

ITCA WIC TRAINING PROGRAM

Module 05:

Hemoglobin Testing

Using the HemoCue® 201+ Analyzer

February 2012

ITCA WIC Knowledge Modules

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Instructions

To complete each competency units complete the following steps:

1. Read the introduction.
2. Read each section.
3. Complete the Self-Evaluation at the end of each section.
4. If you have trouble answering the questions, read the section again or ask your director for more information.
5. Make arrangements with your director at the Skill Checks to demonstrate your ability to apply your knowledge in the clinic.
6. After you complete all of the Self-Evaluations and Skill Checks, make arrangements with your director to complete the Unit Assessment.
7. Submit the original Unit Assessment and Skill Checks to ITCA. Copies should be kept at the local agency.

5 – 1 Introduction to Hemoglobin Testing

Objectives

After completing this unit, you will be able to:

- ✓ Define anemia.
- ✓ Maintain the HemoCue® equipment.
- ✓ Complete Quality Assurance Log Sheets.
- ✓ Safely and accurately check hemoglobin levels.
- ✓ Solve problems with the equipment.

Overview

By now you have probably learned that a common task during certifications is to check the blood or hemoglobin (Hgb) of applicants and clients. A screening test is done to determine whether a person has enough iron. A person with a hemoglobin value below normal may have anemia. The machine that we use to check the hemoglobin is called the HemoCue® machine.

In this unit you will learn about anemia as well as the safe and accurate way to check hemoglobin levels in WIC clients.

5 – 2 What is Anemia?

Objectives

After completing this section, you will be able to:

- ✓ List at least three problems caused by low iron levels.
- ✓ List at least two causes of iron deficiency anemia.
- ✓ List at least two educational topics that you can discuss with clients who have low hemoglobin.
- ✓ Determine who should be tested and when they should be tested.
- ✓ Determine if a client has low hemoglobin.

Overview

In this section, you will learn what anemia is and the causes and problems associated with it. You will learn when hemoglobin needs to be taken for each category and what values are normal for each client category. When clients are found to have low hemoglobin values, nutrition education on increasing iron intake, iron's absorption, and encouraging a doctor's recommendation for vitamins should be provided to the client.

Anemia

Before you learn about how to use the HemoCue machine and take blood from clients, you need to learn about anemia and the causes of anemia. A couple of definitions that you should become familiar with are below:

Hemoglobin is found in red blood cells. It carries oxygen from the lungs to the rest of the body. We measure the hemoglobin when we use the HemoCue® machine. Iron is an important part of hemoglobin.

Anemia means that the blood has low levels of hemoglobin in it.

Types of Anemia

There are many types of anemia. When we say that someone has anemia, it means that they have low levels of hemoglobin in their blood. In WIC, we are usually thinking of anemia caused by low iron levels in the blood. This is called iron deficiency anemia. But there are other causes of anemia, including low levels of vitamin B12, folate or vitamin A. An infection may also lower the hemoglobin levels.

Low hemoglobin values may also mean that a person has a serious disease, so it is important that WIC clients with hemoglobin levels below 9.0 be referred to their doctor for more testing. It is also important to note that a hemoglobin value below the cutoff value does not mean that the participant is iron deficient; it may be due to something other than iron deficiency.

Iron Deficiency Anemia:

When the iron being eaten does not meet the iron needs of the body, this causes iron deficiency. This may happen because the diet does not contain enough iron or the iron in the diet is not well absorbed. A participant may be eating many foods high in iron, but may not be meeting their needs because of poor absorption or because of an increased need for iron. Women need more iron during pregnancy and children need more iron during periods of rapid growth. Both of these can cause anemia even with moderate iron intakes.

Dietary Influences on Iron Status



The amount of iron that is absorbed by the body depends on what kind of food the iron comes from and what other foods are eaten with the food containing iron. The iron in meat and fish is absorbed into the body better than iron in other foods such as iron-fortified cereals, grains, vegetables and beans. The absorption of iron from non-meat sources can be increased by adding meat or foods rich in vitamin C to the meal. When meat intake is low, it is important to eat or drink foods rich in vitamin C with iron sources to increase iron absorption.

In infants, the most common dietary cause of iron deficiency is the use of cow's milk or low-iron formula. Infants should not be fed cow's milk until 12 months of age or low-iron formula. Low-iron formula is not recommended for any infants and is not authorized by the ITCA WIC Program. Infants should be breastfed or fed iron-fortified infant formula. Iron-fortified infant cereal provided by WIC also helps to increase the iron intake of an infant. The iron-fortified infant cereal should be introduced around 6 months of age.

