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## ASSESSMENT OF IRON INTAKE AND MANAGEMENT OF IRON DEFICIENCY ANEMIA

### Background

#### Childhood Anemia

Childhood anemia is a very common diagnosis and usually occurs due to an inadequate amount of dietary iron. Adequate iron storage is necessary to prevent anemia, but is also essential for brain development. In order to prevent iron-deficiency anemia, infants should be drinking either breast milk or iron-fortified formula. Toddlers and older children should eat a balanced, iron-rich diet.

Although iron deficiency is the most common etiology, anemia in childhood can be caused by a variety of conditions that are either congenital or acquired. Types of congenital anemia include sickle cell disease or thalassemia; acquired anemia includes such diagnoses as leukemia, gastrointestinal bleeding, and hemolytic disease. Congenital and acquired anemia generally is not iron-responsive. If a child presents with a pre-diagnosed anemia that is NOT iron-deficient, he/she should be referred to his/her provider for further management.

Sickle cell anemia can be easily ruled out by checking the status of the newborn screening. If sickle cell anemia is strongly suspected and an asymptomatic infant's disease status is unknown, refer to his/her provider, and delay replacement iron regimen until the results are available.

#### Adult Anemia

Anemia in adults is most commonly due to iron deficiency. In contrast to iron deficiency in childhood, which is most commonly caused by deficient dietary intake, the major cause of iron deficiency anemia is blood loss, which can be overt (trauma, hematemesis, melena, menorrhagia, etc.) or occult (e.g. via the gastrointestinal tract). Iron deficiency can also result from dietary deficiencies or reduced gastrointestinal absorption; however, blood loss should first be ruled out by the patient's primary care physician as a cause of iron deficiency before nutritional deficiency or malabsorption is assumed as a diagnosis.

#### Anemia Screening Procedure

Anemia screening is performed by checking hemoglobin levels. **Confirm abnormal/low hemoglobin levels with a second test at the same or a new site.** Make sure the skin is clean and dry before puncture. Avoid any squeezing of the digit after puncture. After the diagnosis of anemia, iron deficiency anemia is confirmed by administering a therapeutic regimen of iron and demonstrating a rise in hemoglobin of  $\geq 1$  g/dL after 4 weeks. If an infant fails to respond to therapy, referral shall be made to a physician or nurse practitioner for further evaluation.

**SUBJECTIVE**

Dietary assessment

- Inadequate consumption of dietary iron
- Consumption of whole cow's milk or formula with low iron or no iron
- Children > age 1 year: consumption of more than 24 ounces of milk daily

Menstrual history (if appropriate)

Patient reported history of gastrointestinal blood loss

Normal versus abnormal newborn state screen for sickle cell disease

Symptoms: Pallor, shortness of breath, tachycardia, decreased energy/fatigue/lethargy, dizziness

**OBJECTIVE**

Fatigued appearance

Pallor of skin and/or conjunctiva

Dyspnea

Tachycardia

Heart murmur

Abnormal/low hemoglobin (hgb), see chart below

Age	Criteria for anemia (hemoglobin concentration in g/dL)	
	Female	Male
6-12 months	<11.0	<11.0
1-2 years	<11.0	<11.0
2-5 years	<11.1	<11.1
5-8 years	<11.5	<11.5
8-12 years	<11.9	<11.9
<b>12-15 years (non-pregnant)</b>		
Nonsmoker	<11.8	<12.5
Smoke up to 1 pack/day	<12.1	<12.8
Smoke 1-2 packs/day	<12.3	<13.0
Smoke >2 packs/day	<12.5	<13.2
<b>15-18 years (non-pregnant)</b>		
Nonsmoker	<12.0	<13.3
Smoke up to 1 pack/day	<12.3	<13.6
Smoke 1-2 packs/day	<12.5	<13.8
Smoke >2 packs/day	<12.7	<14.0
<b>&gt;18 years (non-pregnant)</b>		
Nonsmoker	<12.0	<13.5
Smoke up to 1 pack/day	<12.3	<13.8
Smoke 1-2 packs/day	<12.5	<14.0
Smoke >2 packs/day	<12.7	<14.2

Age	Criteria for anemia (hemoglobin concentration in g/dL)	
	Female	Male
<b>PREGNANT: 1<sup>st</sup> Trimester</b>		
Nonsmoker	<11.0	N/A
Smoke up to 1 pack/day	<11.3	N/A
Smoke 1-2 packs/day	<11.5	N/A
Smoke >2 packs/day	<11.7	N/A
<b>PREGNANT: 2<sup>nd</sup> Trimester</b>		
Nonsmoker	<10.5	N/A
Smoke up to 1 pack/day	<10.8	N/A
Smoke 1-2 packs/day	<11.0	N/A
Smoke >2 packs/day	<11.2	N/A
<b>PREGNANT: 3<sup>rd</sup> Trimester</b>		
Nonsmoker	<11.0	N/A
Smoke up to 1 pack/day	<11.3	N/A
Smoke 1-2 packs/day	<11.5	N/A
Smoke >2 packs/day	<11.7	N/A

**ASSESSMENT**

Not at risk for iron depletion with normal hemoglobin

**OR**

At risk for iron depletion with normal hemoglobin

- Infant at risk: preterm, low birth weight, diet of non-iron fortified infant formula, introduction of cow's milk prior to 12 months of age, or breastfed infant who is receiving inadequate dietary iron after six months of age
- Toddler/child/adolescent at risk: consumption of more than 24 ounces of cow's milk daily, low dietary iron intake/picky eaters, previous history of iron deficiency

**OR**

Anemia, suspect iron-deficiency

**PLAN**

For those not at risk for iron depletion with a normal hemoglobin

Instruct in age appropriate diet high in iron

Certification for WIC if eligible

Educate regarding the importance of iron for both blood and brain development

For those at risk of iron depletion with a normal hemoglobin

Instruct in age appropriate diet high in iron

Issue age-appropriate multivitamin with iron or write prescription:

- Infant/toddler multivitamin with iron drops at dose of 1 ml daily **OR**
- Children's chewable multivitamin at dose of one tablet daily per manufacturer's directions
- **NOTE:** If multivitamins with iron are used in an infant who is not anemic, the daily dose should not exceed 15 mg elemental iron daily or 2 mg/kg/day. Most infant/toddler *multivitamin* with iron drops contain 10 mg elemental iron per milliliter. Most chewable multivitamins with iron for toddlers and older children/adolescents contain 15-18 mg elemental iron per tablet. These should be administered according to package instructions.

