Quality Qorner

Asked and Answered

I had promised that if readers sent questions about any of my columns, I would respond, and that if the question and answer were applicable to the larger laboratory community, I would share this information through this *Quality Qorner* column.

A reader asked about nurses drawing blood samples from patients' peripherally inserted central catheter (PICC) lines (December 2005). She wanted to know if it was allowed to use blood drawn from PICC lines for coagulation studies. Her pathologist insists, "no blood drawn from lines will be accepted for coagulation testing."

Because I am not qualified to answer that question myself (being a former blood banker—not a "clotter," as one of my teachers called coagulation specialists), I asked Dr. Daniel Baer for some advice. He's the pathologist who edits the column "Tips from the clinical experts," published in the journal *Medical Laboratory Observer* and was the former continuning education editor of ***LAB****MEDICINE*. Dr. Baer said this is one of the most frequently asked questions, because more and more patients have such indwelling lines that make both the administration of medications and fluids and the collection of blood samples much easier for both the patients and the nurses. He generously provided information to share with you.

The question of adequacy of blood samples from line draws for coagulation studies needs consideration from 2 perspectives; the care of the patient and the quality of the test results. In regard to patient care, only staff familiar with sterile technique should obtain a sample from an indwelling catheter, since the chances for dislodgement, infection, or clotting greatly increase when inexperienced personnel manipulate the line. That is why most hospitals have a policy that only experienced nurses can obtain samples from indwelling lines. Phlebotomists may act as assistants, handling and labeling the samples after collection, but it is inadvisable to allow phlebotomists to perform their own line draws for blood samples.

In regard to the quality of the test results, the issue is whether any residual line contents in the collected sample can alter the test results. Therefore, to eliminate the effect on test results, adequate flushing of the line with a solution and discard of the first amount of collected blood is necessary. The volume of blood necessary to flush an intravenous catheter or arterial line before obtaining a blood sample for analysis depends on 2 factors: 1) the volume of solution retained in the line, and 2) the degree of contamination between the material in the line and the analyte(s) to be measured.

The first fluid withdrawn from the catheter contains the flushing solution. To draw an uncontaminated specimen, it is also necessary to remove and discard an amount of blood equal to at least 5 times the volume contained in the tubing. This is especially necessary for clotting studies sensitive to heparin, such as the activated partial thomboplastin time (APTT) test. Another precaution to take includes filling the sample tubes following the correct sequence, as recommended in the current edition of CLSI (formerly NCCLS) guideline H3, *Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture*.[1]

From most catheters, discarding the first 2 mL of collected blood is recommended for non-coagulation testing and at least 5 mL is recommended for coagulation testing. However, nursing and laboratory policy should also be based on the manufacturer's recommendations for the appropriate discard volume.

My nurse friend, Wanda, who originally suggested the idea of having the nurses collect early morning samples from their patients with PICC lines gave this response:

"Our protocol is to first flush the line with 10 mL of normal saline, then draw and discard the initial 5 mL blood, then draw the blood for the testing samples, and finally flush again with 10 mL saline. We do not use heparin as a flush on peripheral IV or PICC lines. However, when 'power' PICC lines are needed, then heparin is used as a flush with the same draw protocol. 'Power' PICC lines are used when a patient needs to have contrast injected and on my unit these are not used very frequently."

Standards of practice for intravenous nursing procedures include the caution that is it the nurse's responsibility not only to care for the patient, but also to possess the knowledge necessary for sample acquisition, safe handling, and transport of samples to the laboratory; laboratory protocols for sample collection and labeling; and appropriate use of access devices. Therefore, from a quality management perspective, both laboratory and nursing should collaborate on developing the instructions for collecting blood samples from indwelling lines so that the needs of patients, nurses, and the laboratory can all be met.

Another issue that affects the quality of the test results is the quality of the vacuum tubes. Expiration dates are very important, especially in locations where there are only a few tubes and low use. Over time, tubes lose some of their vacuum; therefore, tubes containing additives will not fill to the proper volume—leading to inaccurate coagulation test results.

My thanks to the reader who sent me the question, to Wanda who started all this, and to Dr. Baer for sharing his expertise with fellow laboratory professionals. Are there any *nontechnical* quality issues out there bugging you? Please contact me!

1. CLSI (formerly NCCLS). Procedures for the collection of diagnostic blood specimens by venipuncture; Approved guideline H3-A5. Wayne, PA: Clinical and Laboratory Standards Institute, 2004.

This Month's Quality Quote:

"Control the process—count on the results."
—Anonymous

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