

Health and Nutrition Assessment Handbook

Biochemical (Hematological)

Hemoglobin (Hgb) testing is commonly used to screen for iron deficiency anemia. Measurements of Hgb reflect the amount of functional iron in the body. Changes in Hgb concentration occur at the late stages of iron deficiency. While Hgb is not a direct measure of iron status and does not distinguish among different types of anemia, this test is a useful indicator of iron deficiency anemia.

Equipment and Materials for Testing

Analyzers

- Analyzers are purchased by the state agency (SA).
- Analyzers are Clinical Laboratory Improvement Amendment (CLIA) waived. Local agencies (LA) should contact the SA for a current copy of the Certificate of Waiver for the analyzers and display it where the testing is conducted.

Microcuvettes (packaged 50 per vial)

- Microcuvettes are purchased by the SA.
- Store microcuvettes at room temperature away from any direct heat source.
- Vials of microcuvettes should be kept tightly capped. Microcuvettes should be removed with gloved hands, as needed, for testing prior to use. Unopened microcuvettes have a shelf life of two (2) years from the date of manufacture.
- The expiration date is printed on each vial. Do not use expired microcuvettes. Expired microcuvettes should be returned to the SA.
- When opening a new vial of microcuvettes, label with the date opened.
- Vials of microcuvettes that have been opened are stable for three (3) months if the cap is kept on tightly.

Capillary Blood Sampling Lancets

- Lancets are purchased by the LA.
- Lancets should be sterile, single use, retractable, and disposable.
- Recommended lancet depth is 2.0 mm for adults and 1.5 mm for children and infants.

Safety

Standard (Universal) Precautions

- Since blood is a primary carrier for hepatitis C virus (HCV), hepatitis B virus (HBV), and human immunodeficiency virus (HIV), standard (universal) precautions are required. Wear protective gloves.
- Dispose of lancets and microcuvettes in a puncture-proof biohazard sharps container.
- Dispose of all blood soaked items in biohazard marked bags.
- Use an individually wrapped adhesive bandage (i.e., Band-Aid), opened at the time of the procedure, to cover the puncture site. Do not stick bandages to another surface (e.g., clothing, wall, or table top) before use.

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Anemia Screening Guidelines

A diagnosis of anemia can only be made by a physician or other health care provider. The anemia screening performed at a WIC LA provides information on the hemoglobin status of the participant, enables staff to assign the applicable nutrition risk factor, guides nutrition education, and assists in making appropriate referrals.

For all categories, the data must have been collected while in the same status as that of the certification or mid-certification assessment (MCA) for the WIC program as explained below.

	Pregnant Women	Breastfeeding and Postpartum Women	Infants 0 - <12 Months of Age	Children 12 - < 24 Months of Age	Children 2 - 5 Years of Age
Timeframes to collect blood work data	At the earliest opportunity during the pregnancy, usually the first visit.	After termination of the pregnancy, ideally 4-6 weeks postpartum. Blood work should not be taken before 4 weeks postpartum.	Between 9 - <12 months of age.	15 - 18 months of age. One blood test is required between 12 - <24 months of age, ideally to be done 6 months after the infant blood work.	Once every 12 months of age for children whose blood test results were within the normal range at their last certification.
Other issues specific to category and/or age		If certified later than 4 to 6 weeks postpartum, blood work shall be taken at the time of certification. For breastfeeding women 6-12 months postpartum, no additional blood test is required if a blood test was already obtained after delivery and documented.	A blood test before 9 months of age may be appropriate for preterm and low birthweight infants not fed iron-fortified formula. All other infants should be screened for anemia at 9 - <12 months of age.	One blood test taken at or before 12 months cannot fulfill the requirement for both the infant and the 12 - <24 months of age child screening.	Required for the 2 year old certification or MCA visit. For children 2 - 5 years of age, blood work must be taken at least once every 12 months. Recheck at the next certification or MCA if Risk Factor 201 was assigned.

If an applicant or applicant's parent or guardian refuses blood work, the participant shall be placed on a monthly cycle until the data has been collected. The reason for refused blood work must be documented in MOWINS.