Give iron-related pamphlet

Certification for WIC if eligible

Educate regarding the importance of iron for both blood and brain development

For those with suspected iron deficiency anemia, see table below and refer to the Iron replacement Dosing Chart:

Age <6 months	Age 6-12 Months	Age 1-3 Years	Age 3-12 Years	Age 12-18 Years	>18 Years
Obtain dietary assessment	Obtain dietary assessment	Obtain dietary assessment	Obtain dietary assessment	Obtain dietary assessment	Evaluate for blood loss (history, physical, hemocult)
Instruct to use breast milk or iron fortified formula	Instruct in adequate consumption of dietary iron	Instruct in adequate consumption of dietary iron	Instruct in adequate consumption of dietary iron	Instruct in adequate consumption of dietary iron	Consider referral to MD or NP
Supplement with iron according to the dose based on body weight (see dosing chart)	Give iron-related pamphlet Refer to WIC if eligible	Decrease milk if necessary to 16 ounces or less daily Give iron-related pamphlet	Decrease milk if necessary to 16 ounces or less daily Give iron-related pamphlet	Decrease milk if necessary to 16 ounces or less daily Give iron-related pamphlet	Instruct in adequate consumption of dietary iron and Vitamin C
Refer to WIC if eligible	Supplement with iron according to dose based on body weight (see dosing chart)	Refer to WIC if eligible Supplement with iron according to dose based on body weight (see dosing chart)	Refer to WIC if eligible (< 5 yrs.) Supplement with iron according to dose based on body weight (see dosing chart)	Supplement with iron according to dose based on body weight (see dosing chart)	Dispense Ferrous Sulfate (FeSO <sub>4</sub> ) 325mg by mouth three times per day.

### Health Teaching

Oral iron may cause constipation and turn stool black

Establish regular time for drug administration

Iron drops may harmlessly coat the teeth

Oral iron may interfere with absorption of tetracycline  
 Vitamin C will enhance absorption  
 Iron absorption is inhibited by antacids, Vitamin E, eggs, coffee, tea, and milk  
**ORAL IRON IS A SERIOUS POTENTIAL POISON - Issue safely**

### Referral Indicators

Premature infant  
 Poor weight gain/abnormal growth pattern  
 Symptomatic anemia (see “objective” for list of possible symptoms)  
 Heart murmur present  
 Pregnancy  
 Pre-diagnosed anemia that is NOT iron-deficient  
 Sickle cell disease and other hemoglobinopathies  
 Symptoms of gastrointestinal bleeding (dark tarry stools, blood in toilet bowl or on toilet paper, large amounts of blood passed from the rectum, vomiting blood)  
 Special health needs that increase the risk of iron-deficiency (chronic infection, inflammatory disorders, chronic or acute blood loss, restricted diets, use of medications that interfere with iron absorption)  
 Parent needs further guidance/education (subjective evaluation by RN/RD)  
 Inadequate response to therapy

#### **CRITICAL VALUES:**

**For ages <5:** Refer immediately for hemoglobin of **8.5 or less** or if the patient is symptomatic

**For ages 5 and up:** Refer immediately for hemoglobin of **10 or less** or if the patient is symptomatic

\*For all ages, if the patient is symptomatic, they should be referred to their primary care provider immediately

### Follow-up

For individuals with normal hemoglobin or iron depletion with normal hemoglobin:

Screen for anemia at routine intervals during WIC visits and/or preventive care visits (EPSDT exams)

For individuals with suspected iron deficiency anemia:

Evaluate for compliance to dietary and iron therapy

Repeat hemoglobin in 4 weeks, confirm at least 1 g/dL increase in hemoglobin

- **If there less than a 1 g/dL increase in hemoglobin after 4 weeks of iron supplementation, confirm that the dose is appropriate, there is no dairy overconsumption, and that the patient is compliant. If there are no confounding factors and the hemoglobin has not gone up, refer to health care provider.**

- **If there is at least 1g/dL increase in hemoglobin, continue iron supplementation for 8 weeks after hemoglobin confirmed normal.**

Refer to health care provider if compliant infant shows inadequate response to therapy or hemoglobin remains below normal range despite 6-8 weeks of iron supplementation.

### **Iron Replacement Dosing Chart**

All treatment of iron deficiency anemia is two-fold, a diet high in iron rich foods and therapeutic regimens of iron.

If concentrated iron drops, elixir or tablets are used in an infant or child that is anemic, the dose should not exceed 6 mg/kg of elemental iron daily to a maximum of the standard adult dose. Replacement iron doses may be divided into two or three daily doses. Liquid concentrated iron preparations are generally accepted but may not be palatable. If a child refuses to take the prescribed preparation, another may be used as long as the daily dose of elemental iron remains consistent.

**All doses referenced in this protocol and on the dosing chart refer to either:**

- **Concentrated ferrous sulfate drops that contain 15 mg/1.0 ml elemental iron.**  
**OR**
- **Ferrous sulfate elixir that contain 44 mg/5.0 mL elemental iron.**  
**OR**
- **325 mg ferrous sulfate tablets that contain 65 mg elemental iron per tablet.**

**Instruct the caregiver regarding measurement using calibrated, oral medication syringes. Doses in milliliters require a precise dropper or oral syringe with well-marked increments of 0.1 ml.**

Maximizing the dose for body weight is very important.

