Health and Nutrition Assessment Handbook (HNAH)
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 (LAs) must contact the SA for a current copy of the certificate of waiver for the analyzers. The certificate should be displayed where the testing is conducted.

Microcuvettes (packaged 75 per vial)

- Microcuvettes are purchased by the LA.
- Store microcuvettes at room temperature away from any direct heat source.
- Vials of microcuvettes must be kept tightly capped. Microcuvettes should be removed with gloved hands, as needed, for testing prior to use.
- Vials of microcuvettes are good until the expiration date on the bottle, which is printed on each vial.
- Do not use expired microcuvettes. Microcuvettes must be disposed of once expired in a biohazard sharps container.

Capillary blood sampling lancets

- Lancets are purchased by the LA.
- Lancets must be sterile, single-use, retractable and disposable.
- Recommended lancet depth is 2.0-2.2 mm for adults and 1.5 mm for children and infants, according to the World Health Organization (WHO) blood draw guidelines from 2010.

Safety

Since blood is a primary carrier of the hepatitis C virus (HCV), hepatitis B virus (HBV) and human immunodeficiency virus (HIV), standard (universal) precautions are required.

Standard (universal) precautions

- 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.
- Open an individually wrapped adhesive bandage, i.e., Band-Aid, at the time of the procedure to cover the puncture site. Do not stick bandages to another surface, e.g., clothing, wall or tabletop, before use.

Anemia screening guidelines

Only a physician or other health care provider can diagnose anemia. The anemia screening conducted at a WIC-clinic provides information about the participant's hemoglobin status, enables staff to identify relevant nutrition risks, guides nutrition education and helps in making appropriate referrals.

Data must be collected while in the same WIC program category as determined at certification or the mid-certification assessment (MCA), 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**
Time frames 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 must not be taken before 4 weeks postpartum.	Between 9 and <12 months of age.	Between 15-18 months of age. One blood test is required between 12 and 24 months of age, ideally to be done six months after the infant's initial blood work.	Once every 12 months 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 after 4-6 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 birth weight infants not fed iron-fortified formula. All other infants should be screened for anemia in between 9 and <12 months of age.	One blood test taken at or before 12 months cannot fulfill the requirement for both the infant and the 12 to <24 months of age child screening.	Required for the 2-year-old certification or MCA visit. Recheck at the next certification or MCA if risk factor 201 was assigned.

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

Hematological testing training

Qualified LA staff must complete HemoCue training and have their skills validated before performing Hgb blood testing with participants.

HemoCue training can be completed by watching the recorded HemoCue Hb 301 System training and taking the HemoCue and HNAH quiz on the Required Training page in the LA Portal. When available, live trainings are preferred and can be registered for on the Hemocue OnCue Education webpage. The recorded training can be viewed as a refresher, a corrective action plan (CAP) or on an as-needed basis.

The skills validation can be provided by a state nutritionist, a trained nutrition coordinator approved by the SA or a trainer provided by the manufacturer. The validator must complete the Capillary Skills Sampling Checklist.

Document all training on the WIC Staff Training Record and keep certificates of completion.

Procedure for capillary testing

All women, infants and children must have a finger stick. *Toe and heel sticks are not allowed for infants.*

1. Wash hands and wear gloves.
2. For best results, use the middle or ring finger for sampling. Avoid fingers with rings on.
3. Remove a microcuvette from the vial and recap the vial immediately.
4. Make sure the hand is warm and relaxed.
5. Clean the puncture site with alcohol. Wipe off the alcohol with a clean, dry, lint-free wipe or let it air dry completely.
6. Use a rolling motion with the thumb to lightly press the finger from the top of the upper joint to the tip. This stimulates the blood flow toward the sampling point.
7. For the best blood flow and the least pain, take the sample on the side of the finger closest to the thumb and not the center.
8. While maintaining gentle pressure on the fingertip, seat the lancet firmly against the finger and puncture the finger. Discard the lancet in an approved container.
9. Use dry gauze or other lint-free wipes to wipe away the first two or three large drops of blood. Apply gentle pressure with a rolling motion, if necessary, until another drop of blood appears. This encourages blood flow and reduces the chance of dilution from interstitial fluid. Avoid “milking the finger.”

