



Reducing Blood Loss Due to Phlebotomy

There has been a great deal of buzz recently about reducing blood collection volumes and unnecessary venipunctures. Recent disruptive innovation in the diagnostics industry would suggest that a small amount of blood acquired by fingerstick is sufficient to run several common laboratory tests. But is all the recent discussion really new technology or have labs had the ability to reduce sample collection volumes all along?

There have been several studies over the past 10 years focused on the impact of laboratory testing on patient blood loss. Iatrogenic anemia, commonly known as hospital-acquired anemia (HAA), is an anemia resulting from treatment for an unrelated condition. Though there are several factors that may contribute to HAA, such as length of hospital stay, bone marrow depression, hemolytic conditions, etc., it has been shown that the blood drawn for laboratory testing is definitely a contributing factor.

The risk factors for HAA associated with phlebotomy are related to the frequency of testing, test utilization issues, the volume of blood collected and discard volumes. All of these factors can be minimized relatively easily with a little focused effort by the laboratory and healthcare providers.

Testing Patterns

Improved technology and research result in new diagnostic tests being added to test menus on a routine basis. In addition to multiple new tests, there also may be several iterations of a test for a single analyte making ordering a challenge for providers. This is where laboratory professionals can play a vital role in creating diagnostic teams or development of testing formularies to provide guidance to physicians on ordering the right test for the patient circumstance.

Factors such as rigid testing schedules that do not consider necessity should also be addressed. Because many critically ill patients have IV lines that facilitate ease of collection, the frequency of testing may not seem like an issue. However, each time the patient is drawn, 5-10mL of blood is discarded to clear the line. To minimize this, tests should be batched whenever possible and consideration given to benefit of the test results to patient treatment. This will become an increasingly important issue with the changes in healthcare reimbursement and managed care.

Laboratory Testing

In the majority of cases, patient diagnosis is based on laboratory testing. For patients susceptible to HAA, most of the tests ordered are chemistry profiles, CBCs, coagulation tests and blood gases to monitor patients on ventilation.

From a laboratory perspective, the means to reduce blood volumes required for testing has been in place for some time. Instrumentation is capable of aspirating microliter volumes of blood so that most routine panels and tests can be completed with less than 0.5mL of sample (see Table 1). However, most laboratory departments are still collecting 3-5mL of blood per tube and in some cases, more. This has been, in part, to ensure that there is sufficient volume for any reflex, repeat or add-on testing but has now become a habit that may no longer be necessary in most circumstances. Significant sample volumes are discarded from laboratory storage on a daily basis, which also adds to expense of disposal.

Table 1: Estimated Testing Volumes by Laboratory Department

Instrumentation	Aspiration Volume	Dead Volume	Total Volume for Routine Testing	Volume Collected	Serum/Plasma Available
Chemistry	2-10µL	50µL	200µL	4-5mL	2 - 2.5mL
Immunoassay	50µL	100µL	350µL	4-5mL	2 – 2.5mL
Hematology	200µL	1mL	1.2mL	3-4mL	NA
Coagulation	50µL	50µL	100µL	2-3mL	1 - 1.5mL

The use of low draw volume tubes could significantly impact the volumes collected and yet still provide enough sample to run the necessary tests. Greiner Bio-One has a complete line of 1mL and 2mL VACUETTE® Blood Collection Tubes to facilitate reduced collection volumes. Many of these can be used on instrumentation currently utilized for laboratory testing since they are standard 13x75mm evacuated tubes.

Other considerations in reducing collection volumes involve ensuring that a quality sample is drawn initially. In other words, by using good phlebotomy technique and sample handling practices, there is an opportunity to reduce redraws due to factors such as quantity not sufficient, hemolysis and fibrin. This will also ensure accuracy of test results and avoid recollection to verify falsely elevated or depressed values related to preanalytic error. Though this seems fairly obvious, it is easy to fall into bad habits that impact patient care in ways that may not be immediately apparent. Development of HAA is just one such consequence.

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