### Iron Replacement Dosing Chart

Weight		Dosing Script (Write This on Prescription)		
Lbs	Kgs	IRON DROPS (15 mg / 1.0 ml)	ELIXIR (44 mg / 5.0 ml)	TABLETS (65 mg / tablet)
10	4.5	10.2 mg elemental iron (0.7 ml) po bid		
11	5.0	11.3 mg elemental iron (0.8 ml) po bid		
12	5.5	12.3 mg elemental iron (0.8 ml) po bid		
13	5.9	13.3 mg elemental iron (0.9 ml) po bid		
14	6.4	14.3 mg elemental iron (1.0 ml) po bid		
15	6.8	15.3 mg elemental iron (1.0 ml) po bid		
16	7.3	16.4 mg elemental iron (1.1 ml) po bid		
17	7.7	17.4 mg elemental iron (1.2 ml) po bid		
18	8.2	18.4 mg elemental iron (1.2 ml) po bid		
19	8.6	19.4 mg elemental iron (1.3 ml) po bid		
20	9.1	20.5 mg elemental iron (1.4 ml) po bid		
21	9.5	21.5 mg elemental iron (1.4 ml) po bid		
22	10.0	22.5 mg elemental iron (1.5 ml) po bid		
23	10.5	23.5 mg elemental iron (1.6 ml) po bid		
24	10.9	24.5 mg elemental iron (1.6 ml) po bid		
25	11.4	25.6 mg elemental iron (1.7 ml) po bid		
26	11.8	26.6 mg elemental iron (1.8 ml) po bid		
27	12.3	27.6 mg elemental iron (1.8 ml) po bid		
28	12.7	28.6 mg elemental iron (1.9 ml) po bid		
29	13.2	29.7 mg elemental iron (2.0 ml) po bid		
30	13.6	30.7 mg elemental iron (2.0 ml) po bid		
31	14.1	31.7 mg elemental iron (2.1 ml) po bid		
32	14.5	32.7 mg elemental iron (2.2 ml) po bid		
33	15.0	33.8 mg elemental iron (2.3 ml) po bid	33.8 mg elemental iron (3.8 ml) po bid	
34	15.5	34.8 mg elemental iron (2.3 ml) po bid	34.8 mg elemental iron (4.0 ml) po bid	
35	15.9	35.8 mg elemental iron (2.4 ml) po bid	35.8 mg elemental iron (4.1 ml) po bid	
36	16.4	36.8 mg elemental iron (2.5 ml) po bid	36.8 mg elemental iron (4.2 ml) po bid	
37	16.8	37.8 mg elemental iron (2.5 ml) po bid	37.8 mg elemental iron (4.3 ml) po bid	
38	17.3	38.9 mg elemental iron (2.6 ml) po bid	38.9 mg elemental iron (4.4 ml) po bid	
39	17.7	39.9 mg elemental iron (2.7 ml) po bid	39.9 mg elemental iron (4.5 ml) po bid	
40	18.2	40.9 mg elemental iron (2.7 ml) po bid	40.9 mg elemental iron (4.6 ml) po bid	
41	18.6	41.9 mg elemental iron (2.8 ml) po bid	41.9 mg elemental iron (4.8 ml) po bid	
42	19.1	43.0 mg elemental iron (2.9 ml) po bid	43.0 mg elemental iron (4.9 ml) po bid	
43	19.5	44.0 mg elemental iron (2.9 ml) po bid	44.0 mg elemental iron (5.0 ml) po bid	
44	20.0		45.0 mg elemental iron (5.1 ml) po bid	

Weight		Dosing Script (Write This on Prescription)		
Lbs	Kgs	IRON DROPS (15 mg / 1.0 ml)	ELIXIR (44 mg / 5.0 ml)	TABLETS (65 mg / tablet)
45	20.5		46.0 mg elemental iron (5.2 ml) po bid	
46	20.9		47.0 mg elemental iron (5.3 ml) po bid	
47	21.4		48.1 mg elemental iron (5.5 ml) po bid	
48	21.8		49.1 mg elemental iron (5.6 ml) po bid	
49	22.3		50.1 mg elemental iron (5.7 ml) po bid	
50	22.7		51.1 mg elemental iron (5.8 ml) po bid	
51	23.2		52.2 mg elemental iron (5.9 ml) po bid	
52	23.6		53.2 mg elemental iron (6.0 ml) po bid	
53	24.1		54.2 mg elemental iron (6.2 ml) po bid	
54	24.5		55.2 mg elemental iron (6.3 ml) po bid	
55	25.0		56.3 mg elemental iron (6.4 ml) po bid	
56	25.5		57.3 mg elemental iron (6.5 ml) po bid	
57	25.9		58.3 mg elemental iron (6.6 ml) po bid	
58	26.4		59.3 mg elemental iron (6.7 ml) po bid	
59	26.8		60.3 mg elemental iron (6.9 ml) po bid	
60	27.3		61.4 mg elemental iron (7.0 ml) po bid	
61	27.7		62.4 mg elemental iron (7.1 ml) po bid	
62	28.2		63.4 mg elemental iron (7.2 ml) po bid	
63	28.6		64.4 mg elemental iron (7.3 ml) po bid	
64	29.1		65.5 mg elemental iron (7.4 ml) po bid	One tablet (65.0 mg elemental iron) po bid
65	29.5		66.5 mg elemental iron (7.6 ml) po bid	One tablet (65.0 mg elemental iron) po bid
66	30.0		67.5 mg elemental iron (7.7 ml) po bid	One tablet (65.0 mg elemental iron) po bid
67	30.5		68.5 mg elemental iron (7.8 ml) po bid	One tablet (65.0 mg elemental iron) po bid
68	30.9		69.5 mg elemental iron (7.9 ml) po bid	One tablet (65.0 mg elemental iron) po bid
69	31.4		70.6 mg elemental Iron (8.0 ml) po bid	One tablet (65.0 mg elemental iron) po bid
70	31.8		71.6 mg elemental iron (8.1 ml) po bid	One tablet (65.0 mg elemental iron) po bid
71	32.3		72.6 mg elemental iron (8.3 ml) po bid	One tablet (65.0 mg elemental iron) po bid
72	32.7		73.6 mg elemental iron (8.4 ml) po bid	One tablet (65.0 mg elemental iron) po bid
73	33.2		74.7 mg elemental iron (8.5 ml) po bid	One tablet (65.0 mg elemental iron) po bid
73 - 95	33.2 43.2		86.0 mg elemental iron (9.8 ml) po bid	One tablet (65.0 mg elemental iron) po bid
> 95	> 43.2		64.8 mg elemental iron (7.4 ml) po tid	One tablet (65.0 mg elemental iron) po tid

## **Writing a Prescription for Iron Replacement** **Provider and Pharmacist Prescription Guidance**

When writing a prescription for ferrous sulfate, the dosage should be based strictly on the exact weight of the child. Use the following format when writing prescriptions for iron replacement. This format will help to standardize the instructions given to pharmacists and should help minimize dosing errors if the pharmacy needs to provide the medication in another formulation.