Effects of Iron Deficiency

Iron deficiency affects different people in different ways. Some people may not notice any symptoms, others may experience those listed below.

Iron Deficiency in Women and Children:

- ◆ Slow growth
- ◆ Poor mental abilities
- ◆ Fatigue
- ◆ Poor coordination

Iron Deficiency during Pregnancy:

- ◆ Low birth weight
- ◆ Prematurity
- ◆ Infant mortality



Smoking and Anemia

Smoking makes a person's hemoglobin levels higher than a person who does not smoke. This is related to the byproducts from the smoke. Women who smoke or are exposed to high levels of cigarette smoke in their house will have higher hemoglobin values than women with the same iron status who are not exposed to the cigarette smoke.

Who Should be Tested?

According to the ITCA WIC Policies and Procedures, the hemoglobin value must be taken on all applicants/clients at every certification visit with the following exceptions:

Hemoglobin testing exceptions:

- ◆ Infants <9 months old –
The first hemoglobin test for infants should be completed at the health assessment visit between 9-12 months of age. The STARS system will not ask for hemoglobin before this age.
- ◆ Children ≥ 2 years of age –
If the hemoglobin value at the previous certification was normal, there is no need to obtain another one at this certification. If hemoglobin values are normal, they should be taken once per year.
- ◆ Postpartum/breastfeeding woman < 4 weeks postpartum –
The hemoglobin value must be taken between 4 –6 weeks postpartum. If the test is completed before this time, it will likely be low due to blood loss during the delivery of the baby. Breastfeeding women certified for anemia must have their hemoglobin tested again at the 6 month midcertification.

Summary:

Category:	When Measurements are Taken:
Infants	Health Assessment (9-12 months of age)
Children	<p>At each certification within 90 days of certification date</p> <p>Exemptions:</p> <p>Children less than 15 months old: Infant Hgb taken at 9-12 months can be used to certify a child who is less than 15 months old if that Hgb was normal.</p> <p>Children 2 years of age and older: Children 2 years of age and older can be tested every 12 months if previous Hgb was normal otherwise they must be tested every six months or at each certification</p>
Pregnant Women	Certification
Postpartum Women	4-6 weeks postpartum
Breastfeeding Women	4-6 weeks postpartum. If hemoglobin is low, must recheck at 6 months postpartum.
Special Needs (Low hemoglobin)	As recommended by local agency policies or nutritionist. A low hemoglobin value can be rechecked in 2 months.

Identifying Clients with Anemia

The STARS computer system will automatically assign a risk for hemoglobin that is low, based on the clinic's altitude. Normal hemoglobin values vary with category and for pregnant women with each trimester. Below is a summary for hemoglobin values taken at an altitude up to 2,999 feet.

Summary:

Category:	Normal Values:
Infants	11.0 and higher
Children 12-23 months 2-5 years	11.0 and higher 11.1 and higher
Pregnant Women 1 st Trimester (0-13 weeks) 2 nd Trimester (14-26 weeks) 3 rd Trimester (27-40 weeks) .	11.0 and higher 10.5 and higher 11.0 and higher
Postpartum Women	12.0 and higher
Breastfeeding Women	12.0 and higher

Referrals

Clients who have a hemoglobin value less than 9.0 must be referred to the nutritionist for high risk counseling and to their doctor for follow-up. Depending on local agency policy and procedure, a client may be retested in two months by a CNW, and then referred to the nutritionist if still below 9.0.

Since the HemoCue® test is a screening, testing by a laboratory through venous puncture may indicate that the client does not have anemia.

Nutrition Education

Clients that are determined to have low hemoglobin should be provided with education to improve their iron status. Nutrition education should include the following:

- ◆ A verbal account of iron rich foods that the client normally consumes.
- ◆ Encourage high iron foods that the client is currently eating.
- ◆ Work with the client to find more high iron foods that the client may be able to include in their diet.
- ◆ Encourage high vitamin C foods with non-meat sources of iron.
- ◆ Encourage the client to take iron supplements as advised by their doctor.