   Ensure that the blood drop is sufficiently large, approximately the size of a split pea, before filling the microcuvette. Hold the microcuvette by the "wing" end and position the tip point down into the center of the blood drop. Fill the microcuvette completely in one continuous motion. Do not refill a partially filled microcuvette.

10. 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).
11. Visually inspect the microcuvette for air bubbles. If bubbles are present, discard the microcuvette.
12. The filled microcuvette must be analyzed immediately or within 40 seconds after it has been filled. It must be kept in a horizontal position. Place the filled microcuvette into the cuvette holder and gently nudge the flap to move the holder into the measuring position. Depending on the analyzer, the result will be displayed within 3-10 seconds. Document the result before pulling the cuvette holder out to the loading position. Remove the microcuvette and discard it in an appropriate biohazard container.
13. Clean blood spills on the counter or work surface with a 10 percent bleach solution or an approved disinfectant.
14. Change gloves between all participants, including family members.
15. Turn the power switch to “off” after all testing for the day.
16. When lead and Hgb samples are taken from the same finger stick, see the procedure for lead and Hgb testing using the same finger stick on page 6.

Low Hgb value result

A participant with low Hgb should be referred to their health care provider. Blood work must be repeated at the participant’s next certification or MCA.

Analyzer maintenance and repair

Maintenance

1. All equipment in contact with blood must 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 automatically verifies the performance of the optronic unit. If the analyzer remains switched on, this test is performed every second hour. 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. The cuvette holder and exterior of the analyzer should be cleaned at the end of each day.
    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. While pressing the catch or small silver button with the tip of a pen or a pencil, 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.

c. Clean the cuvette holder and exterior with 20-70 percent alcohol or alcohol prep pads.

d. 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 analyzer with 20-70 percent alcohol 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 the prep pad contains additional agents that will leave a residue on the optics.

   b. To clean the optronic unit, use two cotton-tipped swabs moistened with 20-70 percent alcohol or manufacturer cleaner. Insert the swabs into the opening of the cuvette holder and move them from side to side 5-10 times. If the swabs are stained, repeat the process. If the swabs remain clean, no further cleaning is required.

   c. Let the optronic unit dry for 15 minutes before replacing the cuvette holder.

Repair service

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

Equipment order

LAs will order microcuvettes through McKesson.

Analyzers will be ordered through the SA. Upon receipt, send an email to WICOperations@health.mo.gov with the LA name and number of analyzers received within one week of receiving the shipment.

Email the SA at WICOperations@health.mo.gov or call 1-800-392-8209 regarding broken or replacement analyzers.

WIC requirement for lead assessment

1. For children one to five years of age, ask if a lead screening or test has been done within the last year.

   a. Lead screening is asking if the child has had a blood lead test or if screening has been done using the Missouri Healthy Children and Youth (HCY) Lead Risk Assessment Guide to determine whether a blood lead test is needed.

   b. A lead test, also known as a blood lead test, measures the amount of lead in a person's blood. There are two types of lead tests:

      i. Capillary (finger-prick) test: This screening test is often the first step and can provide fast results.

      ii. Venous blood test: This test is more accurate, as it involves drawing blood from a vein in the arm. Results may take a few days to be available.

2. MOWINS does not allow for lead values with decimals to be entered in the Blood tab. LAs will document all lead values in either a general or a SOAP note and will manually assign the risk factor based on the following criteria.
    a. Children with values of 3.5 mcg/dL or greater.
    b. Infants and women with values of 5 mcg/dL or greater.
3. Based on recommendations issued by the Missouri Department of Health and Senior Services, refer children who have not had a lead screening or test to a testing program.
4. Document lead referrals in MOWINS as Lead Screening and Local Health Department or Medical and Dental Health Services.
5. If a participant has been assigned risk factor 211, refer them to their health care provider.
6. The LA may ask a pregnant woman if she has had a lead screening or test.

Procedure for lead and Hgb testing using the 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 Hgb testing at the WIC appointment:

1. Take Hgb first, unless otherwise instructed by the product used to collect the lead sample. If the lead sample is collected first, the integrity of the Hgb 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 third or fourth 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 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, the time to conduct the test must be billed to another funding source.