<b><i>For liquid iron preparations, write:</i></b>	<b><i>Example:</i></b>
Ferrous sulfate drops (15mg elemental iron/1.0 mL) Sig (insert dosing script from dosing chart) #QS 1 month, 3 refills	Ferrous sulfate drops (15 mg elemental iron/1.0 mL) Sig 10.2 mg elemental iron (0.7 mL) po bid #QS 1 month, 3 refills
Or	Or
Ferrous sulfate elixir (44mg elemental iron/5.0 mL) Sig (insert dosing script from dosing chart) #QS 1 month, 3 refills	Ferrous sulfate elixir (44 mg elemental iron/5.0 mL) Sig 66 mg elemental iron (7.5 mL) po bid #QS 1 month, 3 refills
<b><i>For iron tablets, write:</i></b>	<b><i>Example:</i></b>
Iron tablets (65 mg elemental iron/tablet) Sig (insert dosing script based from dosing chart) #QS 1 month, 3 refills	Iron tablets (65 mg elemental iron/tablet) Sig one tablet (65 mg elemental iron) po tid #QS 1 month, 3 refills

## **REFERENCES**

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- Mahoney DH, et al. Iron deficiency in infants and young children: Treatment. In: UpToDate, Hoppin, AG (Ed), UpToDate, Waltham, MA, 2010.
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## LEAD TOXICITY SCREENING

### GENERAL INFORMATION

Children from 6 to 72 months may be at risk for lead poisoning (lead poisoning can affect any child regardless of race, economic status, or living conditions)

Children under the age of 6, living in older homes, and living in poverty have the highest risk for lead poisoning

### Sources of lead exposure include:

- Housing built prior to 1978 with old chipping paint, lead water pipes, or lead soldered pipes
- Recently renovated home or frequently visited house/building built before 1978
- Close proximity (80 ft) to a heavily traveled highway (leaded gasoline) or near industrial site
- Work or hobbies involving paint, chemicals, battery, mining, lead smelting, leaded glass, lead sinkers, and lead glazed pottery
- Pewter or leaded crystal containers for storing, cooking, or eating food/drink
- Plastic or vinyl mini blinds, (purchased prior to 1996)
- Folk medicine such as Mexican, Asian, and Middle Eastern
- Sibling, housemate, frequent visitor, playmates of children with known lead toxicity

### Effects of lead toxicity include:

- Very severe lead exposure in children can cause coma, convulsions, and even death
- Lower levels can affect the central nervous system and kidneys
- Very low levels are associated with decreased intelligence, behavior problems, decreased growth, and hearing difficulties

### SUBJECTIVE

Have parent/guardian complete the **Blood Lead Risk Assessment Questionnaire** (see Table 1). Document all positive risk factors in the medical record. If the parent/guardian answers “yes” or “don’t know” to any of the questions, the child is considered to be at **high risk** and should be **screened with a finger stick BLL at that time.**

### OBJECTIVE

**Obtain a finger stick blood lead level** at well child visit on all children **12 months and 24 months of age**

**Obtain a finger stick blood lead level** at well child visit on **children 36 to 72 months of age** **Who do not have a previously documented blood test**

**Confirm** all elevated blood lead levels (5 µg/dL or greater) using venous blood sampling in accordance with the **Recommended Schedule for a Confirmatory Venous Sample** (see Table 2)

**Obtain a finger stick blood lead level for siblings (6-72 months of age) of children with a confirmed elevated blood lead level**, and consult with parents regarding the need to test other frequent playmates, pregnant household members, and others

Consult parent(s) or caretaker regarding results and need for follow-up (document any parent/guardian refusal)

Comprehensive follow-up services must be based on the child's confirmed Blood Lead Level (BLL) and managed according to **Schedule for Follow-up Blood Lead Testing** (see Table 3)

### **ASSESSMENT**

All children with a confirmed **BLL  $\geq 5$   $\mu\text{g}/\text{dL}$**  should receive comprehensive follow-up services based on the confirmed Blood Lead Level (BLL) and managed according to **Schedule for Follow-up Blood Lead Testing** (see Table 3)

### **PLAN**

Provide comprehensive follow-up services for confirmed **BLL  $\geq 5$   $\mu\text{g}/\text{dL}$**  according to **Schedule for Follow-up Blood Lead Testing** (see Table 3)

Stress need for appropriate follow-up, testing, treatment, and intervention

Repeat blood lead level (BLL) according to guidelines

If developmentally delayed, refer to appropriate programs

### **Health Teaching (for confirmed cases of lead exposure of 5 $\mu\text{g}/\text{dL}$ or greater)**

Provide anticipatory guidance during pregnancy, when children are 3-6 months of age, and again when they are 12 months of age (parental guidance during this time frame might prevent some lead exposure)

Provide lead poisoning prevention counseling to all children receiving child health exams

Educate about the effects/problems of lead poisoning, important sources of lead (be alert to parental occupations/hobbies), and discuss ways to prevent access to causative agents

Stress hand washing (especially before eating), showering, proper handling of soiled clothes, and frequent washing of toys and pacifiers

Educate about soil contaminated with lead (if soil near house is contaminated because of lead-based paint or near major highway, advise to plant shrubs near house to decrease play activity in that area)

Educate about miniblinds and possible lead contamination

Provide nutritional counseling regarding the need for 3 small meals and 3 snacks a day with adequate iron and calcium (iron deficiency can enhance lead absorption and empty stomach increases lead absorption)