Hematological Testing Training

Qualified LA staff must complete a competency (hands-on) assessment training before performing hemoglobin blood testing with participants. This training can be provided by either a state nutritionist or a trainer provided by the manufacturer, if available.

Online training is available on the [Missouri WIC website](#). The training does not replace in-person training; however, it can be viewed as a refresher, a corrective action plan, prior to training, or on an as-needed basis.

Document the following in the individual's training file:

- Who provided the training, and
- The date the training was completed.



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Procedure for Capillary Testing

1. All women, infants, and children must have a finger stick. *Toe and heel sticks for infants are not allowed.*
 - a. For best results, use the middle or ring finger for sampling. Avoid fingers with rings on.
 - b. Remove a microcuvette from the vial and recap the vial immediately.
 - c. Do a finger puncture. Make sure the hand is warm and relaxed.
2. When lead and hemoglobin samples are taken (from the same finger stick), see the “Procedure for Lead and Hemoglobin Testing Using Same Finger Stick” (page 6).
3. Clean the puncture site with alcohol. Wipe off the alcohol with a clean, dry, lint-free wipe or allow it to air dry completely.
4. Use your thumb to lightly press the finger from the top of the distal knuckle to the tip. This stimulates the blood flow toward the sampling point.
5. For best blood flow and least pain, take the sample on the side of the finger and not the center.
6. While maintaining gentle pressure on the fingertip, puncture the finger using a lancet. Seat the lancet firmly against the finger. Discard the lancet in an approved container.
7. Use dry gauze, or other lint-free wipes, to wipe away the first two or three large drops of blood. Apply light pressure, as needed, until another drop of blood appears. This stimulates blood flow and lessens the likelihood of a dilution effect by interstitial fluid. Avoid “milking the finger.”
8. Make sure the drop of blood is big enough to fill the microcuvette completely. Hold the microcuvette at the “wing” end and introduce the tip into the middle of the drop of blood. Fill the microcuvette in one continuous process. Do not refill a partially filled microcuvette.
9. Wipe off any excess blood from the outside of the microcuvette using a clean, lint-free wipe, taking care not to touch the open end (rounded side and tip) of the microcuvette.
10. Visually inspect the microcuvette for air bubbles. If bubbles are present, discard the microcuvette.
11. The filled cuvette should be analyzed immediately or, at the latest, within 10 minutes after it has been filled. The filled microcuvette should be kept in a horizontal position. Place the filled microcuvette into the cuvette holder and gently slide the holder into the measuring position. The result will be displayed within 60 seconds. Pull the cuvette holder out to the loading position. Remove the microcuvette and discard it in an appropriate biohazard container.
12. Clean blood spills on the counter or work surface with a 10% bleach solution or a disinfectant spray.
13. Change gloves between all participants, including family members.
14. Turn the power switch to “off” at the conclusion of all testing for the day.

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Low hemoglobin value result

A participant with a low hemoglobin should be referred to their health care provider. There is no need for repeat blood work until the participant's next certification or mid-certification assessment (MCA).

