020/017441s178lbl.pdf). Revised September 2020. Accessed July 15, 2025.



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## IV Iron Products-Replacement Dosing






The A.S.P.E.N. pediatric nutrition support core curriculum (3rd ed., pp. 632). Silver Spring, MD: American Society for Parenteral and Enteral Nutrition  
 Evstatiev, R, et al; FERGI Study Group. Ferric carboxymaltose prevents recurrence of anemia in patients with inflammatory bowel disease. *Clin Gastroenterol Hepatol* 2013;11:269-277



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## Goals of IV iron replacement dose

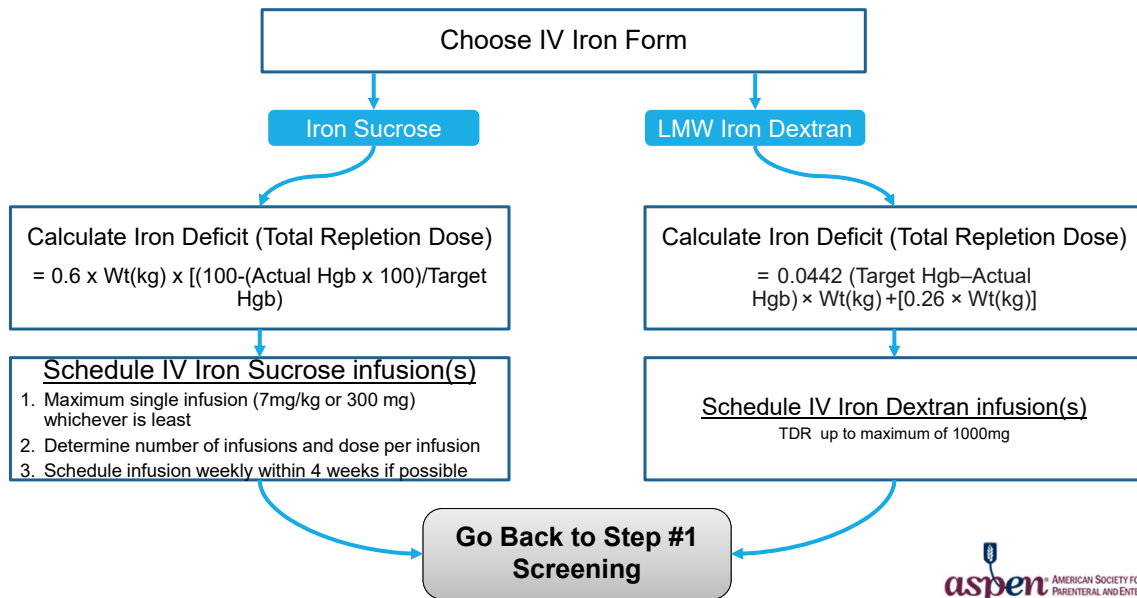
- 
Relieve symptoms of anemia
- 
Increase Hg level by 2 g/dL or achieve normal values within 4 weeks
- 
Correct iron deficiency anemia and replenish Iron stores to achieve a robust ferritin level which is more likely to prevent recurrence of anemia

Goyal A, Zheng Y, Albenberg LG, et al. Anemia in Children With Inflammatory Bowel Disease: A Position Paper by the IBD Committee of the North American Society of Pediatric Gastroenterology, Hepatology and Nutrition. *J Pediatr Gastroenterol Nutr.* 2020;71(4):563-582. doi:10.1097/MPG.0000000000002885  
 Stein J, Dignass AU. Management of iron deficiency anemia in inflammatory bowel disease - a practical approach. *Ann Gastroenterol.* 2013;26(2):104-113.



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## Step #3 IV Iron Dose to Treat Iron Deficiency Anemia



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## CASE STUDY

Iron Sucrose Replacement dosing:

- Age = 6 months
- Weight = 6.25 kg
- Target Hg = 12 g/dL
- Current Hg = 8.4 g/dL
- Calculation:

$$60 \times \text{Wt(kg)} \times [(\text{target Hg-current Hg})/\text{Target Hgb}] = \text{mg iron}$$

$$60 \times 6.25 \text{ kg} \times [(12-8.4 \text{ g/dL})/12 \text{ g/dL}] = 112 \text{ mg}$$

**\*\*Give 25 mg IV iron sucrose x 4 doses one week apart**



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## CASE STUDY

**From Step #1**  
Repeat labs 1 mo after:  
IV iron infusions (all doses)

	3 mo	4 mo	5 mo	6 mo	8 mo
Hg (10-13 g/dL)	9.7	10	8.7	8.4	11.1
MCV (74-108 fl)	73	73.7	71.9	68.4	74.2
RDW (11.5-15%)	13.9	14.2	15.2	16.1	15
Ferritin 6-155ng/ml	49.2			5.8	33
sTfR (1.8-4.6mg/L)	4.6			12.8	4.2
CRP (0-0.6 mg/dL)	<0.4			<0.4	<0.4