Stress need to clean floors, window frames, windowsills, and other surfaces at least weekly with warm water and a general all-purpose cleaner or a cleaner made specifically for lead

Discuss the ineffectiveness of dry methods of cleaning, such as sweeping or vacuuming (unless a Hepavac is used) for lead removal

If drinking water has increased lead, use only fully flushed water (let water run one to two minutes) from cold-water tap for cooking, drinking, and making formula (encourage breast-feeding)

For cooking preparation and storage, use pottery that is labeled safe for cooking and/or storing food, and do not store food in open cans

**Table 1: BLOOD LEAD RISK ASSESSMENT QUESTIONNAIRE**

<p><b>Mandatory Questions:</b></p> <p>Does your child live in or regularly visit a house built before 1950? (This could include a day care center, home of a baby sitter, or a relative.)</p> <p>Does your child live in or regularly visit a house built before 1978 with recent, ongoing, or planned renovations or remodeling (within the past 6 months)?</p> <p>Does your child have a sibling or a playmate that has, or did have, lead poisoning?</p>
<p><b>Optional Questions</b> (may be asked at the provider's discretion):</p> <p>Does your child frequently come in contact with an adult who works with lead? (Examples include construction, welding, pottery, etc.)</p> <p>Does your home contain any plastic or vinyl mini blinds made before July 1996?</p> <p>Have you ever been told that your child has low iron?</p> <p>Have you seen your child eating paint chips, crayons, soil, or dirt?</p> <p>Does your child live near or visit with someone who lives near a lead smelter, battery recycling plant or other industry that could release lead?</p> <p>Do you give your child any home or folk remedies that may contain lead? (such as moonshine, Azarcon, Greta, Paylooah)</p> <p>Does your child live within 80 feet (or one block) of areas with a constant flow of traffic, such as busy intersections and streets, highways and interstates? (The soil near heavily used streets and roads may contain lead as a result of past use of lead in gasoline; automobile exhaust from past leaded gasoline contributes to both air and soil lead pollution)</p> <p>Does your home's plumbing have lead pipes or copper pipes with lead solder joints?</p> <p>Does your family use pottery ware or leaded crystal for cooking, eating, or drinking?</p>

**Table 2: RECOMMENDED SCHEDULE FOR A CONFIRMATORY VENOUS SAMPLE**

Screening test result ( $\mu\text{g}/\text{dL}$ )	Time to confirmation testing:
5-9	1-3 months
10-44	1 week - 1 month*
45-59	48 hours
60-69	24 hours
$\geq 70$	Urgently as emergency test

\* The higher the BLL on the screening test, the more urgent the need for confirmatory testing

**Table 3: SCHEDULE FOR FOLLOW-UP BLOOD LEAD TESTING<sup>a</sup>**

Medical management includes follow-up blood lead testing. The following table (Table 3) presents the suggested frequency of follow-up tests and should be used as guidance. Case managers and PCPs should consider individual patient characteristics and caregiver capabilities and adjust the frequency of follow-up tests accordingly.

<b>Venous Blood Lead Level (<math>\mu\text{g}/\text{dL}</math>)</b>	<b>Early Follow-Up (first 2-4 tests after identification)</b>	<b>Late Follow-Up (after BLL begins to decline)</b>
5-9	3 months <sup>b</sup>	6-9 months
10-19	1-3 months <sup>b</sup>	3-6 months
20-24	1-3 months <sup>b</sup>	1-3 months
25-44	2 weeks-1 month	1 month
$\geq 45$	As soon as possible	As soon as possible

<sup>a</sup> Seasonal variation of BLLs exists and may be more apparent in colder climate areas. Greater exposure in the summer months may necessitate more frequent follow-ups.

<sup>b</sup> Some case managers or PCPs may choose to repeat blood lead tests on all new patients within a month to ensure that their BLL is not rising more quickly than anticipated.

**Table 4: SUMMARY OF RECOMMENDED ACTIONS FOR CHILDREN BASED ON BLOOD LEAD LEVEL( $\mu\text{g}/\text{dL}$ ) VALUES**

<b>&lt;5</b>	<b>5 - 44</b>	<b>45 – 69</b>	<b><math>\geq 70</math></b>
Lead education* -Dietary -Environmental	Lead education* -Dietary -Environmental	Lead education* -Dietary -Environmental	Hospitalize and commence chelation therapy (following confirmatory venous blood lead test) in conjunction with consultation from a medical toxicologist or a pediatric environmental health specialty unit.
Environmental assessment for pre-1978 housing	Follow-up blood lead monitoring (see guidelines)	Follow-up blood lead monitoring (see guidelines)	
Follow-up blood lead monitoring	Complete history and physical exam  Lab work: -Iron status -Consider hemoglobin or hematocrit  Environmental investigation** (BLL's $\geq 20$ or persistently elevated levels)  Lead hazard reduction  Neurodevelopmental monitoring  Abdominal X-ray (if particulate lead ingestion is suspected) with bowel decontamination if indicated	Complete history and physical exam  Lab work: - Iron Status -Hemoglobin or hematocrit -Free erythrocyte protoporphyrin (FEP)  Environmental investigation**  Lead hazard reduction  Neurodevelopmental monitoring  Abdominal X-ray (if particulate lead ingestion is suspected) with bowel decontamination if indicated  Oral Chelation therapy Consider hospitalization if lead-safe environment cannot be assured	Proceed according to actions for 45-69 $\mu\text{g}/\text{dL}$

\*<http://pediatrics.aappublications.org/content/116/4/1036.full.pdf>

\*\*Environmental investigations are requested by a Childhood Lead Prevention Nurse at the Central office .

If the child lives in Section 8 housing and has an elevated blood lead level, the Tennessee Housing Development Agency will be notified for environmental investigation, assessment, and correction of the problem. For certified inspection, assessment, and abatement firms in the area, call the Lead Line at 1-888-771-5323.