Self-Evaluation

1. List three of the problems caused by low iron levels.

2. List two of the causes of iron deficiency anemia.

3. List two educational topics that should be discussed with a client who has low hemoglobin.

4. Circle the WIC clients the must have their hemoglobin values checked.

Infant at 6 months of age

Certification of a child over two with a previous normal hemoglobin

Certification of a pregnant woman

Certification of a child less than 2 years of age

Certification of a postpartum woman 4-8 weeks

A breastfeeding woman at 6 months postpartum with a previous low hemoglobin

5 – 3 HemoCue® Equipment

Objectives

After completing this section, you will be able to:

- ✓ List the equipment needed to perform hemoglobin checks
- ✓ Explain the handling of microcuvettes
- ✓ Explain the necessary maintenance of the HemoCue® Analyzer

Overview

In this section you will learn about the different HemoCue® equipment that is used to take hemoglobins. These include the analyzer, microcuvettes and lancets. This equipment is purchased directly by ITCA and distributed with orders one time per year. You will also learn about the daily-required maintenance of the HemoCue® machine.

HemoCue® Analyzer

The equipment used by the ITCA WIC program to test the hemoglobin is called the HemoCue® 201+ Photometer. The HemoCue® 201+ measures the hemoglobin levels in the blood.



Microcuvettes

Microcuvettes (also called cuvettes) are the instruments used to collect the blood. They are also what is inserted into the HemoCue® machine to measure the hemoglobin. The microcuvettes come in vials or containers. Each container has an expiration date on it. The microcuvettes must be used before the expiration date on the container.

Once the container of microcuvettes is opened, the date the container is opened should be written on it. The microcuvettes are good for 90 days from the date the container is opened or until the expiration date, whichever comes first. The vial must be tightly sealed after each use. You must always wear gloves when handling the microcuvettes.



Lancets

Lancets are the instruments used to puncture the finger to obtain blood. Currently, the ITCA WIC Program purchases two brands of lancets, HemoCue and Roche, though many others are available. All lancets must meet standards of effectiveness, to ensure accurate results and safety.



◆ Effectiveness –

The lancet must make a sufficiently deep puncture (1.85 to 2.25 mm) to ensure an adequate flow of blood. A puncture not deep enough may make it difficult to collect an adequate blood sample or make it necessary to puncture again.

◆ Safety –

The lancet must puncture the skin and retract automatically within one or two milliseconds. The needle must be completely concealed inside the plastic casing before and after use and the lancet cannot be reused.

Quality Assurance

It is important that the measurements we take in WIC are accurate. In order for our measurements of blood hemoglobin to be accurate, we must follow correct procedures and the equipment must be working properly. If there is a problem with the HemoCue® analyzer, an error message will appear in the window. Follow the steps in the manual, under troubleshooting, to correct the problem. To detect any human error problems a log sheet of client names, hemoglobin values and who completed the test must be kept.

Maintenance

The cuvette holder should be cleaned after each day of use.

Procedures for cleaning the cuvette holder:

1. Check that the analyzer is turned off. The display should be blank.
2. Pull the cuvette holder out to its loading position. Carefully press the small catch positioned in the upper right corner of the cuvette holder.
3. While pressing the catch, carefully rotate the cuvette holder towards the left as far as possible. Carefully pull the cuvette holder away from the analyzer.
4. Clean the cuvette holder with alcohol or mild detergent. It is important that the cuvette holder is completely dry before being replaced.



5

Self-Evaluation

1. Observe another WIC staff member cleaning the cuvette holder.
2. Find your container of microcuvettes.
Is the container lid tightly closed? ☐ yes ☐ no
What is the expiration date stamped on the bottle? _____
Is the date the container was opened written on the bottle? ☐ yes ☐ no
When should this container of microcuvettes be discarded? _____
3. Find your supply of lancets.
Is the needle completely concealed within the plastic case? ☐ yes ☐ no
Does the needle retract back into the plastic case? ☐ yes ☐ no
Are they a depth of 1.85 – 2.2 mm? ☐ yes ☐ no

5 – 4 HemoCue® Procedure

Objectives

After completing this section, you will be able to:

- ✓ List the supplies needed to take a blood sample.
- ✓ Correctly explain the testing procedures.
- ✓ Correctly and accurately perform hemoglobin testing on clients.

Overview

In this section, you will learn about the different supplies needed to take a blood sample. Supplies should be gathered in the laboratory and easily accessible. You will also learn the correct technique and procedure for taking a hemoglobin test. After learning the procedure you will be given the opportunity to practice on clients or staff. Following the procedures will help aid in obtaining accurate hemoglobins the first time.

HemoCue® Procedure

Now you are ready to learn about taking the blood sample from the client. You must have a clean area to work in that is used only for blood work. This area must be cleaned (disinfectant, bleach or disinfectant wipes) after each client.

