[Tips from the Clinical Experts](https://www.mlo-online.com/category/tips-clinical-experts)

**Recollecting blood specimens**

By: [Anthony Kurec](https://www.mlo-online.com/author/akurec)

January 23, 2017

[0](https://www.mlo-online.com/recollecting-blood-specimens#respond)

268

Editor’s note: Anthony Kurec, MS, H(ASCP)DLM, is Clinical Associate Professor, Emeritus, at SUNY Upstate Medical University in Syracuse, NY.  He is also a member of the *MLO* Editorial Advisory Board.

**Q**

I am trying to find out what the national benchmark is for recollected blood specimens. Can you help me with this request? Thank you.

**A**

The Total Testing Process (TTP) reflects the pre-analytic, analytic, and post-analytic phases of laboratory testing. Various percent error rates for each of these phases have been reported, a result most likely due to the different types of errors considered, the total number of phlebotomies performed, and the accuracy of self-reported errors.1,2 Thus, there is a relatively large range in error rates:1

Pre-analytic:    46%—68%
Analytic:             7%—13%
Post-analytic:  18%—47%

The pre-analytic phase is most prone to error and frequently results in having to redraw a patient’s blood sample. The types of errors that most often contribute to specimen rejection and the need for patient redraws include patient identification errors, wrong test(s) ordered, wrong collection tube, improper collection technique (clotted, contaminated, insufficient volume, hemolyzed specimens), and fasting status.3 In a CAP Q-Probe study, the overall specimen rejection rate was 0.2 percent. In another study, which included more than five million test requests, the rejection rate was 0.65 percent.4 Yet another study, which included almost 1.4 million specimens from three patient locations, had this rejection rate:5

Inpatient:  1.0%
Outpatient:  0.35%
Emergency Department: 1.97%

Pre-analytic errors and specimen rejection can result in delayed patient treatment, increased length of stay, and the need to recollect specimens. Repeated specimen rejection and the need to recollect blood samples create concerns about a laboratory’s quality services and may ultimately damage its credibility. More important, other outcomes include patient inconvenience, patient discomfort, delay in test results/treatment, and with some patients, iatrogenic blood loss.2

In addition, redraws can be expensive. Increased patient treatment hours, redrawing of the patient, reanalyzing the specimen(s), and quality assurance monitoring/investigation of the incident add cost. The average cost of pre-analytical errors from all patient types has been estimated to be about $349 per episode. For a critically ill patient, the cost can be as much as $2,700.6 Collectively, these extra expenses can add up to slightly more than one percent of a hospital’s total operating budget.7

In some instances, difficult-to-draw patients will be encountered. In such situations, it may be difficult to obtain the needed amount of blood for all the tests required; thus the need for multiple venipunctures. The number of venipunctures attempted at any one time varies from laboratory to laboratory. The Clinical Laboratory Standards Institute (CLSI) recommends no more than two venipunctures (H3-A6) per patient encounter. However, in one survey, responses indicated that in practice, two to as many as six venipunctures per encounter may be attempted.8,9 Each laboratory should develop a policy as to the number of venipunctures allowed per patient encounter.

In one study where more than 800,000 phlebotomies were performed, a 99.6% success rate was observed. In this same study, phlebotomy events performed by laboratory personnel tended to be more successful than those performed by non-laboratory personnel. Further, the average recollection rate was 0.26 percent.9

To resolve and eventually minimize and/or eliminate pre-analytic errors, the staff must be committed to wanting to make changes. Here are some suggestions to achieve this:

* Clearly define specimen rejection criteria that will identify those circumstances when a new specimen is required.
* Create quality indicators for all major phlebotomy activities such as misidentification errors, specimen collection errors, storage and transportation errors, and patient complaint issues. This requires an honest reporting process.
* This establishes a baseline error rate to see how many and what type of errors currently exist.
* Perform a root cause analysis for each of the sources of error.
* Where possible, implement barcoded patient bracelets and a specimen barcode system to ensure proper identification every time of each patient and specimen.
* Use the delta check option on specimen results.
* Consider an electronic event reporting system that identifies and transmits occurrences to a data bank.
* And finally, identify an individual who can assume responsibility for quality management oversight, specifically looking for pre-analytic errors.10

To ensure that quality laboratory phlebotomy services are actively implemented, it is critical to have a well-developed policy-and-procedure manual that guides every phlebotomist in performing safe and accurate blood draws. This will protect patients and the phlebotomist. Key areas to consider in developing the procedure manual include the following:1,11,12

* Two patient identifiers, such as patients spelling their full name, date of birth, address, etc. If a patient is unable to respond, ask the caregiver. Do not draw the patient if there is a discrepancy.
* Verify fasting status.
* Tourniquet time should be one minute, with up to a two-to-five-minute reprise if it has to be reapplied.11,13
* Ensure alcohol has dried before attempting venipuncture.
* Collect specimens in proper order of draw:
1. Sterile collections
2. Light blue (Na citrate)
3. Plain red (no anticoagulant)
4. Serum separation tube (SST)
5. Green (heparin)
6. Lavender (EDTA)
7. Gray (Na fluoride or K-oxalate).
* Invert tubes gently (180° and back):

° Na citrate: three to five times
° SST: five times
° Heparin, EDTA, Na fluoride: eight to 10 times.

