



IDAHO DEPARTMENT OF HEALTH & WELFARE
DIVISION OF PUBLIC HEALTH

Idaho WIC Training **Hematology**



What Will You Learn?

Collecting and assessing hemoglobin/hematocrit levels for WIC participants is an important piece of the nutrition/health assessment and may help identify potential health risk(s). Staff will learn how to perform a hemoglobin/hematocrit test correctly.

Instruction Level

Prerequisite for taking the course: WIC Overview

Items Needed for This Course

- Access to Hemocue website with training materials <http://www.hemocue.us>
- Access to the WIC website for the *Hgb Collection Reference* Document ([WIC website](#) → Staff → Training → Training Links)
- No Idaho TRAIN LMS online course exists for this guidebook

Recommended Time

- Approximate time it takes to complete Hematology course: 1-2 hours
- Approximate time to complete the face to face activities and discussion: 2-3 hours

Module 1: Hematological Testing Procedures

In the Idaho WIC Program, a simple blood test involving a small skin prick is used to identify individuals who are at risk for anemia. This test is a hemoglobin/hematocrit test and is part of program certification procedures. Much can be learned about the nutritional status or health of WIC applicants and participants when test results are used along with weight and length (or height) measurements and nutrition/health assessment.

Hemoglobin is an iron-containing molecule in red blood cells. Its function is to carry oxygen. Anemia occurs when either the volume of red blood cells is reduced or the amount of red blood cells is low in hemoglobin. In either case, the amount of oxygen that can be carried by the blood is decreased. The hemoglobin test measures the concentration of hemoglobin in the blood. The hematocrit test measures the percent of blood that is composed of red blood cells. Red blood cells contain hemoglobin and other substances so the hemoglobin test result is a much smaller number than the hematocrit test result. The most common test done in WIC is the hemoglobin.

In order to be useful as an indicator of nutritional status, the blood test must be accurately performed, recorded, and compared with appropriate standards.

Hemoglobin/Hematocrit Testing

A hemoglobin/hematocrit test is required for certification for all WIC applicants except infants under nine months of age. Premature infants are tested at six months of age or collection is paired with the next appointment closest to 6 months of age. The child hemoglobin test is 6 months after the infant test (for example, 12 months of age for premature infants who had hemoglobin collected at 6 months of age). Infants are initially certified for one year (if < 6 months old, > 6 months old are initially certified for 6 months) with a health screening completed at 5-7 months into certification and hemoglobin collected between 9-12 months old.

NOTE: If an applicant has had a hemoglobin/hematocrit test performed by a medical care provider within the last 60 days, that value may be used for certification purposes if documentation from the provider is brought in verifying date and value and is reflective of the current category.

Collection of hemoglobin/hematocrit for infants and children are driven by age. Women will have their hemoglobin/hematocrit collected based on certification appointments. The hemoglobin/hematocrit test should be repeated for participants who had low values and received related nutrition education. It is recommended that the test is repeated, for some participants this may be in two months depending on how low the value is.

Hemoglobin Test Procedures

Locate the HemoCue and cuvettes in your clinic (equipment brand may vary by agency).

It is important for the area where the hematology tests are performed to be clean. Do not bring food or beverages to the area. It should be disinfected at least once a day. There should be waste disposal

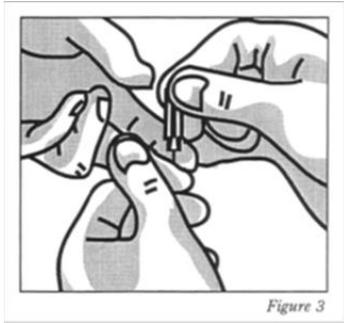
containers (paper waste, biohazard waste, and sharps biohazard waste).