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## CASE STUDY-Return to Step #1: Screening

From Step #1  
>1 yo: every 3-6 months

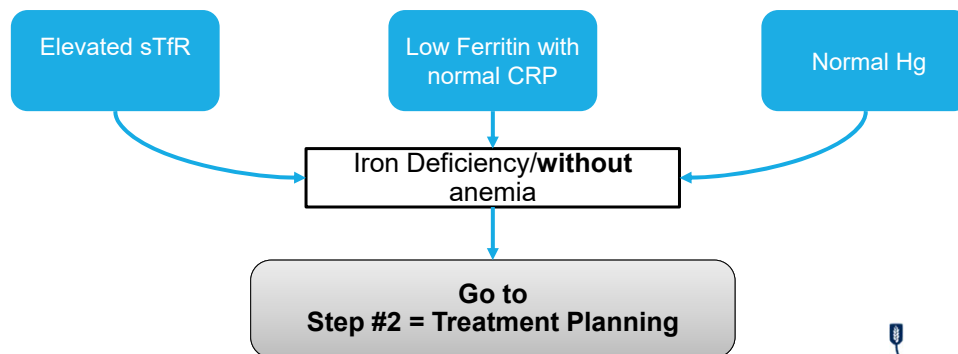
Age	8 mo	10 mo	13 mo
Hg (10-13 g/dL)	11.1	11.4	11
MCV (74-108 fl)	74.2	79.6	78.4
RDW (11.5-15%)	15	14.9	14.4
Ferritin 6-155ng/ml	30.5		6.8
sTfR (1.8-4.6mg/L)	4.2		6.2
CRP (0-0.6 mg/dL)	<0.4		0.5



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## Step #1 Screening for Iron Deficiency

Age	13 mo
Hg (10-13 g/dL)	11
Ferritin 6-155ng/ml	6.8
sTfR (1.8-4.6mg/L)	6.2
CRP (0-0.6 mg/dL)	0.5



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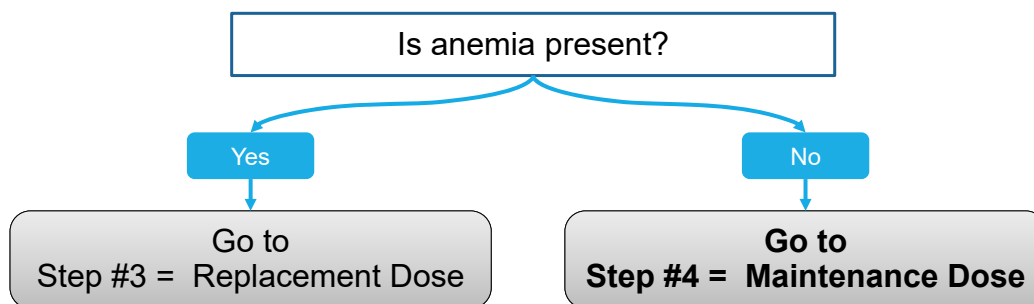
## Step #2: Treatment Planning

- Determine if patient needs:
- IV iron storage repletion (a maintenance iron dose intended to replete the patient's iron stores) = maintenance dose
- IV iron deficit dose (a large dose aimed to correct an iron-deficiency anemia, and replete iron stores) = replacement dose
- Enteral iron

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## Step #2 Treatment Planning

Age	13 mo
Hg (10-13 g/dL)	11
Ferritin 6-155ng/ml	6.8
sTfR (1.8-4.6mg/L)	6.2
CRP (0-0.6 mg/dL)	0.5



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# Treatment Planning

## Dosing and Administration to Replenish Iron stores (Maintenance dose)



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## Maintenance IV Iron Dosing

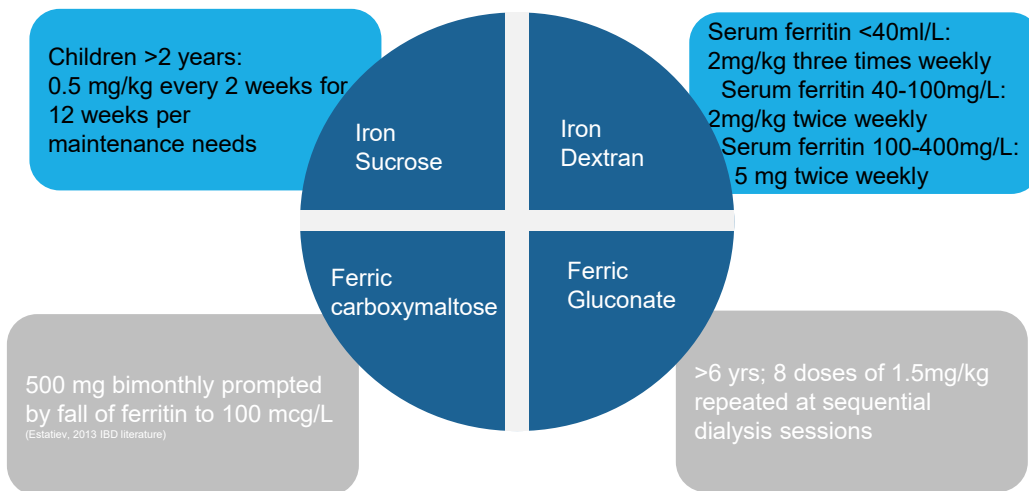
- There are no published guidelines in the **PIF population** for parenteral iron dosing when ID exists without anemia
  - Turn to Inflammatory Bowel Disease and CKD literature
- Anemia recurs frequently and quickly

