ATTENTION TO PRE-ANALYTICAL QUALITY WHEN COLLECTING A BLOOD SAMPLE: THINGS TO KEEP IN MIND

The quality of a lab test result is only as good as the specimen used to generate it. Pre-analytical issues have been established as the primary cause of the majority of analytical and clinically significant "errors". Being aware of and controlling each part of the specimen collection and processing procedure will help to ensure the highest quality of the sample.

In terms of quality improvement this is literally 'going for the low hanging fruit.'

For specific instructions on proper patient preparation and collection of specimens by analyte, please refer to the LifeLabs website (www.lifelabs.com) under "Laboratory Services".

Step of Procedure	Source of Information for Proper Procedure	Potential Issues	Tests Impacted
Patient Preparation	LifeLabs website, under "Laboratory Services"	Not fasting	• Glucose and lipids increased in non-fasting state. • Presence of lipemia in sample renders the sample unacceptable for analysis for some tests (e.g. ALT, Uric acid, Albumin).
Patient Preparation	LifeLabs website, under "Laboratory Services"	Posture	• Plasma volume is affected by patient posture during collection. Significant decrease in proteins and protein-bound substances in recumbent posture compared to erect posture. • Secretion of hormones such as catecholamines, aldosterone, renin and antidiuretic hormone affected directly by posture.
Time of Collection	LifeLabs website, under "Laboratory Services"	Diurnal variation	• Many hormones, including corticotropin, cortisol, TSH, renin, aldosterone and growth hormone, exhibit diurnal variation.
Type of tube used to collect	LifeLabs website, under "Laboratory Services" and Client Specimen requirement Chart (QRA; 14 December 2007)	Sample collected in wrong type of vacutainer tube	• Calcium significantly decreased by EDTA. • PTH significantly increased in EDTA tubes.
Order of draw	Client Guide: Order of Draw and Fill Line Level Chart (QRA; January 2008)	Carry over contamination of anticoagulant between vacutainer types	• Potassium artificially increased and calcium artificially decreased in a sample collected in an SST tube following Potassium EDTA (lavender) tube.
Phlebotomy	CLSI document H3-A6 Vol. 27, No. 26	Prolonged use of tourniquet	• Artifactual hemo-concentration, leads to increased proteins and protein-bound substances.
Phlebotomy	CLSI document H3-A6 Vol. 27, No. 26	Fist clenching	• Potassium significantly increased.
Phlebotomy	Client Guide: Order of Draw and Fill Line Level Chart (QRA; January 2008) and Inside Diagnostics (Summer 2008)	Underfilled tube	• Falsely prolonged coagulation results. • Falsely low WBC, high MCV and hematocrit, and morphologic changes to white and red blood cells. • May not have enough blood to isolate bacteria for blood cultures.
Phlebotomy	Client Guide: Order of Draw and Fill Line Level Chart (QRA; January 2008) and Client Specimen Requirement Chart (QRA; 14 December 2007)	Inadequate inversion of tubes after collection	• Plastic vacutainers are coated with "glass particles" to activate clot formation. Gentle inversion (4-6 times as per specific analyte instructions is imperative). • Formation of clots in EDTA (lavender) tubes impacting CBC analysis or potassium (SST tube).
Clotting process	Client Specimen Requirement Chart (QRA; 14 December 2007)	Inadequate time allowed for clotting	• Formation of clots in serum after centrifugation interferes with analytical processing.
Centrifugation	Client Specimen Requirement Chart (QRA; 14 December 2007)	Delay in separation of serum/plasma from red blood cells	• Ammonia levels rise rapidly. • Progressive decrease in glucose result. • Potassium will significantly increase. • Analytes in high intracellular concentration (e.g., magnesium LDH, AST, ALT, and Ferritin) will increase.
Labelling of tube	Client Guide: Order of Draw and Fill Line Level Chart (QRA; January 2008) and Dear Client Letter (October 2007)	Inadequate information, leading to isidentification of sample	• All tests.
Storage of sample prior to analysis	LifeLabs website, under "Laboratory Services" and Client Specimen Requirement Chart (QRA; 14 December 2007)	Incorrect storage temperature and/or excessive storage time to maintain stability of analyte	• All tests will be affected if samples are not stored at the right temperature and for the defined stability period.

REFERENCES:

1. Clinical and Laboratory Standards Institute Document H3-A6, Volume 27, No. 26. Procedures for the Collection of Diagnostic Blood Specimens by Venipuncture; Approved Standard – Fifth Edition.
2. Clinical and Laboratory Standards Institute Document H4-A4, Volume 19, No. 16. Procedures and Devices for the Collection of Diagnostic Blood Specimens by Skin Puncture; Approved Standard – Fourth Edition.