Obtaining a Good Sample

- Wash hands in hot, soapy water, dry and put on disposable gloves. Alcohol-based hand sanitizer that contains at least 60% alcohol can be used if soap and water are not available or convenient. Hand sanitizer does not eliminate all types of germs and should not be used if hands are visibly dirty. Gloves are recommended to protect against possible contact with HIV-infected or hepatitis-infected blood.
- Collect the supplies needed for the procedure. You will need an absorbent paper towel, lancet, adhesive bandage, cuvette, cotton ball, alcohol, tissues, or gauze pads. Place the paper towel on the area. Unwrap the adhesive bandage and moisten a cotton ball with alcohol.
- While you are gathering supplies explain to the applicant or caregiver why you are doing the test and how it will be done.

For example you might say: “The hemoglobin test is done to measure the amount of red blood cells or the amount of iron in your blood. Low levels of iron in the blood can affect the health of you and your child. It is easy to measure the hemoglobin. If it’s low we’ll talk about some easy ways to correct it by eating more iron-rich foods. I will take a few drops of blood from your finger and fill this cuvette. (Show client the cuvette.) Then I’ll put the cuvette in the machine so the hemoglobin level can be read.”

- Grasp the client’s entire hand and bend the fingers back and forth several times to get the blood flowing. For infants, it may be easier to draw blood from the big toe.
- Clean the tip of the finger (or toe) by wiping with an alcohol moistened cotton ball. Wipe off alcohol with a gauze pad before puncturing the finger. Do not get alcohol in the cuvette.
- Hold all the fingers (or toes) firmly, applying slight pressure. Use the lancet to puncture the skin quickly. Stick the finger on the inside. Make sure you puncture deep enough to allow the blood to flow freely. Be prepared for a sudden withdrawal movement by the applicant. Do not let go. The capillary will close off for about 2.5 seconds, then open up and bleed.
- Wipe off the first drop of blood with a clean tissue, or gauze pad.
- When the second drop of blood appears, place the cuvette next to the blood and fill it with one continuous draw without breaking contact with the blood. Wipe off the sides of the cuvette being careful not to take any blood out. Avoid squeezing the finger or toe since this may cause blood and tissue fluid to mix. This affects the accuracy of the test. If the blood does not flow freely, you will need to puncture the finger (or toe) again.



- Ask the client or parent to press the cotton ball tightly on the finger (or toe) to stop the blood flow.
 - Place an adhesive bandage around finger (or toe).
- Place the cuvette in the HemoCue machine. The hemoglobin value can be seen in the HemoCue display window.
- Record the value in WISPr (it is okay to record the HgB on a piece of paper in the lab room to enter into WISPr when returning to the clinic room).
- Dispose of the cuvette and lancet in a rigid, sharps container with a tight-fitting lid. Clean work area, remove gloves and wash hands thoroughly. Alcohol-based hand sanitizer that contains at least 60% alcohol can be used if soap and water are not available or convenient. Hand sanitizer does not eliminate all types of germs and should not be used if hands are visibly dirty.

If You Did Not Get Enough Blood for a Good Sample the First Time...

Try to Increase the blood circulation to the hand by:

- having the client open and close the hand with arm dangling to the side.
- rubbing the hand between your two hands
- having the client hold the hand under warm water for a few minutes
- prick the finger with both the arm and hand hanging at the side instead of propping on a table.

Helpful Tips when Testing Infants and Children

- Ask the caregiver to hold the child on his/her lap, holding arm at the elbow or leg. A squirming child can be braced between the knees. If necessary, the caregiver can brace the child's shoulders with one arm, and use the other to turn the child's head toward her.
- Explain to the child that the prick will be the only part that will hurt. Show the child the cuvette and touch his/her finger with it to show that it doesn't hurt.
- Stay relaxed. Children can tell if adults are anxious.
- Have the child hold the adhesive bandage and tell him/her it will be his/hers when it's all over. Suggest the child close his or her eyes until it's over.

- Prick very quickly, but firmly.
- Be sure to give the child positive comments. Use comforting phrases like “You’re doing a good job” or “I’m so proud of you.” DO NOT say phrases like, “Big boys (or girls) don’t cry.”

