From the Center for Phlebotomy Education's Educational Toolbox

Blood Collector's ATM

Abbreviated Teaching Modules for staff development, competencies and classroom

Tourniquet Time #3203

Did you know there is a limit to the amount of time a tourniquet can be left in place before obtaining the blood sample? Many phlebotomists, even those who have been working in the field for a long time don't know. Obviously, if your patient looks like the guy to the right, the tourniquet has been left on too long. But beyond the obvious, what is the rule regarding the amount of time a tourniquet can be left in place prior to collecting a blood sample? The Clinical and Laboratory Standards Institute's (CLSI) publication GP41 states that tourniquet application should not exceed one minute. If it does, reported results could be erroneously high for all protein-based analytes and cellular elements.

Can a phlebotomist apply a tourniquet, find a vein, and obtain the sample within one minute? Sometimes yes and sometimes no. For outpatients, collecting the sample within one minute may not be a big deal. With hospitalized patients however, the one-minute rule is more of a challenge. For those times when you can't obtain the sample within one minute of tourniquet application, it is important to understand the proper protocol.

If the tourniquet has been in place for one minute, or it would appear the sample will not be obtained within one minute, release the tourniquet. Allow two minutes to pass before applying the tourniquet again. This gives the circulation in the extremity a chance to return to its basal state.

Phlebotomists are in a hurry; they have to be. It is the nature of their work. Even experienced phlebotomists are tempted to ignore the one-minute rule because much is expected of them when it comes to productivity. Can the one-minute rule be ignored because all collections need to be completed in a timely manner? NO. What happens when the one-minute rule is ignored? The term for the consequence is *hemoconcentration*, or "concentrated blood." When hemoconcentration occurs:

- Blood cells, potassium, triglycerides, cholesterol, coagulation factors and other large molecules accumulate in even larger concentrations below the tourniquet
- Smaller elements and fluids begin to migrate through the capillaries and into the surrounding tissues

Consider a tourniquet as being like a dam built by a beaver across a stream. Some water, little fish, twigs, and other small particles will get through. The rest builds up behind the dam. That approximates hemoconcentration. The blood becomes "concentrated" with cells and larger molecules below the tourniquet, rendering an inaccurate picture of the patient's actual physiology if that blood is tested.

Okay, so that's what happens when the tourniquet is left on too long. What does that mean to the patient? If the tourniquet is left on Mr. Smith for several minutes before a specimen to be tested for a CBC is obtained, how might the results be impacted? You guessed it; the RBC count could be elevated. Because red blood cells are a large cell in the blood, their numbers will be increased below the tourniquet. Would that really reflect Mr. Smith's physiological status? No. What if Mr. Smith's RBC count is actually low, but because the tourniquet had been left on too long the reported results made it look like his RBC count is normal? How might the medical management of Mr. Smith be altered?

The same thing happens with potassium, triglycerides, cholesterol, and many other analytes. If during Mr. Smith's specimen collection, you also collected a sample to be tested for potassium, the results reported would be higher than his actual potassium. With inaccurate results reported for at least his CBC and potassium, would it be safe to say that Mr. Smith may not receive proper medical management? The laboratory has no way of knowing if a tourniquet has been on the patient too long. But *you* know. How would you want a blood sample to be collected for yourself or a family member? Following proper protocol, of course. That is the way it should be for each and every patient. **One minute. That's the rule!**

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In the article about tourniquet time, you learned there is a limit to the amount of time a tourniquet should be applied before collecting a blood sample. You learned that a tourniquet is much like a dam built across a stream by a beaver, with some components of the blood easily passing through and others not. Now you know what occurs when a tourniquet is left on too long and the impact it can have on your patient. You also learned how to prevent inaccurate test results from being reported on your patients due to lengthy tourniquet time.

Test Your Knowledge:

1. What is the term for what occurs when the tourniquet is left on too long?
   a) vasoconstriction
   b) hemolysis
   c) hemoconcentration

2. What is the result of leaving the tourniquet on too long?
   a) red blood cells, potassium, cholesterol and some other analytes temporarily decrease
   b) red blood cells, potassium, cholesterol and some other analytes temporarily increase
   c) red blood cells, potassium, cholesterol and analytes are the same above and below the tourniquet

3. What is the maximum time a tourniquet should be left in place prior to obtaining a blood sample?
   a) one minute
   b) two minutes
   c) the amount of time it takes to obtain the sample

4. Name one analyte that will be falsely elevated during hemoconcentration.
   a) potassium
   b) H2O
   c) hemolysis

5. If the sample cannot be obtained within the proper time frame and the tourniquet is released, how much time must elapse before reapplying the tourniquet?
   a) five minutes
   b) one minute
   c) two minutes

6. Who has the responsibility for following tourniquet time protocol?
   a) the technicians testing the specimen
   b) the ordering physician
   c) the phlebotomist obtaining the blood sample

Name: _____ Date: _____

Facility/Supervisor_____ Dept: _____