The following actions are **NOT** recommended at any blood lead level:

- Searching for gingival lead lines
- Testing of neurophysiologic function
- Evaluation of renal function  
(except during chelation with EDTA)
- Testing of hair, teeth, or fingernails for lead
- Radiographic imaging of long bones
- X-ray fluorescence of long bones

## **REFERENCES**

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Centers for Disease Control and Prevention. Managing Elevated Blood Lead Levels Among Young Children: Recommendations from the Advisory Committee on Childhood Lead Poisoning Prevention. Atlanta: CDC; 2002  
[http://www.cdc.gov/nceh/lead/ACCLPP/Final\\_Document\\_030712.pdf](http://www.cdc.gov/nceh/lead/ACCLPP/Final_Document_030712.pdf)

# LIST OF STANDARD ABBREVIATIONS

Revised November 2012

## NOTE:

Region specific abbreviations may be used as long as they are approved by the region and are attached to the following list of approved standard abbreviations.

**The use of abbreviations in standard program and laboratory manuals and Patient Tracking and Billing Management Information System (PTBMIS) are allowed.**

The following Joint Commission on Accreditation of Healthcare Organization (JCAHO) prohibited abbreviations should not be used because potential for provider error:

qd /every day; qod / every other day; and U/ units

## **-A-**

A&D	Alcohol & Drug
A & O	alert and oriented
Ab	abortion
Abd	abdominal, abdomen
Abn	abnormal
ac	before meals
ACHES	abdominal pain, chest pain, headaches, eye problems and severe leg pain
ADD	attention deficit disorder
ADHD	attention deficit hyperactive disorder
ad lib	as desired
ADL	activities of daily living
adm	admission, admit
AIDS	acquired immunodeficiency Syndrome
AKA	above knee amputation
ALT	anterio lateral thigh
Am	morning
AMA	against medical advice
amb	ambulatory
Amox	Amoxocillin
amp	amputation
amt	amount
ant	anterior
ant font	anterior fontanelle
appt	appointment
ARDS	Acute Respiratory Distress Syndrome

ASA	aspirin
ASAP	as soon as possible
ASHD	arteriosclerotic heart disease
AUB	abnormal uterine bleeding
auth #	authorization number
AV	anteverted

## **- B -**

BC	birth control
BCA	bichloracetic acid
BCP	birth control pills
B/F	black female
BF	breastfeeding
BID	two times daily
Bil	bilateral
BKA	below knee amputation
BM	bowel movement
B/M	black male
BMI	body mass index
BMR	basal metabolic rate
B/P or BP	blood pressure
BOM	bilateral otitis media
BS or BG	blood sugar or glucose
BSE	breast self exam
BSO	bilateral salpingo oophorectomy
BTB	break through bleeding
BTL	bilateral tubal ligation
BUM	back up method
BV	bacterial vaginosis
BW	birth weight
BX	biopsy

**- C -**

C	centigrade/ Celsius
Ca	cancer
Ca+	calcium
CABG	coronary artery bypass with graft
CAD	coronary artery disease
Cal	calorie
cap	Capsule
Carb	carbohydrate
cath	catheterization
cc	cubic centimeter
CC	chief complaint
CCLG	Creative Curriculum Learning Games
CCU	Coronary Care Unit
CD	communicable disease
CEDEP	Communicable Environmental Disease & Emergency Preparedness
Cert	certify
CHA	Community Health Agency
CHF	congestive heart failure
Chol	cholesterol
CHR	child health record
CID	correction in documentation
Cigs	cigarettes
Circ	circumcision
ck	check
cm	centimeter
CMT	cervical motion tenderness
CMV	cytomegalovirus
CNS	central nervous system
c/o	complains of
Co	county
CO <sub>2</sub>	carbon dioxide
comp	comprehensive
colpo	colposcopy
cont	continue
COPD	chronic obstructive pulmonary disease
CPAP	continuous positive airway pressure
cryo	cryosurgery
C-section	cesarean section
CTA	clear to auscultation
CV	cardiovascular
CVA	cerebral vascular accident

CVAT	costo vertebral angle tenderness
Cx	cervix
CXR	chest x-ray

**- D -**

D	diarrhea
D & C	dilatation and curettage
dc, D/C	discontinue, discharge
DCS	Department of Children's Services
Del	delivery, delivered
delt	deltoid
dept	department
dev	development
DHS	Department of Human Services
diaph	diaphragm
diff	differential
Dir	Director
disc	discussed
disp	dispensed
DM	Diabetes Mellitus
DMPA, Depo	Depo-Medroxyprogesterone (Depo-Provera)
DOE	dyspnea on exertion
Doxy	Doxycycline
DTR	Deep tendon reflex
DTs	Delirium tremors
DVT	deep vein thrombosis
Dx	diagnosis
DZ	disease

**- E -**

ECC	endocervical curettage
ED	Emergency Department
edu/ed	education
EDC	estimated date of confinement
EDD	estimated date of delivery
EES, E-mycin	Erythromycin
EMS	Emergency Medical Services
enc	encourage
ENT	ear, nose, throat
Env	environment
ER	emergency room
eRx	e prescribe
esp	especially
etc	and so on
ETOH	alcohol

eval evaluate  
 ex example  
 ext external

**- F -**

F, Fa father  
 FA Folic Acid  
 FBD fibrocystic breast disease  
 FBS, FBG fasting blood sugar or glucose  
 fe female  
 Fe iron  
 FeSO<sub>4</sub> ferrous sulfate  
 FM fetal movement  
 font fontanel  
 FH fundal height  
 FHR fetal heart rate  
 FHT fetal heart tone  
 Fl fluoride  
 freq frequent  
 FSP Family Service Plan  
 ft foot  
 FTT failure to thrive  
 f/u follow-up  
 FUO fever of undetermined origin  
 FVA Fluoride Varnish Application  
 Fx fracture

**- G -**

GB gall bladder  
 GC gonorrhea  
 GERD gastro esophageal reflux disease  
 GF grandfather  
 GI gastrointestinal  
 glu glucose  
 Gm gram  
 GM grandmother  
 Gr grade  
 gr grain  
 GSE genital self-exam  
 gtt drops  
 G\_P\_A\_ gravida \_\_, para \_\_, abortion\_  
 GYN gynecology