Evstatiev, R, et al; FERG Study Group. Ferric carboxymaltose prevents recurrence of anemia in patients with inflammatory bowel disease. Clin Gastroenterol Hepatol 2013;11:269-277.  
Kulnig S, et al. Rapid recurrence of IBD-associated anemia and iron deficiency after IN iron sucrose and erythropoietin treatment. Am J. Gastroenterol 2009; 104: 1460-1467



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## IV Iron Products-Maintenance Dosing



The A.S.P.E.N. pediatric nutrition support core curriculum [3rd ed., pp. 632]. Silver Spring, MD: American Society for Parenteral and Enteral Nutrition  
 Evshteyn, R. et al; FERGEI Study Group. Ferric carboxymaltose prevents recurrence of anemia in patients with inflammatory bowel disease. Clin Gastroenterol Hepatol  
 2013;11:269-277



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## Suggested Parenteral Requirements of Iron: Extrapolation

RDA for enteral iron		
Age	Male	Female
Birth to 6 mo	0.27 mg*	0.27 mg*
7-12 mo	11 mg	11 mg
1-3 yr	7 mg	7 mg
4-8 yr	10 mg	10 mg
9-13 yr	8 mg	8 mg
14-18 yr	11 mg	15 mg
Estimated parenteral requirements of iron		
Age	Requirement (µg/kg/day)	
Preterm	200-250	
0-18 yr	50-100	
Maximum dose	5 mg/day	

Extrapolated:  
 50-100 mcg (0.05-0.1 mg) per kg per day =  
 1.5-3.0 mg/kg per month

Thus for 3-month maintenance dose,  
 can give 4.5 mg-9 mg/kg per dose every  
 3 months

\*Adequate intake – intake at this level is assumed to ensure nutritional adequacy; established when evidence is insufficient to develop an RDA.

Talathi, S. et al; Evaluation and Management of Iron Deficiency in Children Undergoing Intestinal Rehabilitation-A Position Paper from the  
 NASPHGAN Intestinal Rehabilitation Special Interest Group. JPGN 2023;76: 672-683



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## Step #4 IV Iron Dose to Replenish Iron Stores

Age	13 mo
Hg (10-13 g/dL)	11
Ferritin 6-155ng/ml	6.8
sTfR (1.8-4.6mg/L)	6.2
CRP (0-0.6 mg/dL)	0.5

Is anemia present?

No

Provide 5 mg/kg IV iron

### From Step #1

Repeat labs 1 mo after:  
IV iron infusions (all doses)



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## CASE STUDY

Iron Sucrose Maintenance dosing:

- Age = 13 months
- Current Weight = 8.8 kg
- **\*\*Give 5 mg/kg IV iron sucrose x 1 dose to replenish iron stores**
- Re-check labs in a month



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## Proposed Guideline Tool

**Step #1 Screening for Iron Deficiency in Children with Intestinal Failure**

**Step #2 Treatment Planning**

**Step #3 IV Iron Dose for Treating Iron Deficiency Anemia (Replacement)**

**Step #4 IV Iron Doses to Replenish Iron Stores (Maintenance Dose)**



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## Take Away Points

- Diagnosing ID in the PIF is challenging
- Routine and consistent screening for ID and IDA facilitates accurate and early diagnosis
- ID and IDA can be treated with both enteral and parenteral iron
- Children with ID without anemia should be repleted with a maintenance iron dose to replete iron stores
- Children with ID with anemia should be treated with a replacement iron dose to replace an iron deficit
- Routine monitoring after IV iron doses is warranted to assess for response to therapy, iron overload and other causes of anemia



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## Learning Assessment Question 1

**Which of the following deficiencies can lead to anemia in the PIF population?**

- A. Copper
- B. Vitamin A
- C. Vitamin D
- D. Carnitine

## Learning Assessment Question 2

**Which biochemical marker of iron deficiency is the last to be decreased in the progression to iron deficiency anemia?**

- A. Ferritin
- B. Soluble transferrin receptor
- C. Iron level
- D. Hemoglobin

## Learning Assessment Question 3

### An IV Iron *Replacement* dose should?:

- A. Treat an iron deficiency without anemia and is a routine dose to increase iron stores (ferritin)
- B. Increase Hg level by 2 mg/dl within 1 week
- C. Correct iron deficiency anemia based on the iron deficit
- D. Always include a test dose prior to the full dose administration

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# Questions?