Supplies needed:




- ✓ HemoCue® analyzer
- ✓ HemoCue® cuvette
- ✓ Lancet
- ✓ Alcohol wipes
- ✓ Gloves
- ✓ Gauze
- ✓ Bandage
- ✓ Hand sanitizer or sink with liquid soap
- ✓ Measurement Post-It Note®
- ✓ Pen
- ✓ Biohazard container (sharps container)

Procedure for taking hemoglobin:


1. Seat the applicant/client comfortably. Explain the testing procedure to the client.

Example:

We will be testing your blood (your child's blood) to see if you have enough iron in your blood. I will need to prick your finger (your child's finger) to get some blood. The machine will tell us if your iron levels are low or not.

2. If the client's fingers are cold, warm them with warm water, have the client rub their hands together or have the client gently shake their hands.
3. Put gloves on. Take out and prepare all needed supplies.
4. Use the middle or ring finger for sampling. The finger should be straight, but relaxed. Rings must be removed from any fingers you are using to take the blood sample. 
5. Clean the puncture site with an alcohol wipe. Wipe the site dry with one swipe of the gauze. Continuous wiping with gauze may leave tiny pieces of gauze on the skin, which can get into the cuvette and cause inaccurate results.
6. Using your thumb, lightly press the finger from the top of the knuckle towards the tip. This stimulates the flow of blood towards the sampling area. 
7. When your thumb reaches the fingertip, maintain gentle pressure and prick the side of the fingertip using the lancet. 

Note: Pricking on the side of the finger instead of the middle causes less pain for the client, since there are fewer nerves on the side of the finger.

8. Wipe away the first two drops of blood with some gauze. You may need to apply gentle pressure until another drop of blood appears. Avoid milking. 

9. Wait for the third drop of blood to become big enough to fill the cuvette completely. Place the cuvette in the middle of the blood drop. The cuvette will fill itself. Leave the cuvette in the drop until it is filled.



Note: Never take the cuvette away when it is partially full and then apply it to the drop of blood again to fill it completely. A new cuvette will need to be used.

10. Dry off any extra blood on the cuvette. Be sure not to suck any blood out of the cuvette. Make sure no air bubbles are present.



11. Place the cuvette in the holder on the HemoCue® machine. Push the holder into the machine.



12. Record the hemoglobin value on the Laboratory Quality Assurance Log Sheet and on the client's measurement Post-It Note®.



13. Discard the cuvette and lancet in a biohazard container. Dispose of other items in the garbage or biohazard trash can.

Note: If the gauze or other supplies are saturated with blood, they must be disposed in a biohazard container or bag and not in the regular garbage.

14. Clean work area with disinfectant, alcohol or disinfectant wipes.
15. Take off gloves with care. Do not touch outside of glove with bare hands.
16. Immediately wash hands with soap and water and/or use sanitizer.

Common Problems

Problems can occur with both the HemoCue equipment and user error. Listed below are common problems and tips to avoid them.

Equipment:

- ◆ Dirty instrument –
If the HemoCue machine is dirty, an error message will appear. The cuvette holder should be washed daily. Follow the instructions in the user manual. If error message continues to appear, call HemoCue technical support at 1-800-426-7256

Poor techniques:

- ◆ Inadequate finger stick –
If the finger stick is not deep enough to allow adequate flow of blood, an accurate representation of blood cells cannot be obtained. If the finger stick is done poorly, the hemoglobin values will be low and a person who does not have anemia may be assigned the anemia risk.
- ◆ Milking the finger –
Milking the finger is usually done when there is inadequate blood flow. This will also cause low readings. The finger should never be milked. Be sure to make a deep puncture so good blood flow can be obtained.
- ◆ Not wiping away first two drops –
The first two drops of blood should be wiped away and the third drop should be measured. This allows for a good mix of blood cells. If the first two drops are not wiped away a low hemoglobin value may be obtained.
- ◆ Mixing blood with alcohol –
The finger should be completely dried of alcohol before the puncture is performed. Dry finger with one wipe of gauze and/or allow to air dry. This will avoid mixing the blood with alcohol or sweat. If the blood is allowed to mix with alcohol or sweat, a low hemoglobin value may be obtained.
- ◆ Obstructing blood flow –
The hand should not be squeezed so tightly as to obstruct blood flow to the fingers. Fingers with rings should not be tested.

◆ Refilling cuvette –

The cuvette must be filled with an entire drop of blood in one continuous flow. The cuvette should never be topped off. If the blood drop is not big enough to fill the cuvette in one continuous flow, another cuvette should be used. This may require a new puncture. Topping off the cuvette will cause the hemoglobin value to be higher than it really is.

◆ Air bubbles –

The cuvette should be checked for air bubbles. If there are air bubbles in the cuvette, it has not been filled properly. It should be thrown away and a new sample should be taken. The presence of air bubbles will cause the hemoglobin reading to be low.