Possible Sources of Error

- Excess squeezing or pressure of finger (or toe). This causes tissue fluid to come out and may dilute the sample.
- Not wiping off the alcohol before puncturing the skin.
- Not getting a good finger stick may be caused by the client having cold hands.
- Failure to wipe off the first drop of blood. The first drop of blood may be mixed with alcohol or may contain broken red blood cells and extra plasma.
- Holding the cuvette by the tip. This contaminates the area the machine reads.
- Not getting enough blood in the cuvette. If air bubbles occur in the cuvette, discard it and begin with a new cuvette.
- Referring to the incorrect Hemoglobin/Hematocrit Table of Baseline Values located in the Idaho WIC Policy Manual under *Nutrition Risk Criteria*. Ask your trainer which tables you will be referencing for the clinic sites you will be working in.

What if the Value is Low?

If the value is abnormally low, it may be necessary to repeat the test to make sure that an error did not occur.

If the hemoglobin is $<$ or $=$ to 10 (or decreases at the next test), a Registered Dietitian (RD) referral will be needed in 2 months to check hemoglobin. If the hemoglobin is low, but $>$ 10, then test again in 6 months with staff.



Complete Activity 1 in your Activities Workbook

Module 2: Understanding Values

About the Hemoglobin/Hematocrit Test

If the hemoglobin/hematocrit value is low, it may indicate iron-deficiency anemia. However, the test taken in WIC does not determine if a client has iron-deficiency anemia. Do not tell clients they have anemia if the test is low.

Because the hemoglobin/hematocrit test does not tell whether an individual has iron-deficiency anemia, it is important to use the *Referral Guidelines* seen in the HGB Collection guide in order to know if you are to refer the participant to the Registered Dietitian (RD). Most WIC participants with low hemoglobin/hematocrit values improve to within normal ranges after increasing the dietary iron in their diets. Values that do not respond to increased dietary iron may be the result of other nutritional factors like folic acid or vitamin B12 deficiency or non-nutritional factors.

Notice the hemoglobin/hematocrit standards change as pregnancy progresses. A slight decline in values is normal. It is because the plasma (liquid) portion of the blood grows faster than the red cell portion during pregnancy.

The standard value changes depending on the clinic altitude and if the client smokes or not. It increases as the clinic altitude goes up. The standard also increases for smokers. See the Idaho WIC Policy Manual Nutrition Risk Criteria for *risk 201: Low Hematocrit/Low Hemoglobin*.

Hemoglobin/Hematocrit related Nutrition Risk Criteria (NRC)

Low Hemoglobin/Hematocrit (NRC 201)

Low hemoglobin is defined as having a value below the baseline for healthy, well-nourished individuals of the same age and sex. Adjustments are made to account for trimester of pregnancy, smoking status, and altitude.

Why does Low Hemoglobin/Low Hematocrit Values Indicate Nutritional Need?

Low hemoglobin/hematocrit values *may* indicate anemia. Anemia can be caused by either medical, genetic (very rare), or nutritional reasons. The most common nutrition-related anemia is iron deficiency, which may be caused by a diet low in iron, poor absorption of iron from foods, increased iron needs due to growth, pregnancy or blood loss.

The goal of WIC is to prevent serious health problems. The WIC standards may be higher than local hospitals, doctor's offices, or community health clinics use because WIC wants to serve applicants at risk for anemia, as well as applicants who already have anemia.

Pregnant Women

Many pregnant women have low iron levels. They enter pregnancy with low iron stores and may eat a diet low in iron. During pregnancy they may continue to eat a diet low in iron-rich foods. Their diet may also lack foods that enhance iron absorption, such as vitamin C-rich foods and foods high in *heme iron* (iron sources that come from meat). They may be eating too many substances that interfere with iron absorption, such as phytates and tannins in tea and coffee.

