

An Introduction to Preanalytical Errors in Laboratory Testing

The total laboratory testing process, which includes every step from test request to the receipt of results, can be divided into three phases: pre-analytical, analytical and post-analytical. The pre-analytical phase encompasses the steps from test request, specimen collection, transport, until specimen analysis.

Most errors affecting laboratory testing occur in the preanalytical phase, primarily because of the difficulty in achieving standardized procedures for specimen collection and the many steps involved in the process, each of which can create opportunities for errors. Some of the errors that may be encountered:

Test ordering

- Duplicate test request
- Inappropriate test request for patient's condition
- Missing information

Specimen collection

- Missing or incorrect patient identification/mislabeled specimens
- Incorrect order of draw
- Wrong tube or anticoagulant
- Wrong specimen type
- Inadequate mixing
- Insufficient specimen quantity
- Clotted specimens
- Hemolyzed/lipemic specimens

Specimen storage/transport

- Pneumatic tube transport
- Incorrect storage temperature/duration

Employing best practices and compliance with strategies for error prevention can lead to a substantial reduction in preanalytical errors. These practices include:

- Understanding the sources of preanalytical variability
- Increased error detection, reporting and tracking
- Process and risk analysis
- Improving collection practices by developing standard operating procedures
- Adhering to the instrument manufacturers' instructions for use
- Enhanced healthcare professional training; coordinated staff training with periodic competency assessments

Resources:

- Accurate results in the clinical laboratory: A guide to error detection and correction. 2nd ed. Dasgupta A, Sepulveda JL, eds. Cambridge, MA: Elsevier, 2019.
- Reduction of preanalytical errors in the clinical laboratory at the University of Korea through quality improvement activities. Lee NY. Clin Biochem 2019;70:24-29.
- Are we getting better at the preanalytical phase or just better at measuring it? Lippi G, Bovo C, Mattiuzzi C. J Lab Precis Med 2018.
- Pre-analytical errors: A major issue in medical laboratory. Almatrafi AA. Acta Sci Med Sci 2019;93-95.
- Preanalytical variables: Influence on laboratory results and patient care. Sareen R, Kapil M, Gupta GN. Int J Clinicopathol Correl 2017;1:31-34.
- CLSI. Risk Management Techniques to Identify and Control Laboratory Error Sources; Approved Guideline—Second Edition. CLSI document EP18-A2. Wayne, PA: Clinical and Laboratory Standards Institute; 2009.