◆ Using damaged or expired cuvettes –

The cuvettes should not be exposed to excessive heat or moisture. This will damage the cuvettes and cause inaccurate readings. The cuvettes should not be used after the expiration date.

◆ Waiting too long to take reading –

The sample should be taken within 10 minutes of collecting the blood sample.



Self-Evaluation

1. List six supplies that are required to perform hemoglobins.
 - 1.
 - 2.
 - 3.
 - 4.
 - 5.
 - 6.

2. List three poor techniques that could affect the hemoglobin values obtained. Indicate whether it would cause the value to be higher or lower if applicable.
 - 1.

 - 2.

 - 3.



Skill Check

1. Observe another staff member performing the hemoglobin finger sticks on clients. Write down any questions or concerns about your observations and discuss them with your director.
2. Have the director or nutritionist observe you doing a finger stick on at least three clients or other staff members. Discuss your observations. What errors did you make?

Category:

Item	Score	Max Pts	Comments
HEMOGLOBIN			
• Hands gloved prior to test		1	
• Fingertip wiped with alcohol and allowed to dry		1	
• Tester chose either middle or ring finger (with no ring)		1	
• Tester punctured on the side of tip of finger		1	
• Blood sample was collected without roughly squeezing /milking finger		1	
• Tester wiped away the first 2 drops of blood		1	
• Tester allowed the drop of blood to become big enough to fill the cuvette		1	
• Cuvette was inserted into the drop of blood and was filled in one continuous process		1	
• Tester wiped off excess blood from cuvette		1	
• A check was made for an air bubble (Discarded if present)		1	
• Results were read within 10 minutes		1	
• Cuvette and lancet were discarded in a bio-hazard container		1	
• Hands were washed or sanitizing gel used after testing		1	
• Work area was disinfected		1	
Total	/	14	

Item	Score	Max Pts	Comments
HEMOGLOBIN			
• Hands gloved prior to test		1	
• Fingertip wiped with alcohol and allowed to dry		1	
• Tester chose either middle or ring finger (with no ring)		1	
• Tester punctured on the side of tip of finger		1	
• Blood sample was collected without roughly squeezing /milking finger		1	
• Tester wiped away the first 2 drops of blood		1	
• Tester allowed the drop of blood to become big enough to fill the cuvette		1	
• Cuvette was inserted into the drop of blood and was filled in one continuous process		1	
• Tester wiped off excess blood from cuvette		1	
• A check was made for an air bubble (Discarded if present)		1	
• Results were read within 10 minutes		1	
• Cuvette and lancet were discarded in a bio-hazard container		1	
• Hands were washed or sanitizing gel used after testing		1	
• Work area was disinfected		1	
Total	/	14	

Category:

Category:

Item	Score	Max Pts	Comments
HEMOGLOBIN			
• Hands gloved prior to test		1	
• Fingertip wiped with alcohol and allowed to dry		1	
• Tester chose either middle or ring finger (with no ring)		1	
• Tester punctured on the side of tip of finger		1	
• Blood sample was collected without roughly squeezing /milking finger		1	
• Tester wiped away the first 2 drops of blood		1	
• Tester allowed the drop of blood to become big enough to fill the cuvette		1	
• Cuvette was inserted into the drop of blood and was filled in one continuous process		1	
• Tester wiped off excess blood from cuvette		1	
• A check was made for an air bubble (Discarded if present)		1	
• Results were read within 10 minutes		1	
• Cuvette and lancet were discarded in a bio-hazard container		1	
• Hands were washed or sanitizing gel used after testing		1	
• Work area was disinfected		1	
Total	/	14	

5 – 5 Recording Hemoglobin Values

Objectives

After completing this section, you will be able to:

