

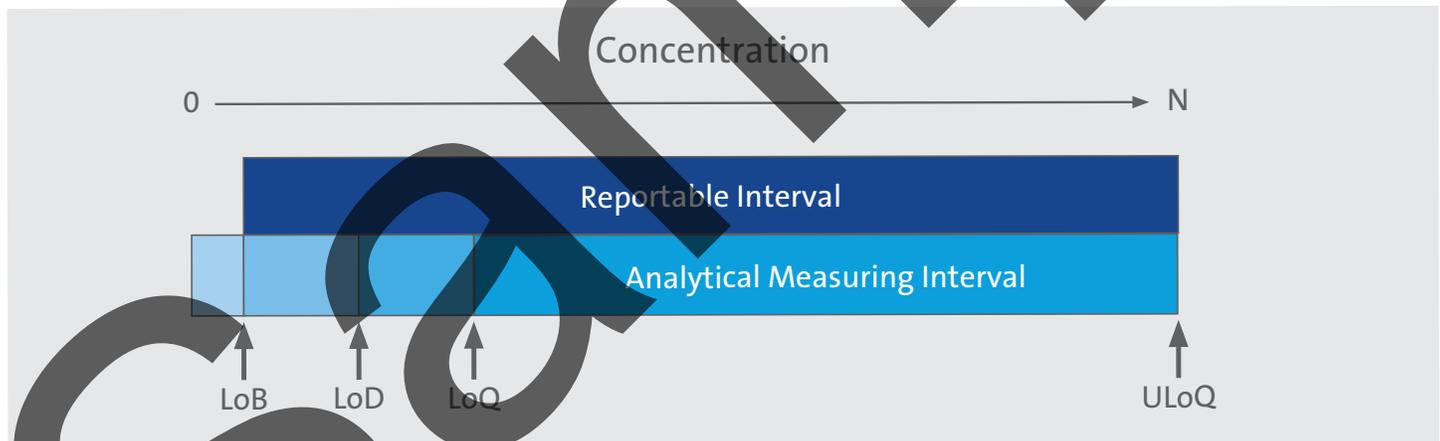
Introduction

This implementation guide describes the minimum procedures necessary for a medical laboratory to verify that a measurement procedure's detection capability is consistent with the claims established by the developer. Detection capability includes (as shown in the figure below):

- Upper boundary on blank sample measurements (ie, limit of blank [LoB])
- “Yes/no” detection of measurand presence (ie, limit of detection [LoD])
- Minimum amount of measurand that can be quantitated reliably with respect to a defined accuracy goal (ie, limit of quantitation [LoQ])

These values are especially critical to detecting extremely small amounts of a measurand. It is always the case that $LoB < LoD \leq LoQ$. Knowledge of the detection capability helps determine the lower limit of the measuring interval, which is the lowest measurand concentration at which all defined performance characteristics of the measurement procedure are met (eg, acceptable bias, imprecision, linearity).

Each measurement procedure also has an upper limit of quantitation, but determining this value is not within the scope of CLSI document EP17.¹



Abbreviations: LoB, limit of blank; LoD, limit of detection; LoQ, limit of quantitation; ULoQ, upper limit of quantitation.

NOTE: For additional information, see CLSI document EP17.¹

IMPORTANT NOTE: The study outlined in this implementation guide is not intended for use by a test developer to establish or validate detection capability for a new commercial or laboratory-developed test. Instead, test developers should use CLSI document EP17¹ for guidance on establishing or validating detection capability. Laboratories and commercial manufacturers are collectively referred to as “developers” in this implementation guide.

Preparing for the Study

For each limit (ie, LoB, LoD, LoQ), a small number of samples are tested in replicate over a few days using one reagent lot and one measuring system.

Selecting the Samples

The procedures described in this implementation guide rely on testing blank samples (ie, with no measurand content) or samples containing low concentrations of measurand. It is acceptable to pool, dilute, or spike samples to obtain blank or low-concentration samples at the desired concentrations, as long as these samples perform similarly to native patient samples when tested by the measurement procedure.

Materials Needed

To verify detection capability, the laboratory needs:

- Selected samples
 - **NOTE:** At least two samples need to be tested. The samples should have concentrations as noted below for each limit.
- Two levels of quality control (QC) materials

The Study

Designing the Study

The table below shows an example study design for verifying detection limits.

Samples	Replicates	Runs	Days	QC	Daily Results Review
2	5	1 per day	5	2 levels each day	Yes

Abbreviation: QC, quality control.

Verifying the Limit of Blank Claim

Measurements of at least 20 total blank replicates, across all samples and days, are needed. The laboratory determines the number of samples, the number of replicates, and the number of days. However, the testing plan must include at least two blank samples, at least two replicates, and at least three days.

Example 1: 2 blank samples • 2 replicates • 5 days = 20 total blank replicates

Example 2: 5 blank samples • 2 replicates • 3 days = 30 total blank replicates

Running the Limit of Blank Study

To verify the LoB, the laboratory should:

1. Prepare enough aliquots for each sample to complete the planned testing. A few extra aliquots should be available in case of testing or processing errors.
2. Test the replicates for each sample according to the plan.