The result of a low-iron diet combined with the increased demand for iron in pregnancy may lead to poor hemoglobin production. This can be followed by inadequate delivery of

oxygen to the uterus, placenta, and developing baby. The mother's heart has to work harder to make up for not having enough hemoglobin, putting an added workload on her body. This leaves the pregnant woman feeling tired and weak. The anemic woman may have a poor appetite and is more likely to become sick or get an infection.

Pregnant women who are anemic may have a greater chance of delivering low birth weight infants. They will also be at higher risk for anemia if they lose too much blood during delivery.

To help pregnant women avoid iron-deficiency anemia, they may be provided with iron supplements in addition to their prenatal vitamins from a medical care provider and counseling on eating iron-rich foods (WIC cereals and beans) from WIC.

Breastfeeding/Non-breastfeeding Women

Following the birth of a baby, many women have low iron levels. The stress of the pregnancy and the blood loss during delivery cause iron stores to be reduced and the blood levels to be lower. These deficiencies often leave the new mother feeling tired and weak.

A woman with low iron stores may have a poor appetite and may be more likely to become sick. She has less energy, yet this is the time when the postpartum woman has more work and more responsibility.

It is important that a woman's iron levels return to normal as quickly as possible after delivery. WIC foods and continuing to take prenatal vitamins can help improve the postpartum woman's iron levels and give her energy to care for the new baby.

Infants

Iron-deficiency anemia can be a serious problem for many WIC infants. Infants have a higher need for iron because of rapid growth. They are more likely to have anemia than older family members.

Healthy infants are born with iron stores which last four to six months. Iron-deficiency anemia is rare in healthy, full term infants during this time. After six months of age, infants run out of their iron stores and must get iron from their diet to maintain normal blood iron levels. This is why the Idaho WIC Program performs a hemoglobin/hematocrit test around nine months of age.

For the first year of life, infants should be breastfed or receive an iron fortified formula. Iron-fortified infant cereals should be started at six months and offered to the infant through the first year of life. Infants fed cow's milk may not get enough iron which is one reason why cow's milk is not recommended for the first year of life.

Premature infants and low birth weight infants are born with smaller stores of iron and are at greater risk for anemia. A premature infant's iron stores are soon depleted. This is why the Idaho WIC Program performs a hemoglobin/hematocrit test at 6 months of age for premature infants.

Blood loss can lead to anemia. Infants who are sick and need blood tests or surgery can lose a lot of blood. These infants may need iron supplements and sometimes blood transfusions.

Children

Children with low iron stores may be pale, tired and weak, fussy, irritable, and have trouble concentrating. They may have headaches, poor appetite, and frequent illnesses. Anemia also affects learning. Although it does not decrease a child's intelligence, it can reduce their ability to pay attention. Children treated for anemia become more attentive and cooperative.

Anemia can occur due to a poor diet or blood loss. A child can get anemia from not eating enough iron- rich foods such as meat, eggs, dark green vegetables and beans, and eating a lot of iron-poor foods. Many snack foods are low in iron. Cookies, unenriched bread, crackers, chips, and soft drinks provide little iron. In addition, children who get a lot of calories from drinks like milk or juice throughout the day tend to have low iron because they are not eating a balanced variety of foods. They may not be hungry for food because they are drinking all of their calories.

What is a 'High Risk' hemoglobin/hematocrit value?

Hemoglobin less than or equal to (\leq) 10g/dl *OR* no rise on re-check *OR* Hematocrit less than or equal to (\leq) 31 percent or no rise on re-check.

If an applicant or participant has hemoglobin or hematocrit reading as noted above, he/she should be referred to the Registered Dietitian (see *RD Referral Guidelines located in the Idaho WIC Policy Manual*). While iron-deficiency anemia is the most common cause of low hemoglobin/hematocrit values, other nutritional concerns may be present. A referral to a healthcare provider may also be needed to prescribe iron supplementation. *Refer to the Idaho WIC Policy Manual Referral Guidelines or the Hgb Collection Reference document for when a 're-test' is indicated.*



Complete Activities 2 & 3 in your Activities Workbook