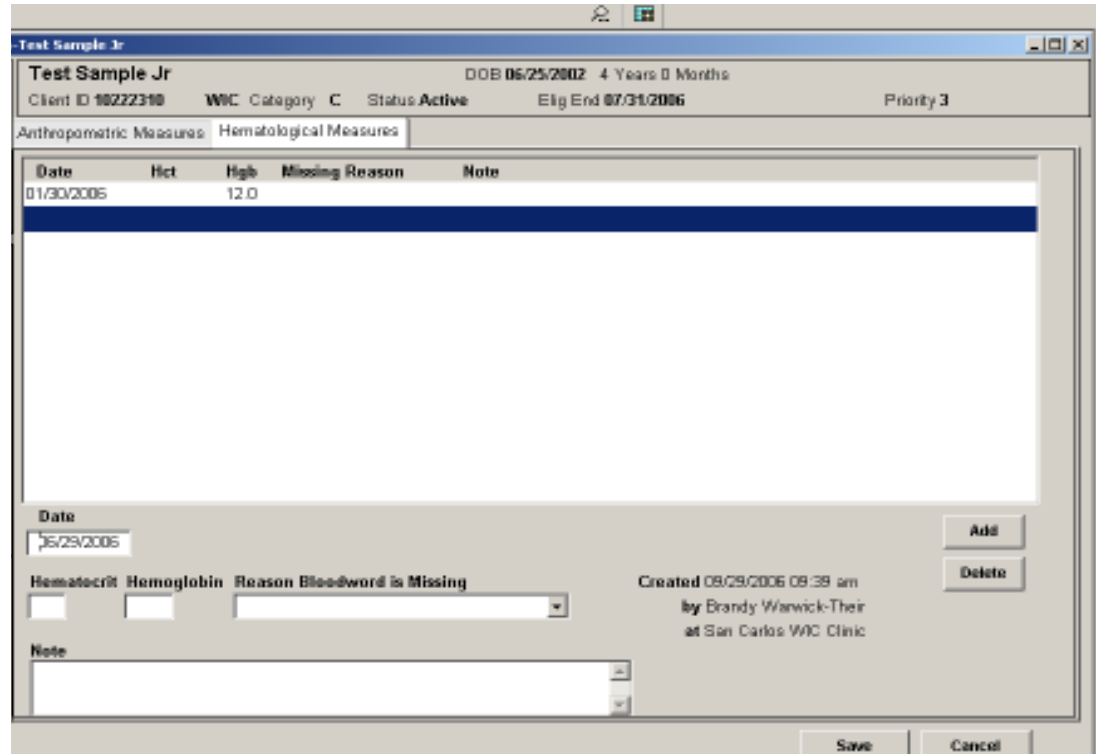
- ✓ Correctly record hemoglobin values.
- ✓ Correctly record reasons why a hemoglobin value was not taken.

Overview

As you learned in section 5-2, hemoglobin values taken at certain intervals are necessary. When the hemoglobin value is obtained, it must be recorded in the hematological screen in the STARS system. When a valid reason exists for not completing a hemoglobin value at this visit, this also must be documented in the Hematological screen in STARS. This section will teach you how to record both values and reasons for missing hemoglobin values in the STARS system.

Recording Measurements

In the Measurement screen, there is a tab called Hematological Measures. This is where the hemoglobin value is recorded. There is also a place to record a hematocrit, which is taken at a laboratory and not at the WIC office. All values obtained in the WIC office using the HemoCue® machine must be recorded as hemoglobins. A note may also be added.



Date	Hct	Hgb	Missing Reason	Note
01/30/2006		12.0		

Date: 05/29/2006

Hematocrit: Hemoglobin: Reason Bloodwork is Missing:

Note:

Created 09/29/2006 09:39 am by Brandy Warwick-Thier at San Carlos WIC Clinic

Buttons: Add, Delete, Save, Cancel

There will be some instances when the STARS system requires hemoglobin, but it is not taken for a valid reason. When a hemoglobin test cannot be completed for one of the following reasons, this must also be recorded on the Hematological tab:

- ✓ Medical Condition (as per state plan)
- ✓ No hgb certified staff available
- ✓ Religious Beliefs
- ✓ Uncooperative infant/child

All of the above reasons should have a note entered into the note section on the Hematological tab. When no certified staff is available, the infant or child is uncooperative; the test must be completed in one month, at the next visit.

Errors in Recording

Sometimes errors can occur in the recording procedures. If you notice that a risk has been auto calculated, but appeared normal, verify what was entered into the system.

Possible Errors in Recording Measurements:

- ✓ Writing down an incorrect measurement at the time of the measurement.
- ✓ Entering the measurements incorrectly into the STARS system.
- ✓ Entering the hemoglobin as a hematocrit.



Self-Evaluation

1. List three valid reasons why a hemoglobin value may not be taken when the STARS system requires one.

- 1.

- 2.

- 3.

2. A postpartum woman is certified at 3 weeks postpartum and a hemoglobin test for her is not needed. When should she return to the clinic to have her hemoglobin tested?