**- H -**

H<sub>2</sub>O water  
 H<sub>2</sub>O<sub>2</sub> hydrogen peroxide

HOH hard of hearing  
 HA headache  
 HBV hepatitis B virus  
 HC head circumference  
 HCTZ hydrochlorothiazide  
 HCV hepatitis C virus  
 HCW health care worker  
 HD health department  
 HDV hepatitis D virus  
 HEENT head, eyes, ears, nose, throat  
 HH Home Health  
 HMB heavy menstrual bleeding  
 hosp hospital  
 hr hour  
 HR heart rate  
 HRT hormone replacement therapy  
 HS night, bedtime  
 HSV herpes simplex virus  
 ht height  
 HTN hypertension  
 Hx history  
 hyst hysterectomy

**- I -**

IBW ideal body weight  
 IBS irritable bowel syndrome  
 ICU Intensive Care Unit  
 I&D incision and drainage  
 ID intradermal or identification  
 IDDM insulin dependent diabetes mellitus  
 i.e. such as  
 IG immune globulin  
 imm immunization  
 in inches  
 info information  
 inj injection  
 Ins insurance  
 inst instruct, instructed, instructions  
 IP intestinal parasite  
 irreg irregular  
 ISG immune serum globulin  
 IUB Irregular uterine bleeding  
 IUGR intrauterine growth retardation  
 IUP intrauterine pregnancy  
 IV intravenous

**- J -**

(none)

**- K -**

K+	potassium
Kcal	kilo calorie
KCL	potassium chloride
kg	kilogram
KUB	kidneys, ureters, bladder

**- L -**

L&D	labor and delivery
LAC	left antecubital
Lap	laparotomy
lat	lateral
lb	pound
LBW	low birth weight
LD	left deltoid
LE	lower extremity
LEEP	Laser Electrosurgical Excision Procedure
LEP	Limited English Proficiency
LFA	left forearm
lg	large
LG	left gluteus
LGA	large for gestational age
LGM	left gluteus maximus
liq	liquid
LLE	left lower extremity
LLL	Left Lower Lobe
LLQ	left lower quadrant
LMP	last menstrual period
LNMP	last normal menstrual period
LSB	left sternal border
LSC	last sexual contact
LT	left thigh
LUA	left upper arm
LUE	left upper extremity
LUQ	left upper quadrant
LHD	local health department

**- M -**

m	male
M, Mo	mother
Max	maximum

mcg	microgram
mcg/dl	micrograms per dilution
MCO	Managed Care Organization
MDI	Metered Dose Inhaler
med	medication
mg	milligram
MGF	maternal grandfather
MGR	murmur, gallop, rub
MGM	maternal grandmother
mgt/mgmt	management
MH	Mental Health
MI	myocardial infarction
min	minute
misc	miscellaneous
ml	milliliter
mm	millimeter
MNT	medical nutrition therapy
mo	month
mod	moderate
mono	mononucleosis
MRSA	methicillin resistant staph aureus
mtg	meeting
MVA	motor vehicle accident
MVI	multivitamin
MVP	mitral valve prolapse
MTZ	metronidazole

**- N -**

Na	sodium
N/A	not applicable
NaCl	sodium chloride
NAS	intranasal
N&V	nausea and vomiting
NAD	no apparent distress
NFP	natural family planning
NGU	nongonococcal urethritis
NICU	neonatal intensive care unit
NIDDM	non insulin dependent diabetes mellitus
NKA	no known allergies
NKDA	no known drug allergies
nl	normal
NN	nurses notes
NOS	not otherwise specified
NPO	nothing by mouth
NRF	no refills
NRT	nicotine replacement therapy

NSAIDS non-steroidal anti-inflammatory drugs  
 Nsg nursing  
 NSR normal sinus rhythm  
 NSSC normal size, shape, and contour  
 N/T non tender  
 nutr, nutri nutrition

**- O -**

O<sub>2</sub> oxygen  
 O & P ova and parasites  
 OB obstetric  
 oc oral contraceptive  
 occ occasional  
 OCP oral contraceptive pill  
 OD overdose or right eye  
 OM otitis media  
 ortho orthopedic  
 OS left eye  
 OT Occupational Therapy  
 OTC over the counter  
 OU both eyes  
 OV office visit  
 oz ounce

**- P -**

P pulse  
 palp palpable  
 PAP Patient Assistant Program  
 PC Primary Care  
 phone conference/call  
 pc after meals  
 PCN penicillin  
 PE physical examination  
 ped pediatric  
 peri perineum  
 PERRLA pupils equal, round, reactive to light and accommodation  
 PGF paternal grandfather  
 PGM paternal grandmother  
 PHBC "Partners for Healthy Babies" curriculum  
 PID pelvic inflammatory disease  
 pk pack  
 pkg package  
 pm afternoon

PMH past medical history  
 PMI point of maximum impulse  
 PMS premenstrual syndrome  
 pneu pneumonia  
 PNV prenatal vitamins  
 POC plan of care  
 po by mouth  
 post posterior  
 pp post partum  
 PPBS, PPBG post prandial blood sugar or glucose  
 ppd packs per day  
 PPNG penicillinase producing neisseria gonorrhoea  
 preg pregnant  
 prep preparation  
 Pres Elig presumptive eligibility  
 PRN as needed  
 Prog program  
 PROM premature rupture of membranes  
 PSVT paroxysmal supraventricular tachycardia  
 PT physical therapy or pregnancy test  
 Pt patient  
 p/u pick up  
 PUD peptic ulcer disease  
 Pul pulmonary  
 pvt private  
 psych psychiatric