* Label tube with patient’s name, DOB, ID numbers, and date/time/phlebotomist’s initials (full signature for blood bank specimens).
* Ensure tubes are adequately filled, especially Na citrate tubes (+/- 10 percent of stated tube volume).
* Special handling of specimens as follows:

° Chilled or frozen: gastrin, ammonia, lactic acid, catacholomines, pyruvate, PTH
° Kept at 37° C: cold agglutinin, cryofibrinogen, cryoglobulins
° Protect from light: all vitamin levels, porphyrins, beta-carotene.

* Transportation and preparation for analysis:

° SST to clot (30 minutes; may take longer if patient is on anticoagulant); stable for two hours
° EDTA stable for four hours @ RT
° Gray top tubes—24 hours
° Avoid extreme temperatures unless indicated.

* Centrifuge:

° SST: 1,000-1,300 RCF in a swing bucket for 10 minutes
° EDTA, heparin, non-gel tubes: 1,300 RCF @ 10 minutes
° Na citrate: 1,500 RCF @ 15 minutes.

The overall intent is to strive toward zero deficiencies. While all pre-analytic variables cannot be absolutely controlled, certain areas, such as patient misidentification, should never occur. Establishing appropriate protocols, developing proper training practices, implementing quality indicator measurements, providing continuing education, and maintaining routine oversight are essential to ensuring improved patient care, patient satisfaction, and overall quality laboratory service.

**REFERENCES**

1. Hammerling JA. A review of medical errors in laboratory diagnostics and where we are today. *Lab Med*. 2012;43(2):41-44.
2. Karcher DS, Lehman CM. Clinical consequences of specimen rejection: A College of American Pathologists Q-Probes analysis of 78 clinical laboratories. *Arch Pathol Lab Med*. 2014; 138:1003-1008.
3. Kurec AS. Proper patient preparation, specimen collection, and sample handling are critical to quality patient care. *MLO*. 2017;49(1):22-24.
4. Atay A, Demir L, Cuhadar S, et al. Clinical biochemistry laboratory rejection rates due to various types of preanalytical errors. *Biochemia Medica*. 2014;24(3):376-382.
5. Stark A, Jones BA, Chapman D, et al. Clinical laboratory specimen rejection—association with site of patient care and patients’ characteristics. *Arch Pathol Lab Med*. 2007;131(4):588-592.
6. Green SF. Tracking the cost of poor quality and errors in preanalytical processes: proven steps labs can use to boost patient outcomes. BD Diagnostics. Executive War College, 2012. <http://www.executivewarcollege.com/wp-content/uploads/2012/03/Green.pdf>
7. Phlebotomy Today STAT! Establishing a preanalytical officer (PAO). June 2015. [www.phlebotomy.com/pt-stat/stat0615.html](http://www.phlebotomy.com/pt-stat/stat0615.html)
8. Center for Phlebotomy Education. Survey says. Limits on venipuncture attempts. Phlebotomy Today STAT! Feb 2012. [www.phlebotomy.com/pt-stat/stat0212.html#survey](http://www.phlebotomy.com/pt-stat/stat0212.html#survey)
9. Dale JC, Novis DA. Outpatient phlebotomy success and reasons for specimen rejection. A Q-Probes study. *Arch Pathol Lab Med*. 2002;126(4):416-419.
10. When is a rose not a rose? The problem of mislabeled specimens. CAP Today. February 2010. <http://www.cap.org/apps/portlets/contentViewer/show.do?printFriendly=true&contentReference=practice_management%2Fdirectips%2Fmislabeled_specimens.html>.
11. Maxwell H. Updated phlebotomy procedures.
December 2010. http://96.36.117.186/NewsLetter.pdf.
12. Becton Dickinson. Product FAQs. Venous blood collection. <http://www.bd.com/vacutainer/faqs/>.
13. Lusky K. Rooting out “invisible’” blood collection errors. CAP Today. December 2003. [http://www.cap.org/apps/portlets/contentViewer/show.do?printFriendly=true&contentReference=http://ecm2.cap.org%3A16200%2Fapps%2Fdocs%2Fcap\_today%2Ffeature\_stories%2F1203RootingOutBloodErrors.htm](http://www.cap.org/apps/portlets/contentViewer/show.do?printFriendly=true&contentReference=http://ecm2.cap.org%3A16200%2Fapps%2Fdocs%2Fcap_today%2Ffeature_stories%2F1203RootingOutBloodErrors.html)