3. A hemoglobin value is recorded in what tab?



Skill Check

1. Have the director or nutritionist observe you recording the hemoglobin of at least one woman, infant and child.

Category:

Item	Score	Max Pts	Comments
HEMOGLOBIN			
• Measurement recorded in the computer correctly		1	
Total	/	1	

Category:

Item	Score	Max Pts	Comments
HEMOGLOBIN			
• Measurement recorded in the computer correctly		1	
Total	/	1	

Category:

Item	Score	Max Pts	Comments
HEMOGLOBIN			
• Measurement recorded in the computer correctly		1	
Total	/	1	

5 – 6 Safety Guidelines

Objectives

After completing this section, you will be able to:

- ✓ Describe necessary protective clothing.
- ✓ Explain how to correctly dispose of any materials used in hemoglobin testing.
- ✓ State when and how work areas should be cleaned.

Overview

Working with blood products can be dangerous. Deadly infections, such as Hepatitis and HIV can be transmitted in blood. However, there are steps we can take to protect ourselves when working with blood. Wearing protective clothing, disposing of hazardous materials properly, avoiding unsafe activities, and cleaning up properly are some of the things that we can do to protect ourselves and others.

Protective Clothing

Latex gloves should be worn at all times when you might come in contact with blood or surfaces soiled with blood. Gloves must be changed after each client, even if they are members of the same family. Gloves must be removed and your hands washed and/or sanitized immediately after completing hemoglobin and cleanup.

Unsafe Activities

Eating, drinking, smoking, handling contact lenses, and applying make-up or lip balm are not allowed in laboratory areas. Food and drink should not be kept in the laboratory area.

Disposing of Hazardous Materials

There are two types of materials that must be disposed of:

- ◆ Sharps –
Waste, including lancets that can penetrate the skin or poke through a bag must be placed in a puncture resistant, leak-proof container such as a Sharps container that is labeled. Special arrangements should be made for disposal of these items. Most agencies use the local Indian Health Services or medical clinic facility for disposal.
- ◆ Non-sharp items –
Non-sharp items that are saturated with blood must be placed in a biohazard-marked bag or container. All other items that come in contact with blood may also be placed in a biohazard-marked bag or container, check your local agency policy and procedures. Special arrangements will also need to be made for the disposal of any biohazard-marked bags or containers.

Note: It is important to keep all waste materials out of the reach of children in the clinics.

Cleanup

Laboratory work surfaces should be cleaned with a disinfectant, bleach or disinfectant wipe after each client.



Self-Evaluation

1. List the two different types of waste. Find the biohazard containers at your agency. List where you dispose the two types of waste at your agency.

2. List three safety measures you can take to prevent contamination by blood products.

Answer Key to Self-Evaluations

5-2 Self-Evaluations

1. Slow growth, poor mental abilities, fatigue, poor coordination, low birth weight, prematurity, infant mortality
2. Diet does not contain enough iron
Iron in the diet is not well absorbed
There is an increased need due to pregnancy or growth
3. High iron foods
High vitamin C foods
Encourage iron supplements as prescribed by M.D.
4. Certification of a pregnant woman
Certification of a child less than 2 years of age
Certification of a postpartum woman 4-8 weeks
A breastfeeding woman at 6 months postpartum with a previous low hemoglobin

5-3 Self-Evaluations

Discuss with your director

5-4 Self-Evaluation

1. HemoCue analyzer, HemoCue cuvette, lancet, alcohol wipes, gloves, gauze, bandage, hand sanitizer or sink with liquid soap, Measurement Post-It Note, Pen, Biohazard container
2. Finger stick not deep enough-lower
Milking-lower
Not wiping away first two drops-lower
Mixing blood with alcohol-lower
Obstructing flow-N/A
Refilling cuvette-higher
Air Bubbles-lower
Damaged cuvettes-N/A
Waiting too long to read sample-N/A

5-5 Self-Evaluation

1. Medical Condition (as per state plan)
No hgb certified staff available
Religious beliefs
Uncooperative infant/child
2. 1 month
3. Hematological Measures

5-6 Self-Evaluation

1. Sharps, non-sharp. Discuss with your director
Wear gloves, do not practice unsafe activities in the laboratory, dispose of hazardous materials properly, wash hands/use sanitizer, clean up work area with disinfectant, bleach or disinfectant wipes

Name: _____
Date: _____
Score: ____/100 points
Percent correct: _____

Unit 5: Hemoglobin Testing

Unit Assessment

DIRECTIONS: Circle the correct answer.

(4 points each)

1. The name of the machine we use to check the hemoglobin is:
 - a. HemoCue®
 - b. Hemolance®
 - c. Hematology®

2. When someone has a low hemoglobin value we say they have
 - a. Cancer
 - b. Diabetes
 - c. Anemia
 - d. Short Stature

3. Hemoglobin
 - a. Helps your body absorb iron.
 - b. Carries oxygen from the lungs to the rest of your body.
 - c. Means that someone has anemia.
 - d. All of the above

4. Anemia means that
 - a. The blood has low levels of hemoglobin in it.
 - b. The blood does not have enough oxygen in it.
 - c. The person does not eat meat.
 - d. The person isn't eating the WIC foods.