Analyzer Maintenance & Repair

Maintenance

1. All equipment coming in contact with blood should be handled as potentially infectious, according to universal precautions and good laboratory practice. Wear gloves when cleaning the optical parts of the analyzers.
2. The analyzer has an internal quality control, the "self-test." Every time the analyzer is turned on, it will automatically verify the performance of the optronic unit of the analyzer. This test is performed every second hour if the analyzer remains switched on. Upon passing the "self-test," the display will show three flashing dashes, indicating that the analyzer is ready to perform a measurement. An error code will be displayed if the "self-test" fails.
3. At the end of each day, the *cuvette holder and exterior* of the analyzer shall be cleaned.
 - a. Check that the analyzer is turned off. The display should be blank.
 - b. Pull the cuvette holder out to its loading position. Press the small catch positioned in the upper right corner of the cuvette holder.
 - c. While pressing the catch, carefully rotate the cuvette holder towards the left as far as possible. Remove the holder from the analyzer. It will come off the stainless steel pin it rotates on.
 - d. Clean the cuvette holder and exterior with an approved disinfectant:
 - I. Isopropanol \leq 45 volume %, i.e., CaviWipes™, DisCide® (not effective against all viral and bacterial bloodborne pathogens).
 - II. Ethanol, 70% (effective against Ebola virus, not effective against all viral and bacterial bloodborne pathogens).
 - e. Wait 15 minutes before replacing the cuvette holder and using the analyzer. Make sure the cuvette holder is dry before using.
4. When an error message has occurred on the display screen, clean the *optical* part of the analyzers with 70% ethanol (without additive) or manufacturer cleaner. A dirty optronic unit may cause the analyzer to display an error code.
 - a. It is not recommended to use alcohol prep pads to clean the optics because there are additional agents in the prep pad that will leave a residue on the optics.
 - b. To clean the optronic unit, use a cotton tip swab moistened with 70% ethanol or manufacturer cleaner. Insert the swab into the opening of the cuvette holder. Move from side to side 5 – 10 times. If the swab is stained, repeat with a new swab. No further cleaning is required if the swab remains clean.

Repair Service

If your agency has any questions regarding hematological testing equipment, please contact your district nutritionist and not the manufacturer.

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Equipment Order

When you receive the order, verify the number of analyzers and boxes of microcuvettes received. Send an email to WICOperations@health.mo.gov with the LA name and number of analyzers and boxes of microcuvettes received within one (1) week of receiving the shipment.

Email the SA at WICOperations@health.mo.gov or call 1-800-392-8209 in regards to broken or replacement analyzers, disposal of expired microcuvettes, or to order more microcuvettes.



WIC Requirement for Lead Assessment

1. For children age one (1) to five (5) years, ask if a lead screening or test has been done within the last year.
 - a. Lead screening is defined as asking if the child has had a blood lead test or if a screening has been done using the Missouri HCY Lead Risk Assessment Guide to determine whether a blood lead test is needed.
 - b. Lead testing is defined as a capillary or venous blood lead test.
2. If a lead test value is provided to WIC:
 - a. Enter blood lead values in MOWINS and record the date the blood lead results were received. This may be the same date as the date the sample was taken if utilizing a lead analyzer in the LA and getting a value that day, or may be the date the blood lead results were received if the sample was sent to an outside lab.
 - b. Values of five (5) or higher shall be entered into MOWINS. Risk factor 211 will be auto assigned by the system.
 - c. Drop the decimal when entering lead values into MOWINS. Do not round to a higher value.
 - d. The LA should document values less than five (5) in a general note or enter the value on the blood tab. When a LeadCare analyzer provides a value of "<3.3" and not the actual value, document "<3.3" in a general note.
3. Refer children who have not had a lead screening or test to a testing program, based on recommendations issued by the Missouri Department of Health and Senior Services, available at <http://health.mo.gov/living/environment/lead/guidelines.php>.
4. Document lead referrals in MOWINS as "Lead Screening" and "Local Health Department" or "Medical and Dental Health Services."
5. If a participant has a blood lead level 5 or higher, refer them to their health care provider.
6. The local agency may ask a pregnant woman if she has had a lead screening or test.

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Procedure for Lead and Hemoglobin Testing Using Same Finger Stick

When a non-WIC entity (i.e., health department or center) fulfills their requirement for a blood test at the same time (using the same finger) as hemoglobin testing at the WIC appointment:

1. Take hemoglobin first, unless otherwise instructed by the product used to collect the lead sample.
If the lead sample is collected first, the integrity of the hemoglobin sample must be preserved by:
 - a. Maintaining gentle pressure on the tip of the finger without “milking the finger”.
 - b. Filling the microcuvette with the 3rd or 4th large drop of blood.
 - c. Filling the microcuvette properly with the point down.
 - d. Filling the microcuvette completely. Do not refill a partially filled microcuvette.
2. Participants shall be advised that lead testing is not required in order to receive WIC benefits.
3. Blood lead testing is not a WIC allowable cost. WIC program funds shall not be used to provide blood lead testing or to purchase lead testing equipment. When blood lead testing is performed by WIC staff, time to conduct the test must be billed to another funding source.