**- Q -**

q every  
 q \_\_\_ h every \_\_\_ hours  
 QID four times a day  
 qt quart

**- R -**

R or RR respirations  
 RA rheumatoid arthritis  
 RAC right antecubital  
 RD right deltoid  
 RDS respiratory distress syndrome  
 re regarding  
 Re√ re-check  
 Rec recommend

rec'd received  
 rev'd reviewed  
 recert recertify, recertification  
 ref referral, refer  
 reg regulation, regular  
 rehab rehabilitation  
 resp respiratory  
 req request  
 RF refill  
 RFA right forearm  
 RG right gluteus  
 RGM right gluteus maximus  
 Rh serological blood grouping factor  
 RLE right lower extremity  
 RLL Right Lower Lobe  
 RLQ right lower quadrant  
 r/o rule out  
 ROI release of information  
 ROM range of motion  
 ROS Review of Systems  
 R/R reactive reparative changes  
 RRR regular rate rhythm  
 R/S resupply  
 RSB right sternal border  
 r/t related to  
 RT Right Thigh  
 RTC return to clinic  
 RUA right upper arm  
 RUE right upper extremity  
 RUQ right upper quadrant  
 RV retroverted  
 Rx prescribed, prescription, treatment  
 RxAP prescription assistance program

s/p status post  
 spec specimen  
 sq squamous  
 SS Social Security  
 s/s signs and symptoms  
 SSI Supplemental Security Income  
 ST Speech Therapy  
 STAT immediately  
 SVD spontaneous vaginal delivery  
 SVT supraventricular tachycardia

**T -**

T/ temp temperature  
 T & A tonsillectomy and adenoidectomy  
 tab tablet  
 TAH total abdominal hysterectomy  
 Tbsp tablespoon  
 TC throat culture  
 TCA trichloroacetic acid  
 TIA transient ischemic attack  
 TID three times a day  
 TM tympanic membrane  
 TNTC too numerous to count  
 TOC test of cure  
 TNCare TennCare  
 tol tolerated  
 tr trace  
 trach tracheostomy  
 trich trichomoniasis  
 TSE testicular self exam  
 tsp teaspoon  
 TTQL Tennessee Tobacco Quit Line  
 Tx treatment

**- S -**

SAB spontaneous abortion  
 SBE self breast exam  
 SCJ squamocolumnar junction  
 SE side effects  
 SGA small for gestational age  
 SIDS Sudden Infant Death Syndrome  
 sl slight  
 sm small  
 SOB shortness of breath  
 SOM serous otitis media

**- U -**

umb umbilicus  
 UNK unknown  
 UOQ upper outer quadrant  
 URI upper respiratory infection  
 US ultrasound  
 UTD up to date  
 UTI urinary tract infection  
 UTV unable to void

**- V -**

VA	Veterans Administration
vag	vaginal
VBAC	vaginal birth after caesarian section
VCF	vaginal contraceptive film
vit	vitamin
VO	verbal orders
Vo	vouchers only
VOC	verification of certification
Voc. Rehab	Vocational Rehabilitation
Vol	volume
VP	venipuncture
VS	vital signs
vtx	vertex
VU	verbalized understanding

**VACCINE MANUFACTURERS**

CHI	Chiron
CSL	Commonwealth Serum Laboratories
GSK	GlaxoSmithKline
MBL	Massachusetts Biologic Labs
MI	MedImmune
MSD	Merck
NOV	Novartis
SP	sanofi pasteur
WL	Wyeth/ Lederle

**- W -**

W/F	white female
W/M	white male
w/c	wheel chair
wk	week
WNL	within normal limits
w/o	without
wt	weight

**- X -**

(none)

**- Y -**

y/o	year old
yd	yard
yr	year

**- Z -**

(none)

## CREDENTIALS/PERSONNEL

APN	Advanced Practice Nurse	MSN	Master of Science in Nursing
BA	Bachelor of Arts	MSW	Masters in Social Work
BFPC/BFC	Breast Feeding Pear Counselor	NA	Nursing Assistant
BS	Bachelor of Science	NE	Nutrition Educator
BSN	Bachelor of Science in Nursing	NUTR	Nutritionist
BSW	Bachelor of Social Work	OT	Occupational Therapist
CA	Counseling Assistant	PA	Physician Assistant
CC	Care Coordinator	PCP	Primary Care Physician/Provider
CDA	Child Development Aide	PHN	Public Health Nurse
CNA	Certified Nursing Assistant	PHOA	Public Health Office Assistant
CNM	Certified Nurse Midwife	PHR	Public Health Representative
DA	Dental Assistant	PHOS	Public Health Office Supervisor
DDS	Dentist	PMD	Private Medical Doctor
DH	Dental Hygienist	PMP	Private Medical Provider
DIS	Disease Intervention Specialist	PTA	Physical Therapy Assistant
DO	Doctor of Osteopath	RD	Registered Dietitian
Dr.	Doctor	RN	Registered Nurse
EMT	Emergency Medical Technician		
HE	Health Educator	RN,C or	Registered Nurse, Certified
IBCLC	International Board Certified Lactation Consultant	RN-BC	
LC	Lactation Consultant	RN-ES	Registered Nurse with Expanded Skills
LCSW	Licensed Clinical Social Worker	RPh	Registered Pharmacist
LDN	Licensed Dietitian/Nutritionist	RPT	Registered Physical Therapist
LPN	Licensed Practical Nurse	SC	Social Counselor
LMSW	Licensed Medical Social Worker	ST	Speech Therapist
MD	Medical Doctor	SW	Social Worker
MHA	Masters in Health Administration		
MPA	Masters in Public Administration		
MPH	Masters in Public Health		
MS	Master of Science		
MSSW	Master of Science in Social Work		

## SYMBOLS

$\bar{p}$	after	$\downarrow$	low, decreased, below
$\bar{a}$	before	$\♂$	male
&	and	$\textcircled{M}$	murmur
@	at	$\emptyset$ or O	no or normal
~	approximate	#	number
b $\sqrt{\quad}$	breast check	$\ominus$	negative
$\sqrt{\quad}$	check, checked	/	per
$\Delta$	change	%	percent
$^\circ$	degree	1 $^\circ$	primary
=	equal	+ or $\textcircled{+}$	positive
q	every	?	question
$\textcircled{f}$	female	$\textcircled{R}$	right
'	foot	2 $^\circ$	secondary
>	greater than	$\bar{c}$	with
$\geq$	greater than or equal to	$\bar{s}$	without
$\uparrow$	high, elevated, above, increase	X	times
"	inches	$\therefore$	therefore
$\textcircled{L}$	left		
<	less than		
$\leq$	less than or equal to		