5. Anemia may indicate which of the following?
 - a. The presence of a serious disease
 - b. Low intake of meat
 - c. Poor overall diet
 - d. All of the above

6. Iron Deficiency Anemia is caused by
 - a. Not eating a balanced diet.
 - b. Not eating meat.
 - c. Iron intake that does not meet iron needs.
 - d. Illness

7. Which of the following are effects of iron deficiency anemia?
 - a. Poor mental abilities
 - b. Fatigue
 - c. Low birth weight in infants
 - d. All of the above
8. Which of the following helps to improve iron absorption from non-meat sources?
 - a. Vitamin A
 - b. Calcium
 - c. Vitamin C
 - d. None of the above
9. Which of the following would be appropriate education for a client with anemia?
 - a. Encouraging high iron foods and high vitamin C foods with non-meat sources
 - b. Encouraging cheese and milk
 - c. Recommending that the client purchase an iron supplement and take it daily
 - d. All of the above
10. All of the following clients must have their hemoglobin tested except
 - a. Infants over 9 months old
 - b. Infants under 9 months old
 - c. Pregnant women
 - d. Postpartum women
11. Microcuvettes are good until
 - a. The expiration date printed on the bottle
 - b. 90 days after the bottle is opened
 - c. Either the date printed on the bottle or 90 days after the bottle is opened, whichever comes first
 - d. None of the above
12. Which of the following statements about microcuvettes is true?
 - a. The date the container is opened should be written on the bottle.
 - b. The container must be tightly sealed after each use.
 - c. The containers must be stored in a cool, dry place.
 - d. All of the above.
13. How should the hemoglobin tab be completed for a 2 week postpartum woman?
 - a. Take hemoglobin and enter the correct value.
 - b. Take hemoglobin, but wait to enter the value at the next visit.
 - c. Use the pregnancy value.
 - d. None of the above.
14. What should you do if you get an error message even after you have followed the trouble shooting directions in the HemoCue® manual?
 - a. Call ITCA
 - b. Call HemoCue®
 - c. Send it in to ITCA for repairs
 - d. All of the above

15. When should hands be cleaned with soap and water and/or sanitizer?
 - a. After placing bandage on the client
 - b. After throwing the cuvette in the biohazard container
 - c. After sanitizing the work environment
 - d. Before eating lunch or snacks
16. You should wipe away how many drops of blood before you obtain the sample?
 - a. One
 - b. Two
 - c. Four
 - d. Any number
17. Which of the following errors in performing the hemoglobin testing may cause the value to be too low?
 - a. A fingerstick that is not deep enough
 - b. Milking the finger
 - c. Mixing the blood with alcohol
 - d. All of the above
18. Which of the following materials are considered biohazardous waste and should be disposed of according to regulations?
 - a. Sharps
 - b. Items that are saturated with blood
 - c. Gloves, gauze, etc. that are not saturated with blood
 - d. a and b
 - e. All of the above
19. One important way to protect yourself from exposure to blood products in WIC is to
 - a. Wear gloves
 - b. Wear a lab coat
 - c. Wear protective goggles
 - d. All of the above
20. Which of the following could result in errors in hemoglobin values
 - a. Refilling a cuvette
 - b. Using expired cuvettes
 - c. Waiting more than 10 minutes to take the reading
 - d. All of the above

2. DIRECTIONS: Write in the correct answer. 'F' for False or 'T' for True.

(2 points each)

- _____ 21. A low hemoglobin always means that a client has iron deficiency anemia.
- _____ 22. Iron is an important part of hemoglobin.
- _____ 23. If a client has an infection, it may cause his/her hemoglobin to be low.
- _____ 24. Iron needs are increased during pregnancy.
- _____ 25. The most common cause of iron deficiency anemia in infants is feeding cow's milk before one year of age.
- _____ 26. The iron in meat is better absorbed than the iron in other foods such as WIC cereals and beans.
- _____ 27. Women who smoke have lower hemoglobin levels than women who do not smoke.
- _____ 28. You should not test fingers that have rings on them.
- _____ 29. It is O.K. to use the same gloves for clients who are in the same family.
- _____ 30. If you do not completely fill the cuvette the first time, you should put the cuvette back into the drop of blood to fill it completely.

